# TEXT SUMMARIZATION OF LEGAL DOCUMENTATION WITH EXPLAINABILITY FEATURE



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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# TEXT SUMMARIZATION OF LEGAL DOCUMENTATION WITH EXPLAINABILITY FEATURE

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This report is submitted in partial fulfillment of the requirements for the Bachelor of Computer Science (Artificial Intelligence) with Honours.

**JNIVERSITI TEKNIKAL MALAYSIA MELAKA** 

# FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2024

## DECLARATION

I hereby declare that this project report entitled

## TEXT SUMMARIZATION OF LEGAL DOCUMENTATION WITH

## **EXPLAINABILITY FEATURE**

is written by me and is my own effort and that no part has been plagiarized

STUDENT :	without citations.	Date : <u>23/08/2024</u>

I hereby declare that I have read this project report and found

this project report is sufficient in term of the scope and quality for the award of

Bachelor of Computer Science (Artificial Intelligence) with Honours.

SUPERVISOR	:	lieza	Date :	23/08/2024_
		(TS. DR. HALIZAH BINTI BASIRON)		

#### **DEDICATION**

I dedicate this work to my esteemed supervisor, Ts. Dr. Halizah Binti Basiron, whose invaluable guidance and expertise have been instrumental throughout this endeavour.

I am sincerely grateful to my academic advisor, Assoc. Prof. Gs. Dr. Asmala Bin Ahmad, for his unwavering support and insightful advice during the completion of this project. To my friends and family, your continuous encouragement and understanding have provided me with resolute strength. This achievement is not just

mine, but ours to celebrate.



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#### ABSTRACT

Summarizing lengthy documents, especially in the legal domain, poses significant challenges for both humans and automated systems. Human efforts often entail considerable time and effort while automated systems sometimes falter in decision-making, leading to ambiguity in the generated summaries. This project explores the use of text summarization in legal documentation, coupled with an explainability feature. It addresses the challenges of condensing lengthy legal texts and improving transparency in automated summarization systems. The project involves gathering legal documents, developing a BART summarization model, and integrating explainability within the system, which is visualizing attention mechanism. The system which has been deployed on web-based application is the final product of this project. The system performance, that includes BERTScore, cosine similarity, and ROUGE score between human-generated and system-generated summaries, and evaluation by target users, lead to several engaging insights on legal summarization. The model demonstrated moderate performance where the user feedback indicated satisfaction with its functionality but highlighted the need for user interface improvements. Key strengths of the model include the system's explainability that is crucial for legal applications. Future improvements suggested including refining model training, enhancing the user interface, and adding features like adjustable summary lengths and language translation. The project contributes valuable insights to artificial intelligence and natural language processing with potential for further research and development.

#### ABSTRAK

Meringkaskan dokumen-dokumen panjang, terutamanya dalam bidang undang-undang, memberikan cabaran besar kepada manusia dan sistem automatik. Usaha manusia sering melibatkan masa dan usaha yang besar manakala sistem automatik kadang-kadang tergagap dalam membuat keputusan, menyebabkan kekaburan dalam ringkasan yang dihasilkan. Projek ini meneroka penggunaan ringkasan teks dalam dokumen undang-undang, disertakan dengan ciri kejelasan. Ia mengatasi cabaran dalam meringkaskan teks undang-undang yang panjang dan meningkatkan ketelusan dalam sistem ringkasan automatik. Projek ini melibatkan pengumpulan dokumen undang-undang, membangunkan model peringkasan BART, dan mengintegrasikan penjelasan dalam sistem, iaitu memvisualisasikan mekanisme perhatian. Sistem yang telah dikerahkan dalam aplikasi web adalah produk akhir projek ini. Prestasi sistem, yang termasuk BERTScore, kesamaan kosinus, dan skor ROUGE antara ringkasan yang dihasilkan oleh manusia dan sistem, serta penilaian oleh pengguna sasaran, memberikan beberapa pandangan menarik mengenai peringkasan undang-undang. Model ini menunjukkan prestasi sederhana di mana maklum balas pengguna menunjukkan kepuasan dengan fungsinya tetapi menekankan perlunya penambahbaikan antara muka pengguna. Kekuatan utama model ini aplikasi termasuk penjelasannya yang penting untuk undang-undang. Penambahbaikan masa depan yang dicadangkan termasuk memperhalusi latihan model, meningkatkan antara muka pengguna, dan menambah ciri seperti panjang ringkasan yang boleh disesuaikan dan penterjemahan bahasa. Projek ini memberikan pandangan berharga kepada kecerdasan buatan dan pemprosesan bahasa semula jadi dengan potensi untuk penyelidikan dan pembangunan lanjut.

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# LIST OF ABBREVIATIONS

FYP	-	Final Year Project
XAI	-	Explainable Artificial Intelligence
NLP	-	Natural Language Processing
AI	-	Artificial Intelligence
TF-IDF	-	<b>Term Frequency-Inverse Document Frequency</b>
ROUGE	-	<b>Recall-Oriented Understudy for Gisting</b>
		Evaluation
LCS	-	Longest Common Subsequence
FFNN		Feed Forward Neural Networks
LSTM	-	Long Short-Term Memory
SSEERSITITEK	KIK/	Similarity based on Sentence Embeddings
CNN	-	Convolutional Neural Networks
MMR	-	Maximal Marginal Relevance
BART	-	Bidirectional and Auto-Regressive
		Transformers
BERT	-	Bidirectional Encoder Representations from
		Transformers
seq2seq	-	sequence to sequence
RNN	-	Recurrent Neural Network
LCSTS	-	Large scale Chinese Short Text Summarization
LSA	-	Latent Semantic Analysis
GPT	-	Generative Pre-trained Transformer
LIME	-	Local Interpretable Model-agnostic
		Explanations

<b>CRISP-DM</b>	-	<b>Cross-Industry Standard Process for Data</b>
		Mining
NLTK	-	Natural Language Toolkit
CUDA	-	Compute Unified Device Architecture
GPU	-	Graphics Processing Unit
PDF	-	Portable Document Format
UI	-	User Interface
UX	-	User Experience



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#### **CHAPTER 1: INTRODUCTION**

#### 1.1 Introduction

Reviewing legal documents such as supreme court case documents often require specialized knowledge and reading through the entire document to capture the key information is time consuming. As the volume of legal documents increases, it becomes crucial to extract essential details without delving into the entire content. Hence, summarization provides a solution by providing flexibility and convenience to readers. In addition, explainable artificial intelligence (XAI) can ensure the system not only produces concise summaries, but also provides transparent justifications for the decisions made, which enhance trust and comprehension for legal professionals.

#### **1.2 Problem Statement**

Legal professionals often struggle with obstacles when driving through documentations which are time and effort. Reading and comprehending pages of documents can be a cumbersome process, which might lead to potential oversights or missed critical details. Moreover, clear explanations are necessary and crucial behind automated summarization, where transparency and accountability are paramount.

This project is aimed to develop a system which can summarize the legal documentation with suitable explanation. The system must ensure the generated summaries accurately capture the key points of original document and provide clear rationale for the inclusion of specific information.

This project embarks on the following objectives:

- 1. To develop a text summarization model for legal case documentation.
- 2. To design an XAI model for the summarization result explainability.
- 3. To create a user-friendly web-based application for the whole model.

#### 1.4 **Project Scope**

The scopes involved in this project are as below with brief explanation:

- 1. Target Users
  - i. Legal Professionals (included judges, magistrates, advocates, attorneys, and university lecturers)
  - ii. University Students (especially law students)
- 2. Project Modules

ii.

i. Text Summarization Model

Collect and preprocess a diverse legal document dataset, implement a legal-specific NLP summarization algorithm using deep learning, and iteratively refine it for optimal performance. XAI (Explainable Artificial Intelligence) Model

XAI is an umbrella term for a range of techniques, algorithms, and methods, which accompany outputs from Artificial Intelligence (AI) systems with explanations (Norkute, 2021). Research and implement suitable XAI techniques such as visualizing attention mechanism for legal text summarization, develop an interpretable framework for generating explanations, ensure user-friendly explanations for legal professionals, and validate and fine-tune the model based on user feedback.

iii. Web-based Application

Design a user-friendly interface, implement the backend system for document uploads, summarization, and explanation generation, integrate the text summarization and XAI models into the application, conduct usability testing, and provide documentation for user assistance.

#### **1.5 Project Significance**

Users such as legal professionals and university students, especially those who study law will get benefits from the project. For legal professionals, this project helps in case law analysis, legal research, preparation for court proceedings, and teaching and learning. It also acts as a powerful aid in university students' academic endeavors such as study aid, research assistance, exam preparation, time management, and legal principles understanding.

In short, text summarization model generates summaries of legal documents which helps in time saving while explainable artificial intelligence (XAI) provides suitable explanations that improve users' understanding of the documents. A userfriendly web-based application allows users to use the application in simple and effective way.

#### **1.6 Expected Output**

This project aims to deliver a robust text summarization model tailored for legal documents for enhancing efficiency in condensing extensive texts without sacrificing accuracy or transparency. It includes the integration of an XAI model for transparent explanation and development of a user-friendly application for whole system combination. Rigorous testing and feedback from readers are essential for validating the process and ensuring the effectiveness of the developed application.

#### **1.7** Report Organizations

#### Chapter 1: Introduction

This chapter introduces the project background briefly, followed by the problem statement highlighting issues motivating the project. The project objectives are outlined, alongside the project scope including the research domain and experimental setup. This chapter also discusses the project's contribution and expected benefits. Lastly, it outlined the report organization which summarizes each chapter's content.

Chapter 2: Literature Review and Project Methodology

This chapter provides a preview of the literature review and project methodology. It identifies the project's domain and summarizes existing systems and

techniques reviewed, with explanations and references. The selected approach and methodology, along with project requirements, are described briefly. Additionally, the project schedule and milestones are outlined. Finally, the chapter is summarized, highlighting the next activities to be developed.

Chapter 3: Requirement Analysis

This chapter introduces the requirement analysis phase, outlining problem analysis, data, functional, and non-functional requirements. It describes input interfaces, database contents, system functions, and performance criteria. The chapter concludes with a summary and explanation of the next steps.

Chapter 4: Design

This chapter outlines the design phase, covering high-level design, user interface (UI), database, AI component, and software or hardware design. It includes refining system architecture, navigation, input and output design, database schema, AI techniques, and software/hardware specifications. The chapter concludes with a summary and explanation of the next steps.

Chapter 5: Results and Discussion

This chapter presents the results and discussions, beginning with an overview of the testing phase and strategy. It evaluates the AI techniques used, focusing on performance metrics specific to each technique. Functional requirements testing is explained, including test case identification and documentation. The chapter concludes with a summary and outlines the next steps in the project.

#### Chapter 6: Conclusion

This chapter discusses the project's strengths and weaknesses, offering suggestions for improvement. It highlights the project's contribution and provides guidance on accessing the user manual. The chapter concludes by summarizing if the project successfully meets its set objectives, ending with final remarks.

## 1.8 Summary

This project aims to develop a text summarization system which utilizes explainable artificial intelligence (XAI) tailored for legal professionals and university students studying law. XAI is to provide transparent justifications for the summarization decisions for enhancing trust and comprehension. The objectives include developing a text summarization model, designing an XAI model for explainability, and creating a user-friendly web-based application. The project's significance is mainly in time saving and understanding improvements for users by generating concise summaries of legal documents with clear explanations. The expected output is a robust text summarization model integrated with XAI and delivered through a user-friendly application, validated through rigorous testing and feedback. Next chapter will discuss the literature review and project methodology.



#### **CHAPTER 2: LITERATURE REVIEW AND PROJECT METHODOLOGY**

#### 2.1 Introduction

In this chapter, the existing body of research surrounding the central themes of this project will be explained by exploring the key concepts, theories, and empirical findings to contextualize the investigation. This section aims to synthesize and critique relevant literature, identify gaps and debates that inform the project objectives. Subsequently, the project methodology outlines the systematic approach employed to address the project goals, detailing the project design, data collection methods, and analytical techniques utilized to acquire and analyze data. By integrating insights from the literature review with our methodological framework, a robust foundation for this project is aimed to construct, facilitating a comprehensive exploration of the research questions at hand.

#### 2.2 Facts and Findings

#### 2.2.1 Domain

The domain of this project falls within the intersection of several fields, which are legal domain, natural language processing (NLP), machine learning, and explainable artificial intelligence (XAI). This project operates within the legal fields, specifically dealing with legal case documents, and involves NLP techniques for processing and analyzing textual data. The incorporation of explainability features suggests the use of machine learning and XAI algorithms not only for summarization but also for providing insights or explanations about the summarized content. This project also delves into interpretability and transparency aspects to ensure the generated summaries and explanations are understandable and trustworthy to stakeholders.

#### 2.2.2 Existing System

A hybrid method for automatic text summarization of legal cases using kmeans clustering techniques and term frequency-inverse document frequency (TF-IDF) word vectorizer is proposed by Varun Pandya (Pandya, 2019). The process involves data preprocessing to clean the document, clustering similar sentences using k-means, and extracting sentences to form a summary. The k-means algorithm groups sentences, which are then vectorized with term frequency-inverse document frequency (TF-IDF). Clustering minimizes intra-cluster distances and maximizes inter-cluster distances, with optimal clusters determined. Sentences are ranked based on TF-IDF score and title similarity, with top-ranked sentences selected for the final summary. The dataset comprises Australian legal cases from Auslii. Evaluation is done by using Recall-Oriented Understudy for Gisting Evaluation (ROUGE) metrics to compare results with three automated tools. Pandya's method showed promising results, where the proposed method performs favourably well against other existing methods, as detailed in a comparative table.

Anand and Wagh have also proposed simple generic techniques using neural network architecture which are feed forward neural networks (FFNN) based summary and long short-term memory (LSTM) based summary (Anand & Wagh, 2022). Their approaches require no manual features or domain knowledge and can be applied across various domains. The process involves generating labeled data using summary information from court judgment headnotes and utilizing this data to extract important sentences for summarization. Different similarity techniques are employed to compute sentence labels, with sentence embeddings (SSE) showing the best performance. FFNN transforms sentences into vectors, calculates probabilities, and selects the top-ranked sentences for the summary. LSTM, combined with convolutional neural networks (CNN), selects sentences with the highest importance likelihood based on LSTM output scores. Evaluation using ROUGE scores on Supreme Court of India judgment documents demonstrates the effectiveness of both methods. The result table shows that LSTM performs better in many cases.

Research about the comparison of extractive and abstractive legal case document summarization has been done by Shukla and his team (Shukla et al., 2022). This research is to analyze the performance of various summarization methods on legal case judgement documents and explore effective evaluation techniques. Extensive experiments with several abstractive and extractive summarizations including both supervised and unsupervised methods have been carried out over three legal summarization datasets. Some examples of the methods are Luhn, Pacsum\_bert, Maximal Marginal Relevance (MMR), Bidirectional and Auto-Regressive Transformers (BART), Bidirectional Encoder Representations from Transformers - Bidirectional and Auto-Regressive Transformers (BERT-BART), and Legal-Pegasus etc. The datasets, Indian-Abstractive, Indian-Extractive, and UK-Abstractive dataset, are developed from Indian and United Kingdom Supreme Courts case documents. The analyses, including ROUGE, BERTScrore, and evaluations by legal practitioners, aim to provide insights into legal summarization and long document summarization in general, contributing to advancements in this field.

Shifting focus to another system, the Neural Networks for Text Summarization, with a Keras implementation of an attention-based sequence-tosequence (seq2seq) model is explored, emphasizing the success of the attention mechanism in the context (Adarsh, 2022). Similar to other systems, data preprocessing is done as the first step of implementation. A model with encoder-decoder architecture which has global attention is built and an embedding layer to convert words into appropriate vector representations is used, learning along with the seq2seq model. Attention mechanisms in encoder-decoder neural networks enable the generation of a context vector at each timestep by considering the decoder's current hidden state and a subset of the encoder's hidden states. The dataset used in this study is Amazon Fine Food dataset found on Kaggle. Since the original and generated summaries are short, the performance evaluation is just done by comparing both of them.

Last but not least, an automatic abstractive text summarization model based on hybrid attention mechanism has been introduced by Zhe Wang, where it incorporates a sentence-level attention mechanism to guide word-level attention distribution, adjusting the weight of sentence-level attention to mitigate high variance issues in word-level attention for shorter documents (Wang, 2021). The methodology of this study introduces a hybrid-attentional model using encoder-decoder networks with recurrent neural networks (RNN). It incorporates attention mechanisms to improve decoder focus and a pointer-generator network for word generation or copying. Additionally, a dynamic hybrid attention mechanism adjusts attention values at both word and sentence levels to enhance summary quality based on document length. Evaluation of the approach by using ROUGE score on large scale Chinese short text summarization (LCSTS) dataset demonstrates the effectiveness of the proposed method in capturing key information and generating concise summaries.

Table 2.1 lists the summary of the reviewed systems, including method or technique used, dataset involved, and evaluation method.

Reviewed System	Summary
Automatic Text Summarization of Legal Classes: A Hybrid Approach (Pandya, 2019)	Method or technique: • K-mean clustering • TF-IDF word vectorizer Dataset: • Australian legal cases Evaluation method: • ROUGE
Effective Deep Learning Approaches for Summarization of Legal Texts (Anand & Wagh, 2022)	Method or technique: • Feed forward neural network (FFNN) • Long short-term memory (LSTM) Dataset: • Supreme Court of India Judgement Evaluation method: • ROUGE
LegalCaseDocumentSummarization:Extractive andAbstractiveMethods and TheirEvaluation (Shukla et al., 2022)	<ul> <li>Method or technique:</li> <li>Extractive (Luhn, Pacsum_bert, MMR, KMM, LetSum, SummaRunner, BERT-Ext, Gist, DSDR, CaseSummarizer)</li> </ul>

**Table 2.1 Summary of Reviewed System** 

	• Abstractive (BART, BERT-BART, Legal-
	Pegasus, Legal-LED)
	Dataset:
	Indian Supreme Court judgements
	UK Supreme Court cases
	Evaluation method:
	• ROUGE
	• BERTScore
AVSI	• Expert evaluation
Text Summarization with	Method or technique:
Attention Based Network	• Sequence to sequence model
(Adarsh, 2022)	• Attention mechanism (global)
Fig	Dataset:
S'BAINO	Amazon Fine Food dataset
SNI LIC	Evaluation method:
	• Compare original and generated summary
An Automatic Abstractive Text	Method or technique: MELAKA
Summarization Model based on	• Sequence to sequence model
Hybrid Attention Mechanism	• Attention mechanism (hybrid)
(Wang, 2021)	Dataset:
	• Large scale Chinese short text
	summarization (LCSTS) dataset
	Evaluation method:
	• ROUGE

#### 2.2.3 Technique

Text summarization is the creation of a short, accurate, and fluent summary of a longer text document (Dutta et al., 2023). This process is crucial for managing the vast volume of online text data, facilitating the discovery and consumption of relevant information more efficiently. There are two main forms of text summarization method, which are abstractive and extractive summarization. Extractive summarization combines existing sentences without any alterations to create a summary while abstractive summarization involves text generation where the machine writes its own sentences (Ada, 2023). Extractive summarization is more rigid due to directly copy sentences from the source text which potentially resulting in awkward reading (Ada, 2023). Conversely, text generation in abstractive summarization initiates better human writing style, enhancing coherence and readability with concise and coherent output (Ada, 2023). There are several prominent examples of both the methods, which are Luhn, Latent Semantic Analysis (LSA), TextRank, LexRank, PositionRank, and TopicRank for extractive summarization, while abstractive summarization includes BART and pretraining with extracted gap-sentences for abstractive summarization (PEGASUS) (Giarelis et al., 2023).

BART, a denoising autoencoder for pretraining sequence-to-sequence model, is introduced by Mike Lewis and his team (Lewis et al., 2019). BART is trained to reconstruct original text from corrupted versions using a Transformer-based architecture, which can be seen as a generalization of models like BERT and generative pre-trained transformer (GPT). The architecture is explained with a diagram in Chapter 4.2.1 (page 31). The study evaluates various text corruption methods and demonstrates BART's effectiveness in tasks such as text generation, comprehension, abstractive dialogue, question answering, summarization, and machine translation. Additionally, ablation experiments within the BART framework are conducted to assess factors influencing end-task performance. On summarization task, BART shows an outperformance over two datasets (CNN/DailyMail and XSum) surpassing other existing methods. The resulting summaries are fluent and grammatically correct, indicating that BART's pretraining has effectively learnt a robust blend of natural language comprehension and generation.

Erkan and Radev have presented a stochastic graph-based method for determining the relative importance of textual units, particularly in the context of text summarization (Erkan & Radev, 2004). The method is named LexRank. It computes sentence importance based on eigenvector centrality in a graph representation of sentences, using intra-sentence cosine similarity. In this study, LexRank is implemented into the MEAD summarization system (Radev & Zhang, 2001). The dataset used in the experiments consists of DUC 2003 and 2004 data sets, which involve generic summarization of news document clusters. For evaluation the ROUGE metric, specifically ROUGE-1 which represents the unigram-based ROUGE score, was used as it aligns closely with human judgements.

A study conducted by Kamya Singh and his team investigates using BERTbased techniques for summarization and sentence similarity checks to enhance important question answering systems (Sharma et al., 2023). The proposed approach combines BERT-based summarization with semantic similarity checking to extract key information and predict crucial questions. Experiments on benchmark datasets have been done and showing that this method surpasses traditional machine learning and deep learning techniques, achieving state-of-the-art performance. The approach was also effective in real-world applications like medical diagnosis, legal case analysis, and financial forecasting.

To evaluate the performance of a text summarization system, there are several methods and one of the approaches is ROUGE score. ROUGE stands for Recall-Oriented Understudy for Gisting Evaluation score (Santhosh, 2023). It is a set of metrics which commonly used for text summarization tasks to automatically generate a concise summary of a longer text. It was designed to evaluate the quality of machine-generated summaries by comparing them to reference summaries prepared by humans. ROUGE has variants like ROUGE-N focusing on n-gram overlap, ROUGE-L on the longest common subsequence (LCS), and ROUGE-S on skip-bigram overlap. ROUGE score ranges from 0 to 1, with higher values indicating better summary quality. It's widely used for its objectivity but may not fully capture semantic meaning or coherence.

Another method used to evaluate the quality of text summarization is BERTScore (Özbolat, 2023). This method measures the similarity between the summary and the original text. It addresses issues encountered by n-gram-based metrics by using contextualized token embeddings from models like BERT to compute similarity. The process involves representing sentences with contextual embeddings, measuring cosine similarity, token matching for precision and recall, considering word importance using IDF, and rescaling values for readability. For a basic level BERTScore calculation, the output will be precision, recall, and F1 score. BERTScore enhances text similarity measurement, making it more accurate and balanced, with potential applications in various domains of natural language processing. However, this method has its own pros and cons. For example, BERTScore can handle different types of texts but it can be biased towards models that are more similar to its own underlying model.

In essence, ensuring the transparency and interpretability of the summaries is crucial, where explainable artificial intelligence (XAI) plays an important role in it. There are some examples of XAI methods in NLP such as visualizing attention mechanisms in neural networks, generating textual explanations for model predictions, and interpreting the reasoning behind the models' decision-making process (Mulkar, 2023). Attention mechanism is introduced by Vaswani in the year 2017 (Vaswani et al., 2017). The architecture is explained with a diagram in Chapter 4.2.1 (page 32). In traditional Deep Learning models like LSTMs and RNNs, longer inputs pose challenges for retaining relevant information, prompting the need for attention mechanisms to signal the model about focus areas (Norkute, 2021). However, transformer models, utilizing self-attention across all encoder and decoder layers, circumvent this issue (Norkute, 2021). Attention mechanisms are widely used in text summarization across diverse domains like news, reviews, scientific papers, legal documents, and social media posts, where models such as the Pointer-generator network, Transformer, and BART exemplify this trend (What Are the Pros and Cons of Using Attention Mechanisms in Text Summarization With RNNs?, 2023).

Research on an open-source tool for visualizing attention mechanism in transformer-based language models is proposed by Jesse Vig (Vig, 2019). The tool offers three levels of granularity which are attention head, model, and neuron views. Its application has been demonstrated on BERT and GPT-2 models. The tool aids in interpreting model decisions and identifying patterns, such as model bias detection, recurring patterns identification, and neurons to model behavior linkage. This allows for a comprehensive understanding of how the model attends to different parts of the input and how individual neurons contribute to attention computation. It enhances model interpretability, enables targeted improvements through user manipulation, and offers versatility for various analysis tasks and model types.

On the other hand, a theoretical analysis of local interpretable model-agnostic explanations (LIME) has been done by Garreau and Luxburg (Garreau & Luxburg, 2020). This explainer is commonly used for providing interpretability to machine learning models. The study derives closed-form expressions for the coefficients of the interpretable model when the function to explain is linear, demonstrating that LIME can uncover meaningful features proportional to the gradient of the function. It aids in understanding model decisions, improving trust, and facilitating compliances with regulations. However, it also highlights potential limitations of LIME where poor parameter choices may cause the algorithm to overlook important features.

Table 2.2 outlines the summary of the reviewed techniques for text summarization, evaluation methods, and explainability features respectively.

<b>Reviewed Techniques</b>	Summary	
Text Summarization		
BART: Denoising Sequence-	Unique characteristic:	
to-Sequence Pre-training for	• denoising autoencoder approach, which	
Natural Language Generation,	enable robust performance in natural	
Translation, and	language understanding and generation	
Comprehension (Lewis et al.,	tasks.	
2019)	Dataset:	
	CNN/DailyMail	
	• XSum	
	Evaluation method:	
	• ROUGE	
LexRank: Graph-based Lexical	Unique characteristic:	
Centrality as Salience in Text	• reliance on eigenvector centrality and	
Summarization (Erkan &	intra-sentence cosine similarity within a	
Radev, 2004)	sentence graph.	
	Dataset:	
	• DUC 2003	

# Table 2.2 Summary of Reviewed Techniques

	• DUC 2004
	<ul><li>Evaluation method:</li><li>ROUGE</li></ul>
Question Summation and Sentence Similarity using BERT for Key Information Extraction (Sharma et al., 2023)	<ul> <li>Unique characteristic:</li> <li>captures bidirectional context.</li> <li>pre-trained with masked language modelling and next sentence prediction.</li> <li>Dataset:</li> <li>500 interview questions from various industries</li> <li>Evaluation method:</li> <li>Performance Metrics</li> </ul>
S S S S S S S S S S S S S S S S S S S	User Study
Understanding BLEU and ROUGE score for NLP Evaluation (Santhosh, 2023)	Variant: • ROUGE-N • ROUGE-L • ROUGE-S Benefits: • flexible for different n-gram lengths. Limitations:
	• not fully capturing semantic meaning or coherence.
Text Summarization: How to Calculate BertScore (Özbolat, 2023) BERTScore Explained in 5 minutes (Sojasingarayar, 2024)	<ul> <li>Benefits:</li> <li>can handle different types of texts.</li> <li>Limitations:</li> <li>can be biased towards models that are more similar to its own underlying model.</li> </ul>

Explainability Features		
Visualizing Attention in	Purpose:	
Transformer-Based Language	• Enhance interpretability of transformer-	
Representation Models (Vig,	based language models.	
2019)	<ul><li>Benefit:</li><li>Aids in interpreting model decisions.</li><li>Links neurons to model behaviour.</li></ul>	
Explaining the Explainer: A	Purpose:	
First Theoretical Analysis of	• Provide interpretability to machine	
LIME (Garreau & Luxburg,	learning models.	
2020)	<ul> <li>Benefit:</li> <li>Enhances understanding of model decisions.</li> <li>Facilitate compliances with regulations.</li> </ul>	
2.3 Project Methodology	اونىۋىرىسىتى ئېكنى	

For the development of the system, Cross-Industry Standard Process for Data Mining (CRISP-DM) is used as the methodology. Figure 2.1 shows the steps involved in CRISP-DM methodology.



Figure 2.1 Cross-Industry Standard Process for Data Mining (CRISP-DM) Diagram (Tounsi et al., 2020)

#### 1. Business Understanding

Legal professionals and university students often deal with extensive documents, spending a lot of time and effort. Summarizing legal documents can save time and effort and help to focus on critical information by having faster review on it. The main goal of this project is to develop a text summarization system for legal documents using BART, integrating with XAI technique which is visualizing attention mechanism to show the reason behind the decision made. The project also aims to design a website for deployment of the system, allowing users to upload documents, view, and download results. It targets a user-friendly interface to enhance user experience (UX) of the system.

#### 2. Data Understanding

It is crucial to gain a comprehensive understanding of the legal documents, entailing the collection of a diverse array of documents. By delving into the structure and content of these documents, it allows discernment of commonalities and key sections to facilitate subsequent processing steps. The data collected should come from legal databases, court filings, or property sources. In the context of this project, the primary focus is on Indian Supreme Court case documents and their abstractive summaries. The dataset will be used

in both training and testing process to train and evaluate the summarization model.

3. Data Preparation

This stage is a critical step to develop an effective text summarization system for legal documents. It involves transforming raw legal texts into a structured format which is suitable for modelling, including tokenization and document structuring. Tokenization is the process of breaking down the text into smaller units, such as words or sentences. In document structuring, a document is split into nested chunks of sentences since some models have a maximum number of tokens that they designed to accept, for example 1024 tokens for BART model. These steps are essential to prepare the data in a way that retains the complexity and detail of legal documents, ensuring the summarization model can generate accurate and contextually relevant summaries.

#### 4. Modelling

This phase involves selecting, developing, and fine-tuning the machine learning or deep learning models that will generate summaries of legal documents. For model selection, extractive or abstractive summarization need to be chosen as both methods will generate different summaries. In this project, abstractive summarization which is BART model is used because it generates new sentences that capture the main ideas of the original text. During the training of the model, pairs of original texts and their corresponding summaries are fed to minimize the difference between the generated summaries and the reference summaries. To show the explainability features, visualization of attention mechanism is applied by highlighting key words or phrases in the original document. By carefully selecting and training summarization models and integrating explainability features, this phase aims to generate high-quality legal document summaries, ensuring transparency and practical utility for legal professionals.

5. Evaluation

Evaluation of the model is important to ensure the generated summaries are accurate, relevant, and useful for the target users. The evaluation process involves both objective and subjective assessments. In objective evaluation quantitative metrics such as ROUGE score is used to measure the overlap of ngrams, word sequences, and word pairs between the generated summary and a reference summary. On the other hand, subjective evaluation involves qualitative feedback from end users to assess the practical utility of the informativeness, coherence, summaries, including and relevance. Incorporating explainability features adds another layer to the evaluation, ensuring that users understand the rationale behind the summarization decisions, thereby increasing trust and usability.

6. Deployment

This is the final phase of CRISP-DM process where the text summarization system for legal documents, along with its explainability features, is made accessible to end-users in a practical, operational environment. This step involves integrating the developed model into existing workflows, ensuring it operates smoothly in real-world settings, and providing a userfriendly interface for legal professionals. The summarization model is embedded into a website, allowing users to upload documents and receive summaries with explanations seamlessly. A user-friendly interface is developed to display the summarized content and its explanations clearly by highlighting the key words or phrases. By deploying the text summarization system effectively, the target users can significantly reduce the time spent on document review, improve their productivity, and make more informed decisions based on concise and understandable summaries.

#### 2.4 **Project Requirements**

This section outlines the project's essential requirements, including software, hardware, and any additional needs. These requirements are crucial for guiding the technical and logistic aspects of the project to ensure that all necessary resources are available for successful execution.

#### 2.4.1 Software Requirement

- Visual Studio Code
- Python version 3.11.4
  - numpy

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- pandas
- torch
- os
- fitz
- transformers
- torch.nn.functional
- pytorch\_lightning

#### 2.4.2 Hardware Requirement

- AMD Ryzen 7 5800H
- NVIDIA GeForce RTX 3050 Ti Laptop GPU
- 16GB RAM
- 512GB ROM (SSD)

#### 2.4.3 Other Requirements

N/A.

# 2.5 **Project Schedule and Milestones**

This section delves into the project schedule and milestones, providing a roadmap for the project's progression. This section outlines the timeline for key activities, milestones, and deliverables, offering a structured plan to track progress and ensure timely completion. By detailing the project schedule and milestones, stakeholders gain insight into the project's timeline and can effectively manage resources and expectations throughout the development process. Table 2.3 (page 21) and Figure 2.2 (page 23) show the project activities and milestones for the system development.

# 2.6 Summary

This chapter introduces the Literature Review and Project Methodology, starting by summarizing existing research and methodologies related to legal text summarization and explainable artificial intelligence (XAI). The section covers domains, existing systems, and techniques, providing a comprehensive overview. Following this, the project methodology is outlined, detailing the Software Development Life Cycle (SDLC) stages from planning to maintenance phase. Additionally, the chapter presents project lequirements by listing essential software and hardware needs. It concludes with a project schedule and milestones which offer a structured timeline for project progression. Next chapter will discuss the requirement analysis.

Activity	Start Date	End Date	Duration (Days)
Task 1: Project Planning and Research			
Define project scope and objectives.	11 March	22 March	12
Identify stakeholders.	11 March	22 March	12
Create a project plan and conduct a feasibility analysis.	25 March	29 March	5
Conduct literature review on domain related to the project.	23 March	29 March	7
Milestone	Proposal, repo	ort chapter 1 an	d 2
Task 2: Data Collection and System Des	sign		
Collect data and separate it into training and testing dataset.	1 April	12 April	12
Define evaluating criteria for summary quality.	1 April	12 April	12
Design system architecture.	1 April	12 April	12
Define user interface.	1 April	12 April	12
Select appropriate algorithm and techniques for the system.	1 April	April 12 April	
Milestone	Report chapte	r 3, data prepro	ocessing
Task 3: Model Training and Optimizati	ion		
Implement abstractive method for text summarization.	15 April	26 April	12
Train the model using training dataset, fine-tuning parameters for optimal performance.	15 April	26 April	12
Evaluate quality of generated summaries.	15 April	26 April	12
Milestone	Text summari	zation module	1
Task 4: Integration of XAI Model	1		
Implement the explainability feature by using attention mechanisms.	5 May	14 June	41

# Table 2.3 Project Activities and Milestones

Integrate the XAI model with the system.	5 May	14 June	41					
Validate integration and interpretability of the XAI model.	5 May	14 June	41					
Milestone	XAI module,	report chapter 4	4					
Task 5: Deployment and Testing								
Develop a web-based application for the system.	15 July	15 Aug	31					
Deploy the system on the application.	15 July	15 Aug	31					
Conduct comprehensive testing on the whole application.	15 July	15 Aug	31					
Milestone	Complete system with application							
Task 6: Documentation and Finalization	Task 6: Documentation and Finalization							
Document project findings, methodologies, and results.	16 Aug	20 Aug	5					
Prepare final report and presentation materials.	21 Aug	23 Aug	3					
Conduct final review and validation of project deliverables.	24 Aug	24 Aug	1					
Project submission.	25 Aug	25 Aug	1					
Milestone	Report chapte	r 5 and 6	1					



Figure 2.2 depicts the Gantt chart for the project development activities for all tasks in CRISP-DM methodology.

**Figure 2.2 Gantt Chart** 

### **CHAPTER 3: REQUIREMENT ANALYSIS**

# 3.1 Introduction

In this chapter, the requirement analysis phase, which is a crucial step in the project development journey, is embarked. This section offers a preview on how this phase will be unfold by outlining its significance and the methodologies it entails. The problem analysis will be delved into to identify core challenges, followed by a detailed examination of data, functional, non-functional, and other requirements essential for the project's success. By providing this preview, the comprehensive understanding of the analysis phase and its role in shaping the project trajectory is aimed to set. According to the CRISP-DM cycle (page 16), this chapter will involve business understanding and data understanding.

### **3.2** Problem Analysis

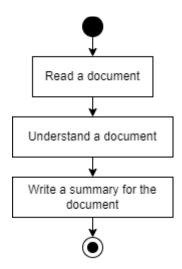


Figure 3.1 Activity Diagram of Human-generated Summary

Figure 3.1 shows the activity diagram of human-generated summary. Legal experts spend a lot of time reading and understanding the legal case documents to produce an appropriate summary. However, there is an increase in the number of documents, where potentially cause the wasting of time and effort on legal case summary production. To overcome the issue, a system which can generate legal case summary without sacrificing accuracy is required.

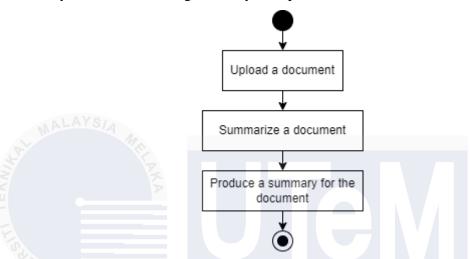


Figure 3.2 Activity Diagram of System-generated Summary

Figure 3.2 shows the activity diagram of system-generated summary. Several text summarization systems have been introduced in these years. The user only needs to upload the legal case document, and the system will process and generate a summary for the corresponding document. There is a problem occurring where the users do not understand why the summary is generated and which part of the original document does the system refer to generate the summary. Hence, a system with explainability features is necessary to enhance human understanding of the generated summaries.

To overcome the issues stated, this project implements abstractive method in text summarization where the system will generate new sentences for the summary, not only copy and combine the original sentences. Explainable artificial intelligence (XAI), which is attention mechanism, will be integrated into the system to show the transparency of the summarization process. This can help to improve the quality and coherence of the generated summaries, providing concise and readable outputs that capture the essence of the original text more effectively.

## 3.3 Requirement Analysis

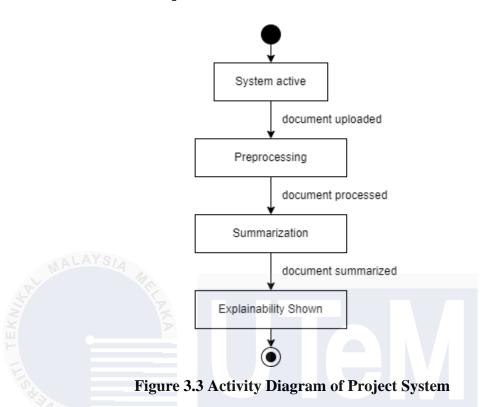
#### 3.3.1 Data Requirement

It is essential to ensure a sufficient amount of data for training purposes. While more data generally leads to more effective model training, it is important to strike a balance, as larger datasets require more computational resources and time for training. Hence, the dataset should be large enough to capture the variability and complexity of legal case documents but not so large to prevent it becoming impractical to train the model within reasonable timeframes.

Additionally, it is crucial to maintain a clear distinction between training data and testing data. Testing data should be separated from training data to evaluate the model's performance. This can help to prevent overfitting where the model performs well on the training data but fails to generalize to new data. By using distinct datasets for training and testing, the model's true performance can be accurately assessed, ensuring its reliability and effectiveness in real-world applications.

Utilizing a dataset exclusively composed of a specific court case is essential for optimizing the model's performance and relevance. By ensuring consistency in the source of dataset, the model can effectively capture the unique linguistic nuances and legal conventions specific to the court proceedings. This focused approach fosters domain expertise, enabling the model to generate more accurate and contextually relevant summaries while maximizing its ability to generalize to new cases within the Indian legal landscape.

#### 3.3.2 Functional Requirement



The primary function of the system is file upload which allows users to upload files for various format (.pdf, .docx, .txt, etc.) into the system. This feature ensures flexibility and convenience for users, enabling them to submit documents in their preferred format without restrictions. By accommodating multiple file types, the system enhances usability and accessibility, facilitating the seamless integration of diverse data sources for analysis and processing.

Once the document is uploaded, the system initiates the data processing pipeline, which includes essential steps such as chunking and tokenizing to facilitate the summarization process. Chunking involves segmenting the text in smaller and manageable chunks or sections to enable more efficient analysis and summarization. Tokenizing is the step to break down the text into individual tokens or words to establish the foundational units for further analysis and manipulation.

Following the preprocessing steps, the system proceeds to generate the summary using the processed data. Leveraging advanced algorithm, the system synthesizes the key information from the document chunks into a concise and coherent summary. By identifying essential concepts, extracting relevant sentences, and ensuring readability and coherence, the system produces summaries that effectively capture the essence of the original document.

After the summarization process, the system presents explainability features by visualizing attention mechanisms to provide users with insights into how the summaries were generated. In this case, the system will highlight the key elements and reasoning behind the summarization decisions. This transparency enhances user trust and understanding by elucidating the factors influencing the summary generation process.

### 3.3.3 Non-functional Requirement

The first non-functional requirement is quality requirement. This includes several criteria such as usability, maintainability, and scalability. The system's user interface should adhere to accessibility. The system should also be modular and welldocumented, allowing for easy maintenance and updates by developers. The capability of scaling horizontally and vertically to accommodate increased user traffic and data volume should be considered.

The system's performance expectations, including throughput and response time are required in this project. The system should be able to process a minimum number of documents per hour to maintain consistent throughput even under heavy load conditions. It should also respond to user requests within an appropriate duration on average by providing feedback to users for document uploads and summary generations.

Accuracy is one of the non-functional requirements for this project. The evaluation methods used in this project are cosine similarity, BERTScore, and ROUGE score. The system's summarization algorithm should achieve a minimum cosine similarity score of 0.75 when comparing the generated summaries to human-authored summaries, indicating a high degree of semantic similarity between the two. BERTScore evaluation method includes precision, recall, and F1-score, where the F1-score should be minimum 0.60 for the model. It should also achieve ROUGE scores of at least 0.50 for ROUGE-1 (unigram overlap), 0.20 for ROUGE-2 (bigram overlap), and 0.20 for ROUGE-L (longest common subsequence) when evaluating the quality of the generated summaries against reference summaries.

# 3.3.4 Other Requirement

- 1. Software Requirements
  - Python (version 3.8 or higher): Python is chosen for its rich ecosystem of libraries and frameworks in natural language processing, enabling efficient development of the text summarization algorithm, supported by its readability, flexibility, and strong community.
  - PyTorch: PyTorch is chosen as the deep learning framework for its robust support in building and training neural network models, especially sequence-to-sequence models for abstractive text summarization, leveraging its dynamic computation graph and popularity in the research community.
  - Natural Language Toolkit (NLTK): NLTK simplifies text preprocessing tasks by offering essential tools such as tokenization, stemming, and part-of-speech tagging, crucial for preparing textual data for summarization, thanks to its comprehensive linguistic resources and user-friendly interfaces.

NumPy: NumPy is a Python library primarily used for working with arrays. It provides extensive functionalities for operations in linear algebra, Fourier transforms, and matrix computations, making it a fundamental tool in scientific computing and data analysis.

- Pandas: Pandas is a Python library designed for working with data sets. It offers functions for analysing, cleaning, exploring, and manipulating data, making it essential for data analysis and data science tasks.
- Os: The OS module in Python offers functions for creating and removing directories, fetching directory contents, and changing or identifying the current directory.
- Fitz: Fitz is the old version of PyMuPDF. It is a high-performance Python library for data extraction, analysis, conversion, and manipulation of PDF and other documents.
- Transformers: Transformers provides APIs and tools for downloading and training state-of-the-art pretrained models, helping to reduce compute costs, carbon footprint, and the time and resources needed to train models from scratch.

- 2. Hardware Requirements
  - N/A
- 3. Environmental Requirements
  - Network connectivity: reliable and high-speed network connectivity is required to ensure seamless communication between system components and support smooth data transmission.

# 3.4 Summary

This chapter outlines the requirement analysis phase to emphasize the need for a balance in data size for training, clear distinction between training and testing data, and the importance of using a consistent dataset source. Functional requirements include file upload, data processing pipeline, summarization, and explainability features are explained. Non-functional requirements encompass quality, performance, and accuracy criteria are interpreted. Other requirements such as software (Python, PyTorch, NLTK) and environmental (network connectivity) requirement have been indicated. Next chapter will discuss the system design.

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# **CHAPTER 4: DESIGN**

# 4.1 Introduction

This chapter serves as a crucial bridge between the conceptualization and implementation phases of system development. It provides a preview of the design analysis results by highlighting key areas such as high-level system architecture, user interface design, database design, AI component design, and software or hardware design if applicable. This chapter sets the stage for detailed exploration and implementation of each design aspect, ensuring a robust and functional system. This chapter is the data preparation and modelling steps based on CRISP-DM cycle (page 16).

# 4.2 High-Level Design

# 4.2.1 System Architecture for Expert System/DSS/Simulation

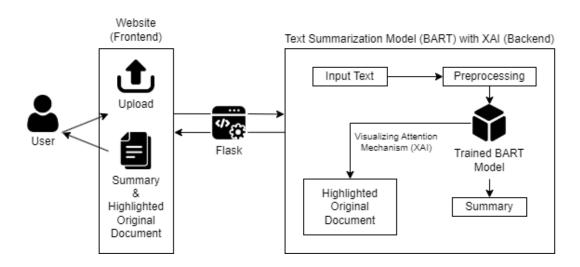


Figure 4.1 System Architecture Diagram

Figure 4.1 shows the architecture of the project system, which is the text summarization system with the explainability feature using natural language processing (NLP) and machine learning techniques. The architecture is separated into two main parts, which are frontend and backend, connected by Flask framework.

In the frontend part, the user interacts with the system through a website. The user can upload a legal document to the system. Once the document is sent to the backend part, the system will undergo preprocessing such as chunking and tokenizing. Then the preprocessed document will be passed to the trained BART model to generate summary. Additionally, the attention weight of the tokens in the document is visualized to produce a highlighted original document, showing important sections or terms. The higher the weight, the deeper the colour of highlight, the more important the word token. Once the outputs are generated, both will be sent back to the frontend via Flask and the user can see the result at the website. The user is also able to download the outputs on their device if they want to keep the results.

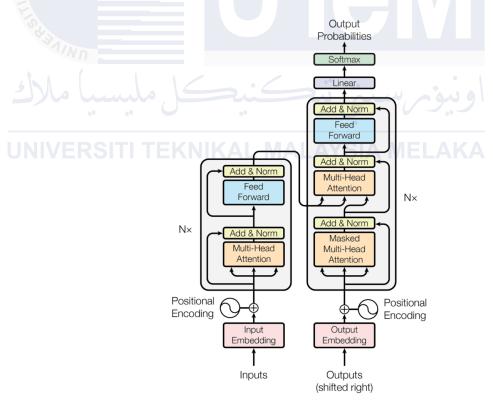


Figure 4.2 Transformer Architecture Diagram (Vaswani et al., 2017)

Figure 4.2 is the architecture diagram of a transformer. A transformer is a type of deep learning model introduced in 2017 and has quickly become fundamental in natural language processing (NLP) (What Is a Transformer Model? | IBM, n.d.). It has been applied to many different tasks in machine learning and artificial intelligence. It

brings two key innovations to text prediction: positional encoding assigns unique positions to tokens, helping the model to understand their order, and self-attention weighs the importance of each token in relation to each other, improving the sequence prediction. The left half of the architecture is the encoder while the right half is the decoder. The encoder maps an input sequence to continuous representations, which are then used by the decoder, along with previous outputs, to generate final sequence.

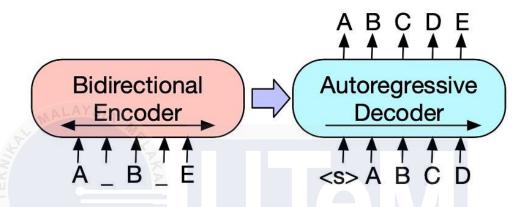


Figure 4.3 BART Architecture Diagram (Lewis et al., 2019)

Figure 4.3 displays the architecture diagram of BART. BART is built upon the transformer architecture, which utilizes self-attention mechanism to capture long-range dependencies in input sequences efficiently. It is a combination of bidirectional and autoregressive approaches. Bidirectional refers to the encoder-decoder architecture, where information from both past and future tokens is used to generate the current token, helping in capturing contextual information effectively. Autoregressive means that during generation, BART predicts tokens sequentially, conditioning on previously generated tokens to ensure coherence and fluency in generated text.

BART consists of an encoder and a decoder. The encoder processes the input sequence and produces a contextualized representation for each token while the decoder takes these representations and generates the output token by token. BART is typically pretrained on large corpora using tasks like denoising autoencoding, where noisy input sequences are corrupted, and the model is trained to reconstruct the original sequence. After pretraining, BART can be fine-tuned on specific downstream tasks like text summarization, where it learns to generate concise summaries based on the input.

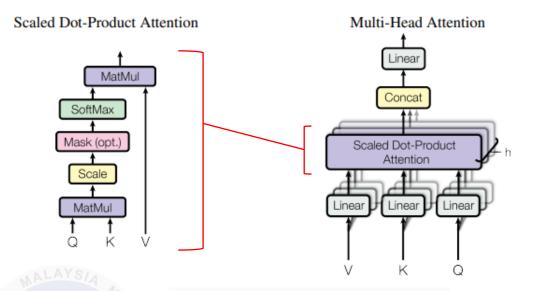


Figure 4.4 Self-Attention Mechanism Architecture (Vaswani et al., 2017)

Figure 4.4 comes out with the self-attention mechanism architecture, which is a key component of transformer-based architectures, including BERT, GPT, and BART. It enables these models to capture dependencies between different words in a sequence effectively. Each token in the input sequence is initially represented as a vector. Before applying self-attention, the input vectors are linearly transformed into three sets of vectors: Key (K), Query (Q), and Value (V) vectors. These transformations are learned during the training process and achieved using weight metrices.

For each token in the sequence, the self-attention mechanism computes attention scores with respect to all other tokens. To calculate the attention score for a token, the dot product between its Query vector and the Key vector of each token in the sequence is computed. These dot products are then scaled and passed through a SoftMax function to obtain normalized attention scores, ensuring that the attention weights sum up to 1. Once the attention scores are obtained, they are used to compute a weighted sum of the Value vectors. The Value vectors represent the information content of each token. The weighted sum is computed by multiplying each Value vector by its corresponding attention score and then summing these products. The weighted sum obtained represents the attended information for each token. These attended representations are concatenated to form the output of the self-attention mechanism. To enhance the model's ability to capture different types of dependencies, the self-attention mechanism often employs multiple attention heads. Each attention head independently computes attention scores, resulting in multiple sets of attended representations. The outputs of these attention heads are typically concatenated or averaged before being passed through the subsequent layers of the model.

# 4.2.2 User Interface Design for expert system/DSS/simulation

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~	→ C	☆	ጏ	=]	¥ (	•
	Welcome to EaseSum !					
	Simplify your legal documents into clear, concise summaries and highlight key points.					
	Choose File No file chosen Submit					
	in PDF, DOC, TXT format					
	EaseSum employs abstractive summarization, a technique where the system generates new sentences to summarize the content rather sentences from the original text. This allows for more concise and coherent summaries that capture the essence of the document. Addition mechanism, which heips it focus on the most relevant parts of the text when generating summaries. By assigning different weights to variate the importance of the word tokens, the deeper the tone, the more important the word token is. The inage shown below is the example of result page, where the highlighted original document will be shown at the left panel while the geright panel. The highlight represent the importance of the word tokens, the deeper the tone, the more important the word token is. The word of the results and one more button for users to upload a new document.	nally, the various server of the server of t	system ut ctions of immary w	ilizes th the doc vill be sh	ie attent ument, i	ion the
	Footer					
5	وم بو ک فحک ۵ 🛋 ماسیا مار	و د				

Figure 4.5 Mockup Interface of Home Screen

Figure 4.5 shows the mockup interface of home screen for the text summarization website. The design is simple to ensure user-friendly interaction between the user and the website. The website has a title welcoming the user and a short description of the website, introducing the system. The choose file button allows users to choose which file they want to upload to the system. Once the submit button is clicked, the selected file will be uploaded to the system for processing. The types of files which are accepted by the system are mentioned below the button. A brief explanation is prepared for users to have a better understanding of the system, with an example result page attached. A footer is the section which includes some overall information about the website, such as what the website is, how the website works, and contact and support details.

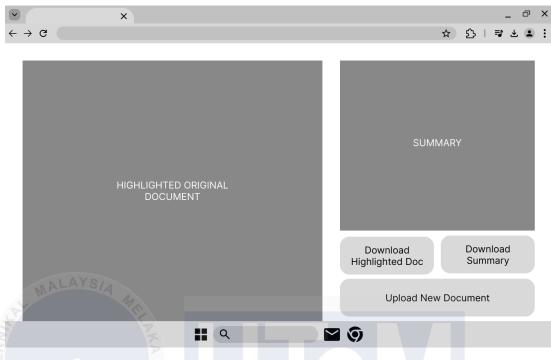


Figure 4.6 Mockup Interface of Result Page

Figure 4.6 illustrates the mockup interface of the result page. Once the users upload the file, the system will process the document and show the result on this page. The original document with highlighted word tokens is shown at the left part of the interface while the summary of the document will be shown at the right part. This provides a better view for users to look at both results at the same time. Users can download the results or upload new legal documents by clicking the button below the summary panel.

# 4.3 AI Component Design

# 4.3.1 Dataset

The dataset used is Indian Supreme Court case documents and their abstractive summaries. The text summarization model in the system requires two datasets for training and testing purposes. There are a total of 7130 documents in the original dataset. 100 documents from the dataset are randomly chosen as testing dataset, the remaining will be the training dataset. All the data is in .txt format. Figures 4.7 and 4.8 show the example of original text and corresponding abstractive summary. More examples of training and testing dataset can refer to Appendix A and B respectively.

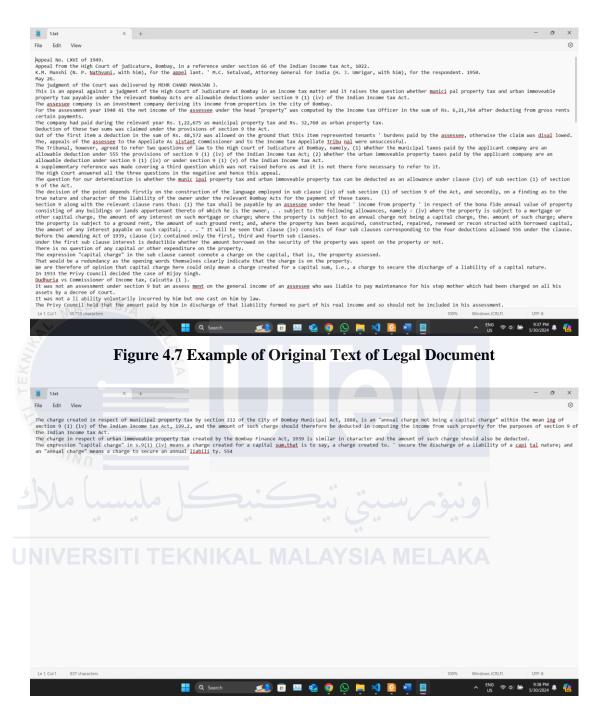
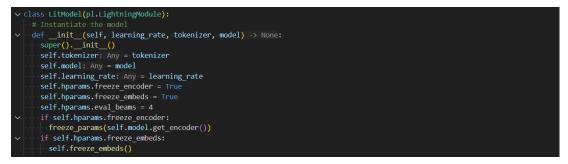


Figure 4.8 Example of Original Text of Legal Document

# 4.3.2 BART Model

The text summarization system involves several key components that work together to ensure the accuracy and efficiency of summary generation, one of them is utilizing PyTorch Lightning to implement BART model. Pytorch Lighting is the deep learning framework for those who require maximum flexibility without sacrificing performance at scale (Falcon, 2021). The reason why PyTorch Lightning is used, but not PyTorch, is because bugs are more likely to be introduced once the research gets

more complicated and things such as multi-GPU training, 16-bit precision, and TPU training are mixed in. This part of code is borrowed from the research done by Shukla et al. (2022). The explanation of various functions is as follows.



# Figure 4.9 Code Snippet for Lightning Model Initialization

Figure 4.9 shows the initialization of a lightning module with a tokenizer, model, and learning rate. It stores these three parameters as instance variables and sets hyperparameters for freezing the encoder, freezing embeddings, and number of beams for evaluation. The encoder parameters and positional and token embedding parameters will be frozen if the conditions are set to true. This means that the model will not update these parameters during training to ensure the learned features are not modified and prevent overfitting.

>	<pre>/ def freeze_embeds(self) -&gt; None:</pre>
	·····#freeze the positional embedding parameters of the model; adapted from finetune.py
	<pre>freeze_params(self.model.shared)</pre>
`	<pre>/ view for drine[self.model.model.encoder, self.model.model.decoder]:</pre>
	freeze_params(d.embed_positions)
- 1	······freeze_params(d.embed_tokens)

# Figure 4.10 Code Snippet for Freeze Embedding Layers Function

Figure 4.10 shows the function to freeze the embedding layers of the model to speed up training and reduce overfitting. Shared embeddings, encoder embeddings, and decoder embeddings are frozen when this function is called on each of them.

	··#·Do·a·forward·pass·through·the·model
$\sim$	<pre>def forward(self, input_ids, **kwargs) -&gt; Any:</pre>
	·····return·self.model(input_ids, ·**kwargs)

# **Figure 4.11 Code Snippet for Forward Pass Function**

Figure 4.11 displays the function of forward pass for the model where it is used to pass input (input\_ids and any additional arguments) to the model and get the output.



# Figure 4.12 Code Snippet for Optimizer Function

Figure 4.12 is the function which configures the optimizer for training. It creates an Adam optimizer with the model parameters and specified learning rate. The Adam optimizer is a popular choice for many deep learning tasks due to its ability to the learning rate and its robustness to noisy gradients.

<pre>v def training_step(self, batch, batch_idx) -&gt; dict[str, Any]:</pre>	
·····*#·Load·the·data·into·variables	
<pre>src_ids: Any, src_mask: Any = batch[0], batch[1]</pre>	
<pre>tgt_ids: Any = batch[2]</pre>	
····#·Shift the decoder tokens right (but NOT the tgt_ids)	
<pre>decoder_input_ids: Any = shift_tokens_right(tgt_ids, self.tokenizer.pad_token_id)</pre>	
····#·#·Run·the·model·and·get·the·logits	
outputs: Any = self(src_ids, attention_mask=src_mask, decoder_input_ids=decoder_input_ids, use_cache=False	e)
<pre>lm_logits: Any = outputs[0]</pre>	
# Create the loss function	
<pre>ce_loss_fct = torch.nn.CrossEntropyLoss(ignore_index=self.tokenizer.pad_token_id)</pre>	
loss: Any = ce_loss_fct(lm_logits.view(-1, lm_logits.shape[-1]), tgt_ids.view(-1))	
return {'loss':loss}	

# Figure 4.13 Code Snippet for Training Step Function

Figure 4.13 shows the code snippet which defines the training step for batches of data. It loads the source IDs, source mask, and target IDs from the batch, and next shifts the decoder unput IDs to the right. The model is run to get logits. This function also computes cross-entropy loss, ignoring padding tokens, and the loss is returned. In essence, this function is used to calculate the loss of a batch of data during training.



# **Figure 4.14 Code Snippet for Validation Step Function**

Figure 4.14 is the validation step for batches of data where it is similar to training step but used for validation. This function will compute the loss of a batch of data during validation and return it.



**Figure 4.15 Code Snippet for Text Generation Function** 

The function shown in Figure 4.15 is to generate text using the model's generation capabilities. It takes input IDs, attention mask, and various generation parameters. The generated text is produced using beam search, with the number of beams and the maximum length of the generated text controlled by the input parameters. The generated text is then decoded and returned as a list of strings.

✓ def freeze_params(model) -> None:
+#Function that takes a model as input (or part of a model) and freezes the layers for faster training adapted from finetune.py
<pre>v for layer in model.parameters():</pre>
layer.requires grade = False

# **Figure 4.16 Code Snippet for Freeze Parameters Function**

Figure 4.16 displays the function of freezing parameters of the given model or model component. It iterates through the model parameters and sets requires\_grad to false to prevent these layers from being updated during training.



# Figure 4.17 Code Snippet for PyTorch Lightning Data Module Initialization

A data module is initialized with the tokenizer, data frame which contains the data, and batch size as shown in Figure 4.17. these parameters are stored as instance variables. This module is designed to handle the data loading and preprocessing for a text summarization task.

**Figure 4.18 Code Snippet for Data Preparation Function** 

The function displayed in Figure 4.18 prepares the data by randomly shuffling and splitting it into training, validation, and test sets with a 60/20/20 split.

++ encode the sentences using the tokenizer	
<pre>v - def setup(self, stage) -&gt; None:</pre>	
<pre>self.train: dict[str, Tensor] = encode_sentences(self.tokenizer, self.train['source'], self.train['target'])</pre>	
<pre>self.validate: dict[str, Tensor] = encode sentences(self.tokenizer, self.validate['source'], self.validate['target'])</pre>	
<pre>self.test: dict[str, Tensor] = encode_sentences(self.tokenizer, self.test['source'], self.test['target'])</pre>	

# **Figure 4.19 Code Snippet for Sentence Encoding Function**

Figure 4.19 shows the sentence encoding function for the three sets of data using the tokenizer. The tokenized data is then stored in the instance variable.

carche train\_dataloader(self) -> DataLoader[Tuple[Tensor, ...]]:
c dataset = TensorDataset(self.train['input\_ids'], self.train['attention\_mask'], self.train['labels'])
c train\_data = DataLoader(dataset, sampler = RandomSampler(dataset), batch\_size = self.batch\_size)
c return train\_data

### Figure 4.20 Code Snippet for Data Loader Creation (Training Data) Function

Figure 4.20 is the code snippet of the data loader creation function. It creates a data loader for the training data to load the data in batches during training.

	def val_dataloader(self) -> DataLoader[Tuple[Tensor,]]:
$\geq$	<pre>dataset = TensorDataset(self.validate['input_ids'], self.validate['attention_mask'], self.validate['labels'])</pre>
1	<pre>val_data = DataLoader(dataset, batch_size = self.batch_size)</pre>
	return val data

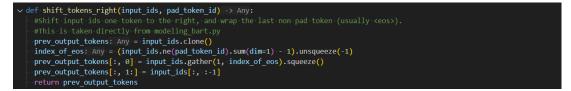
### Figure 4.21 Code Snippet for Data Loader Creation (Validation Data) Function

The code snippet in Figure 4.21 is similar to the one in Figure 4.19, but it is used for validation data.

def test\_dataloader(self) -> DataLoader[Tuple[Tensor, ...]]:
 dataset = TensorDataset(self.test['input\_ids'], self.test['attention\_mask'], self.test['labels'])
 test\_data = DataLoader(dataset, batch\_size = self.batch\_size)
 return test\_data

# Figure 4.22 Code Snippet for Data Loader Creation (Testing Data) Function

The code snippet in Figure 4.22 is similar to the one in Figure 4.19 and 4.20, but it is used for testing data.



### **Figure 4.23 Code Snippet for Token Shifting Function**

Figure 4.23 shows the function for shifting input tokens in sequence to the right by one position for decoder input preparation. The shifted tokens are then returned.



# **Figure 4.24 Code Snippet for Sentences Encoding Function**

Figure 4.24 is the code snippet of the sentences encoding function, where it encodes a list of source and target sentences using a tokenizer. The encoded data is then returned in a batch format.

In summary, the LitModel handles the model's training and generation processes while the SummaryDataModule manages the data loading and preprocessing. This facilitates a streamlined workflow for training a BART text summarization model by utilizing Pytorch Lightning.

# 4.3.3 AI Techniques

To develop a text summarization model for legal documentation with explainability feature using BART model, several processes and techniques are required, including training and testing process. Visualizing the attention mechanism is the technique used for the explainability feature. The overall flow of the system is explained step-by-step using the flowcharts below.

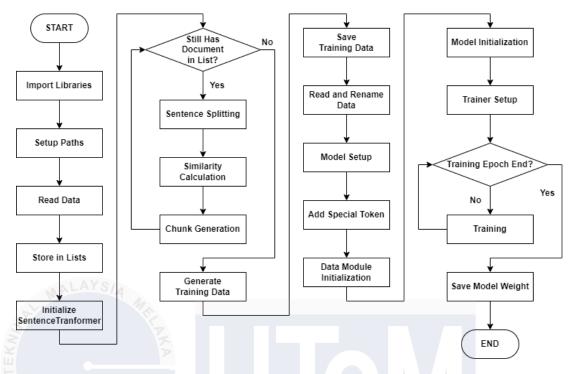
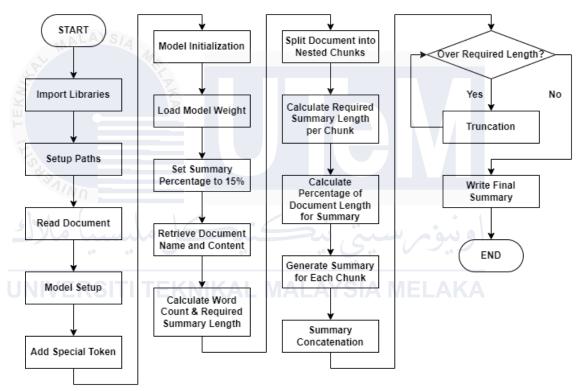


Figure 4.25 Flowchart of Model Training Process

Figure 4.25 shows the training process of the proposed text summarization model. The necessary libraries such as NumPy, NLTK, Pandas, TQDM and BART\_utilities are imported. BART\_utilities is the file containing libraries that utilize PyTorch Lightning (detail description in Chapter 4.3.2 (page 37)). The paths which will be used in the following process are defined, including dataset, root path, and output path. The training data, including judgment and summary, are read from specified directories and stored in lists. A total of 7030 data (a pair of judgement and summary considered as 1 data) is used in the training process.

A pre-trained sentence transformer is initialized and loaded, specifying to run on CUDA (Compute Unified Device Architecture). This is because CUDA offers a significant boost for training and running a model. Next, the model will check both the judgement and summary lists. If there is document in the lists, the model will split paragraphs into individual sentences and store in lists (for example 11 for judgement sentences and 12 for summary sentences). The cosine similarity between two lists of sentences is calculated. Based on the result, chunks of text from judgement and their corresponding summaries will be generated. Once there is no more document in the judgement and summary lists, the training chunks and summaries are done generated and stored in an excel file. The file is then read, and the columns are renamed into source and target data. To continue the training process, the environment for using BART model is set up, including load a pre-trained BART model and tokenizer. Special tokens are added to the tokenizer and the token embeddings in the BART model are resized. The data module and lightning model with specified parameters (BART model is used) are initialized. A PyTorch Lightning trainer is set up with GPU (Graphics Processing Unit) acceleration and other training parameters. After all settings are done, the training process starts until the maximum number of epochs is reached. The training process ends with saving the model weight into checkpoint. The detailed code is attached in Appendix C.



**Figure 4.26 Flowchart of Model Testing Process** 

Figure 4.26 is the testing process of the trained model to read a single document and generate its summary. Similar to the training process, it starts with the import of libraries, path set up, and document reading. The environment for using BART model is set up by loading pre-trained BART model and tokenizer. Special tokens are added to the tokenizer and the token embeddings in the BART model are resized. The lightning model with specified parameters is initialized and the saved model weight is loaded (trained BART model).

The required summary length is set to 15% of the length of the original document. This is because normally the summary length should be in the range of 10%

to 15% of the original text length, or even shorter than the range (Burnell et al., n.d.). The model next retrieves the document's name and content. The word count of the document and the required summary length are calculated. The model splits the document into nested chunks of sentences with a maximum chunk length of 1024 words. The required summary length per chunk and percentage of document length for summary is calculated.

The testing process continues by generating summaries for each chunk using the BART model on GPU. The generated summaries are concatenated into a single string. If the length is more than the required length, truncation needs to be done, else the final summary will be written to the specified output file, and this is the end of the testing process. The detailed code is attached in Appendix D.

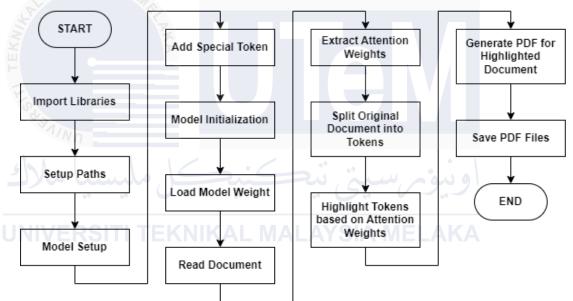


Figure 4.27 Flowchart of Explainability Feature

Figure 4.27 displays the process of how the explainability feature is done. The process is similar to the testing process until the read document step. These steps can be skipped if continued after the summary generation. The attention weights are extracted from the model's output, where the last layer's attention is targeted.

To visualize the attention weights, the original document is split into individual tokens. The important tokens are highlighted based on the attention weights by setting highlight colours proportional to the attention weights. The higher the attention weights, the more important the token is, the more obvious the highlight colour. A PDF (Portable Document Format) file containing the original document text with highlighted tokens based on attention weights is created. The generated PDF file is saved to the specified output directory. The code snippet is attached in Appendix E.

### 4.4 Software or Hardware Design (if applicable)

For this section, readers may refer to the detailed description of Software and Hardware Requirement in Chapter 2.4 on page 19 to 20, under the topic of Project Requirements.

### 4.5 Summary

This chapter outlines the transition from conceptualization to implementation of the proposed text summarization system. It describes the high-level architecture of the system, where the system is divided into a frontend for user interaction and a backend for processing, connected by Flask. Users upload the legal documents, which will be processed and summarized using the trained BART model, and receive documents with important sections highlighted based on attention weights and corresponding summaries. The architectures behind the transformers, BART model, and attention mechanism are also explained. The user interface is designed for simplicity and ease of use, displaying both the original and summarized documents side-by-side. The dataset used in this project is described with examples shown. The AI component utilizes PyTorch Lightning to implement BART model for efficient model training and testing, with detailed code snippets provided for various functions and flowchart granted for process understanding. Next chapter is about the result and discussion of the system developed.

#### **CHAPTER 5: RESULTS AND DISCUSSION**

#### 5.1 Introduction

This chapter outlines the evaluation methods used in the project which are precision, recall, F1-score, cosine similarity, and ROUGE score. It also details the testing of functional and non-functional requirements, including test case identification, tester identification, and test case results. A survey has been prepared with certain questions for the testing and the results will be recorded with detailed explanation. This chapter is the evaluation and deployment phases in CRISP-DM (page 16).

# 5.2 Evaluation of AI Techniques Used in the Project

#### 5.2.1 Techniques

The methods used to evaluate the AI technique used in this project which is the BART text summarization model are BERTScore (including precision, recall, and F1-score) and cosine similarity. In the context of BERTScore, precision reflects how many of the tokens generated by the model are similar to the tokens in the reference summary, recall reflects how well the generated summary covers the tokens from the reference summary, and F1-score combines both to give an overall sense of how similar the generated text is to the reference text in terms of token similarity. High precision but low recall indicates that the model generates very accurate tokens, but it might miss out on important content. High recall but low precision indicates that the model includes the most relevant content but also adds unnecessary or irrelevant tokens. A high F1-score suggests a good balance between capturing the important content and avoiding irrelevant content in the generated summaries.

	BERTScore	for	1181.txt		Precision:	0.5935,	Recall:	0.6200,	F1:	0.6065
	BERTScore	for	1195.txt		Precision:	0.6149,	Recall:	0.6079,	F1:	0.6114
	BERTScore	for	1329.txt		Precision:	0.6055,	Recall:	0.6387,	F1:	0.6217
	BERTScore	for	1378.txt		Precision:	0.5933,	Recall:	0.6647,	F1:	0.6270
	BERTScore	for	1406.txt		Precision:	0.6156,	Recall:	0.5936,	F1:	0.6044
	BERTScore	for	1522.txt		Precision:	0.5765,	Recall:	0.6386,	F1:	0.6059
	BERTScore	for	1531.txt		Precision:	0.6258,	Recall:	0.6255,	F1:	0.6256
	BERTScore	for	1697.txt		Precision:	0.6186,	Recall:	0.6339,	F1:	0.6262
	BERTScore	for	1762.txt		Precision:	0.6247,	Recall:	0.6289,	F1:	0.6268
	BERTScore	for	1778.txt		Precision:	0.7021,	Recall:	0.5913,	F1:	0.6420
	BERTScore	for	1789.txt		Precision:	0.6159,	Recall:	0.6113,	F1:	0.6136
	BERTScore	for	1974.txt		Precision:	0.6105,	Recall:	0.5743,	F1:	0.5919
	BERTScore	for	2035.txt		Precision:	0.6323,	Recall:	0.6473,	F1:	0.6397
	BERTScore	for	2052.txt		Precision:	0.5652,	Recall:	0.5591,	F1:	0.5621
	BERTScore	for	2065.txt		Precision:	0.5900,	Recall:	0.6126,	F1:	0.6011
	BERTScore	for	2122.txt		Precision:	0.5807,	Recall:	0.5880,	F1:	0.5843
	BERTScore	for	2124.txt		Precision:	0.6028,	Recall:	0.6899,	F1:	0.6434
	BERTScore	for	2207.txt		Precision:	0.6597,	Recall:	0.5811,	F1:	0.6179
2	BERTScore	for	2248.txt		Precision:	0.6211,	Recall:	0.6195,	F1:	0.6203
	BERTScore	for	2256.txt		Precision:	0.6015,	Recall:	0.6031,	F1:	0.6023
	BERTScore	for	2304.txt		Precision:	0.5799,	Recall:	0.5570,	F1:	0.5682
	BERTScore	for	232.txt	- 1	Precision: (	ð.5955, I	Recall: (	0.5948, I	1: (	0.5951
	BERTScore	for	2392.txt		Precision:	0.6105,	Recall:	0.5873,	F1:	0.5987
	BERTScore	for	2440.txt		Precision:	0.6218,	Recall:	0.5928,	F1:	0.6070
	BERTScore	for	2593.txt		Precision:	0.6070,	Recall:	0.5632,	F1:	0.5843
	Overall Av	/era	ge Precis:	Loi	n: 0.6241					
V	Overall Av	/erag	ge Recall	; (	0.5976					
	Overall Av	/erag	ge F1 Scoi	ъ	: 0.6091					
1						69			-	

Figure 5.1 Precision, Recall, and F1-Score of Generated

According to Figure 5.1, the BERTScore of every single testing data and the average are calculated. The overall precision, recall, and F1-score are 0.6241, 0.5976, and 0.6091 respectively. From the score calculated, the model can be proved that it can generate quite accurate tokens without missing some important content, but the performance still can be improved to get a higher score.

	Similarity	between	1181.txt	and	1181.txt:	0.9193541386848635
	Similarity	between	1195.txt	and	1195.txt:	0.9303525554499819
	Similarity	between	1329.txt	and	1329.txt:	0.887512350035644
	Similarity	between	1378.txt	and	1378.txt:	0.8198837464532405
	Similarity	between	1406.txt	and	1406.txt:	0.8502952508578361
	Similarity	between	1522.txt	and	1522.txt:	0.8443071406749381
	Similarity	between	1531.txt	and	1531.txt:	0.9255358522734118
	Similarity	between	1697.txt	and	1697.txt:	0.9540117143227209
	Similarity	between	1762.txt	and	1762.txt:	0.948831555904428
	Similarity	between	1778.txt	and	1778.txt:	0.8618334213286098
	Similarity	between	1789.txt	and	1789.txt:	0.8914524463069843
	Similarity	between	1974.txt	and	1974.txt:	0.9123053902746598
	Similarity	between	2035.txt	and	2035.txt:	0.9390765903501115
	Similarity	between	2052.txt	and	2052.txt:	0.6443404534313723
	Similarity	between	2065.txt	and	2065.txt:	0.9311172106911576
	Similarity	between	2122.txt	and	2122.txt:	0.9746142610635046
	Similarity	between	2124.txt	and	2124.txt:	0.8567284823600161
	Similarity	between	2207.txt	and	2207.txt:	0.912408529570948
Y	Similarity	between	2248.txt	and	2248.txt:	0.8877496268596694
	Similarity	between	2256.txt	and	2256.txt:	0.9145632007322129
	Similarity	between	2304.txt	and	2304.txt:	0.9242800812185699
	Similarity	between	232.txt a	and 2	232.txt: 0	.9666595872164601
	Similarity	between	2392.txt	and	2392.txt:	0.8855462794318737
	Similarity	between	2440.txt	and	2440.txt:	0.9367443453920362
	Similarity	between	2593.txt	and	2593.txt:	0.9012599165193018
	Similarity	between	78.txt a	nd 78	3.txt: 0.88	883868459359161
	Similarity	between	784.txt a	and 7	784.txt: 0	.9200697677318741
	Overall Acc	curacy: (	9.94			

Figure 5.2 Cosine Similarity between Reference Summary and Generated Summary, and the Overall Accuracy based on Cosine Similarity

Cosine similarity is a metric used to measure how similar the documents are irrespective of their size (Cosine Similarity | Engati, n.d.). This matric is advantageous as the two similar documents could still have smaller angle even they are far apart by the Euclidean distance because of the size. The smaller the angle, the higher the similarity. The cosine similarity value is allocated between 0 to 1, where the larger the value, the more similar the two documents are. Figure 5.2 displays the result of cosine similarity of the reference summaries and summaries generated by the proposed system, and the overall accuracy based on cosine similarity. A threshold of 0.8 is defined to calculate the accuracy, which means that only summaries with cosine similarity of more than 0.8 will be considered. From the given result, the accuracy is 0.94, showing there are 94 documents from 100 testing data that have cosine similarity higher than 0.8.

### 5.2.2 Applications

The method used to evaluate the applications is ROUGE Score. The detailed explanation of ROUGE score can be found in Chapter 2.2.3 Techniques (page 12). In the evaluation for the proposed application, ROUGE-1, ROUGE-2, and ROUGE-L are used. ROUGE-N measures the overlap of n-grams between the reference summaries and system generated summaries, where ROUGE-1 refers to the overlap of unigrams (every single word) and ROUGE-2 refers to the overlap of bigrams (two consecutive words), while ROUGE-L is based on the length of the longest common subsequence.

	ROUGE scores for 1181.txt and 1181.txt:
	ROUGE-1: 0.5546448087431695, ROUGE-2: 0.20000000000000004, ROUGE-L: 0.26229508196721313
	ROUGE scores for 1195.txt and 1195.txt:
	ROUGE-1: 0.5516587677725118, ROUGE-2: 0.22602089268755934, ROUGE-L: 0.22559241706161137
	ROUGE scores for 1329.txt and 1329.txt:
1	ROUGE-1: 0.5436619718309859, ROUGE-2: 0.268361581920904, ROUGE-L: 0.2704225352112676
	ROUGE scores for 1378.txt and 1378.txt:
Ì	ROUGE-1: 0.5357873210633948, ROUGE-2: 0.2792607802874743, ROUGE-L: 0.32719836400818
	ROUGE scores for 1406.txt and 1406.txt:
_	ROUGE-1: 0.48656294200848654, ROUGE-2: 0.21843971631205675, ROUGE-L: 0.26025459688826025
4	ROUGE scores for 1522.txt and 1522.txt:
	ROUGE-1: 0.5087956698240865, ROUGE-2: 0.21166892808683851, ROUGE-L: 0.2489851150202977
	ROUGE scores for 1531.txt and 1531.txt:
	ROUGE-1: 0.5907626208378088, ROUGE-2: 0.32292787944025836, ROUGE-L: 0.322234156820623
,	ROUGE scores for 1697.txt and 1697.txt:
9	ROUGE-1: 0.6723724751797331, ROUGE-2: 0.3048989379924632, ROUGE-L: 0.2437521396781924
	ROUGE scores for 1762.txt and 1762.txt:
	ROUGE-1: 0.6311336717428089, ROUGE-2: 0.2847457627118644, ROUGE-L: 0.26057529610829105
	ROUGE scores for 1778.txt and 1778.txt:
	ROUGE-1: 0.40672782874617736, ROUGE-2: 0.2822085889570552, ROUGE-L: 0.290519877675841
	ROUGE scores for 1789.txt and 1789.txt:
	ROUGE-1: 0.5801526717557252, ROUGE-2: 0.2664624808575804, ROUGE-L: 0.2564885496183206
	ROUGE scores for 1974.txt and 1974.txt:
	ROUGE-1: 0.504983388704319, ROUGE-2: 0.21087680355160934, ROUGE-L: 0.2170542635658915
	ROUGE scores for 2035.txt and 2035.txt:
	ROUGE-1: 0.5690890481064483, ROUGE-2: 0.22153846153846152, ROUGE-L: 0.25588536335721596
	Average ROUGE scores:
	ROUGE-1: 0.49110974216249476, ROUGE-2: 0.24344801246817693, ROUGE-L: 0.24488994840568767

# Figure 5.3 ROUGE Score between Reference Summary and Generated Summary, and the Average ROUGE Score

The average of the ROUGE score has been calculated as shown in Figure 5.3, which ROUGE-1 is 0.4911, ROUGE-2 is 0.2434, and ROUGE-L is 0.2449. The scores are considered moderate except ROUGE-L as it is lower than 0.3 (What is the ROUGE Score (Recall-Oriented Understudy for Gisting Evaluation)?, Stephen M.). However, it cannot be concluded that the overall performance of the application is poor because ROUGE score relies on reference summaries. The ROUGE score primarily focusses

on the proportion of relevant information preserved in a summary, which may not always be the most crucial aspect in evaluating the system. Researchers may sometimes prioritize on how accurately key details are captured, or fluency, which assesses the coherence and naturalness of the generated summary.

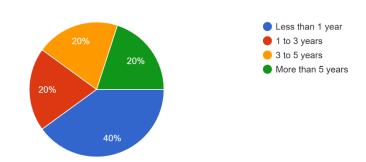
# 5.3 Testing of Functional Requirement

In application development, thoroughly testing the functional requirements of the product is critical to ensure that the system operates as intended and meets the user needs. Functional testing verifies that each function of the application behaves as the required specifications. This process involves several key steps such as test case identification, tester identification, test case results in either pass of fail, and detailed documentation on the failed test case if any. The test case will describe all the functions of the system including documents upload, process, and result. The description is explained in Table 5.1. Test case 1 to 8 is done by the target users while test case 9 is checked by the developer.



**Figure 5.4 Pie Chart of Target Users** 

A survey has been prepared for the users to rate the system's functionality. The target users are those who study or work in legal fields. Figure 5.4 shows the pie chart of the target users with percentage. In a total of 25 respondents, 10 of them (40%) are currently studying or working in legal field while the 15 people (60%) left are not. Those 10 target users will continue with the questions about functionality of the system.

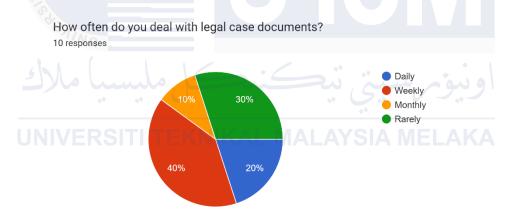


How many years of experience do you study/work in the legal field?

10 responses

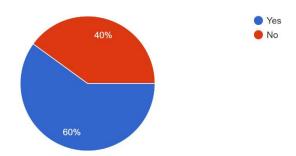
#### Figure 5.5 Pie Chart of Experience Studying or Working in Legal Fields

A simple demographic is indicated in Figure 5.5, Figure 5.6, and Figure 5.7. Figure 5.5 shows the pie chart of experience of the 10 target users studying or working in legal field. 4 people (40%) have less than 1 year experience, while the range 1 to 3 years, 3 to 5 years, and more than 5 years have 2 respondents (20%) each.



### Figure 5.6 Pie Chart of Frequency Dealing with Legal Case Documents

Figure 5.6 displays the pie chart of frequency the target users dealing with the legal case documents. Most of them deal with the documents weekly (4 respondents with 40%), followed by rarely (3 respondents with 30%), and daily (2 respondents with 20%). Only one respondent (10%) from the target users deals with the legal documents monthly.



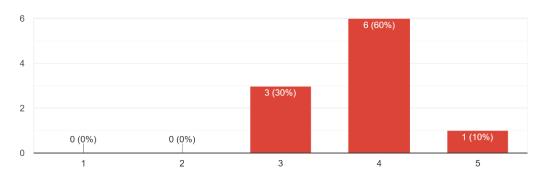
Have you ever use text summarization tools for legal case documents before? <sup>10 responses</sup>

# Figure 5.7 Pie Chart of Experience in Using Text Summarization Tools for Legal Case Documents

Figure 5.7 exhibits the pie chart of target users' experience in using text summarization tools for legal case documents. 60% (6 respondents) of them have used the tools before while 40% of the left (4 respondents) have not.

The demographic gives a basic impression on the target users, especially on the years they are involved in legal field, frequency they deal with legal documents, and their experience on using text summarization tools. This can help in answering the functionality questions better because different experiences can have different opinions on the system. Their rating on the system's functionality is shown in Figure 5.8, Figure 5.9, and Figure 5.10.

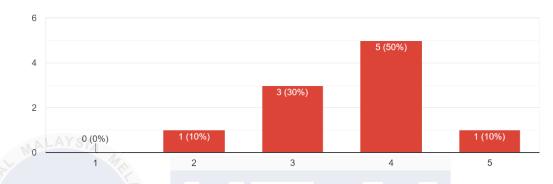
How accurate do you find the summaries generated by the system? <sup>10 responses</sup>



# Figure 5.8 Bar Chart of How Accurate the Users Find the Summaries Generated by the System

Figure 5.8 is the bar chart on how accurate the users find the summaries generated by the system. The rating started from 1 (very inaccurate) to 5 (very

accurate). Most of the target users (6 respondents, 60%) find the summaries generated to be accurate and one of them (10%) said it is very accurate, while 3 respondents (30%) found the summaries generated are only moderate.



Do you think the highlighted words are important keywords in the original text?  $^{\rm 10 \ responses}$ 

Figure 5.9 Bar Chart of the Importance of Highlighted Words

Figure 5.9 displays the bar chart of target users' opinion on the importance of the highlighted words, rating from 1 (very unimportant) to 5 (very important). Half of the target users (5 respondents, 50%) think the highlighted words are important, followed by 3 respondents (30%) who feel the importance of highlighted words are average. For the range unimportant and very important, one respondent (10%) voted for each.

How effectively do you find to understand the legal documents by only reading the summaries generated? 10 responses

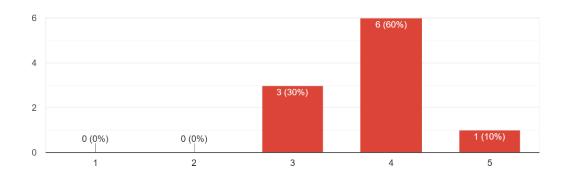
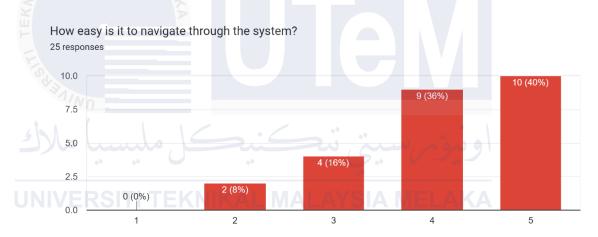


Figure 5.10 Bar Chart of the Users' Understanding of the Legal Documents by only Reading the Generated Summaries

Figure 5.10 shows the bar chart about the target users' understanding of the legal documents by only reading the generated summaries. The rating is between 1 (very poorly) to 5 (very well). 6 respondents (60%) from the target users are able to understand well and one respondent (10%) can understand very well. 30% (3 respondents) of the target users only have moderate understanding of the legal documents if only read the generated summaries.

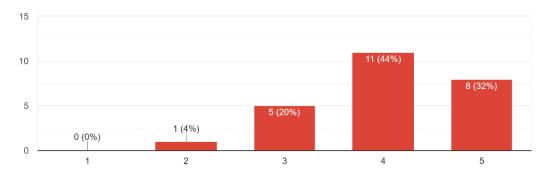
# 5.4 Testing of Non-Functional Requirement

The testing of non-functional requirements of the system is also crucial to ensure the system works smoothly. Testing on usability, design, and aesthetics has been done through a survey, including some open-ended questions for extra opinions, comments, and feedback. A total of 25 respondents have been involved in this section.



#### Figure 5.11 Bar Chart of Easiness of Navigation through the System

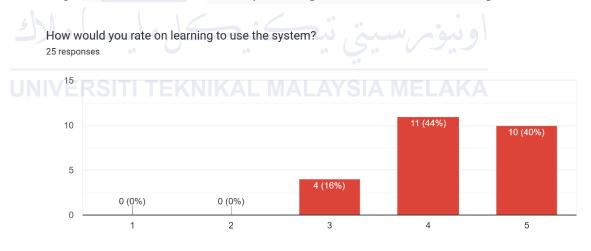
Figure 5.11 indicates the users' opinion on the easiness of navigation through the system, from 1 (very difficult) to 5 (very easy). 10 respondents (40%) think it is very easy to navigate through the system, followed by 9 respondents (36%) who think the navigation is easy. 16% of the users (4 respondents) feel moderate on the navigation while the two respondents left (8%) feel difficult to navigate through the system.



How helpful are the briefing and explanation in guiding you through the system? <sup>25 responses</sup>

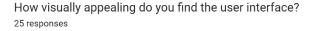
### Figure 5.12 Bar Chart of the Helpfulness of the Briefing and Explanation

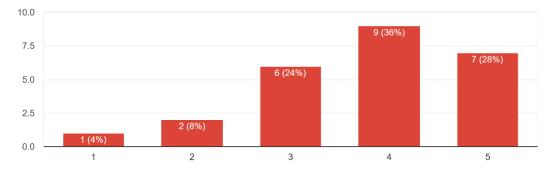
Figure 5.12 is the bar chart about the helpfulness of the briefing and explanation in guiding users through the system. The rating started from 1 (very unhelpful) to 5 (very helpful). 8 respondents (32%) find the information very helpful while 11 respondents (44%) think it is helpful. 20% of the users (5 respondents) feel average on the information and only one respondent (4%) finds it unhelpful.



## Figure 5.13 Bar Chart of Rating on Learning to Use the System

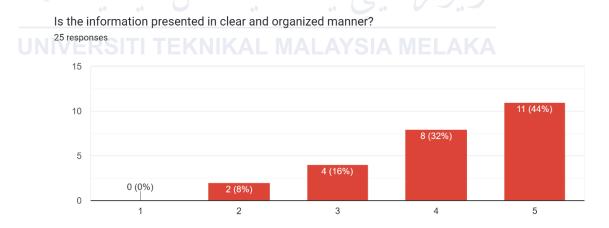
Figure 5.13 exhibits the bar chart of users' rating on learning to use the system from 1 (very difficult) to 5 (very easy). There are 11 respondents (44%) and 10 respondents (40%) feel easy and very easy on learning to use the system respectively. However, 16% of the users (4 respondents) rated only moderate on it.





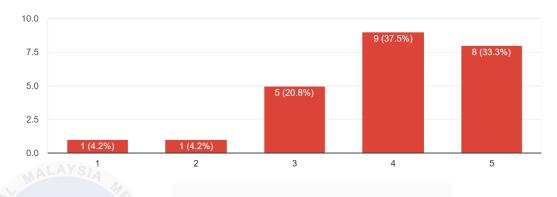
#### Figure 5.14 Bar Chart of Visual Appeal Level of User Interface

Figure 5.14 displays the level of visual appeal of the user interface, rating start from 1 (very unappealing) to 5 (very appealing). The highest rating is 4 which is appealing with the vote of 9 (36%), followed by rating 5 (very appealing) with 28% voting (7 respondents). 6 respondents (24%) found the visual appeal of the user interface is average. For the range unappealing and very unappealing, they have 8% (2 respondents) and 4% (1 respondent) of voting respectively.



#### **Figure 5.15 Bar Chart of Information Presentation**

Figure 5.16 shows the users' opinion on the information presentation whether it is presented in clear or organized manner or not. The rating is between 1 (very disorganized) to 5 (very organized). Most of the users (11 respondent, 44%) agree that the presentation is very organized while 8 respondents (32%) said it is organized. 16% of users (4 respondents) found the presentation is only average and the last 2 respondents (8%) feel the presentation is disorganized.



How would you rate the font size, type, and layout of the content? 24 responses

Figure 5.16 Bar Chart of Rating on the Font Size, Type, and Content Layout

Figure 5.17 indicates the bar chart of users' rating on the font size, type, and content layout from 1 (very poor) to 5 (excellent). The highest rating is 4 (good) with a total of 37.5% vote (9 respondents). 8 respondents (33.3%) rate the readability of the system excellent while 5 respondents (20.8%) feel the readability is only moderate. For the range poor (2) and very poor (1), one respondent (4.2%) voted on each.

Open-ended questions are also prepared for the respondents for the extra comments or feedback. Most of the respondents think the system is already good presently, but some also provide their opinions on future improvement. The largest improvement to be made is enhancing the user interface and content layout such as increasing the line spacing, more creative in colours and layout, and making sure the layout is more organized for easy viewing. Extra functions are also requested by the users. For example, language translator feature and adjustable summary for users to select on the summary length. Overall, the feedback highlights the users' satisfaction with the current system, but also points out some valuable suggestions for enhancing the user interface (UI), layout, and functionality to further improve the user experience (UX).

# 5.5 Summary

This chapter focuses on the evaluation methods and results of the AI techniques and system requirements for the project. The evaluation includes BERTScore (precision, recall, F1-score), cosine similarity, and ROUGE score, with a detailed test case description of the system. The chapter also covers the functional and nonfunctional testing of the system, including user feedback which is gathered through surveys. Functional testing verifies the system's ability to meet the specifications while non- functional testing assesses usability, design, and aesthetics. Extra feedback indicates the general satisfaction of the users with the system, along with some suggestions for user interface and functionality improvements to enhance user experience.



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Test Case	Description	Steps	Expected Output	Actual Output	Status (Pass/Fail)
1	Upload document from local storage.	<ol> <li>Click "Choose File" button.</li> <li>Select file to upload.</li> <li>Click "Submit" button.</li> </ol>	Document selected successfully uploaded to system for processing.	Document selected successfully uploaded to system for processing.	Pass
2	Real-time summarization of document and result generation.	<ol> <li>Click "Choose File" button.</li> <li>Select file to upload.</li> <li>Click "Submit" button.</li> <li>Highlighted original document and summary are on the left and right panel of result page respectively.</li> </ol>	Both results were successfully processed and shown in the right position.	Both results were successfully processed and shown in the right position.	Pass
3	Download highlighted original document to local storage.	<ol> <li>Click "Choose File" button.</li> <li>Select file to upload.</li> <li>Click "Submit" button.</li> <li>Highlighted original document and summary are on the left and right panel of result page respectively.</li> </ol>	Highlighted original document successfully downloaded to local storage.	Highlighted original document successfully downloaded to local storage.	Pass

# Table 5.1 Test Case Table

4	Download summary to local storage.	<ol> <li>5. Click "Download Highlighted Original Document" button.</li> <li>1. Click "Choose File" button.</li> <li>2. Select file to upload.</li> <li>3. Click "Submit" button.</li> <li>4. Highlighted original document and summary are on the left and right panel of result page respectively.</li> <li>5. Click "Download Summary" button.</li> </ol>	Summary successfully downloaded to local storage.	Summary successfully downloaded to local storage.	Pass
5	Upload new document.	<ol> <li>Click "Choose File" button.</li> <li>Select file to upload.</li> <li>Click "Submit" button.</li> <li>Highlighted original document and summary are on the left and right panel of result page respectively.</li> <li>Click "Upload New Document" button.</li> </ol>	IALAYSIA MELA Navigate back to the homepage to allow document upload.	Navigate back to the homepage to allow document upload.	Pass
6	Handle various format of	1. Click "Choose File" button.	Three types of documents were successfully	Three types of documents were successfully	Pass

	document (.pdf,	2. Select file (in .pdf, .docx, .txt) to	uploaded to the system	uploaded to the system	
	.docx, .txt).	upload.	for processing.	for processing.	
		3. Click "Submit" button.			
7	Highlight of important words in original document.	<ol> <li>Click "Choose File" button.</li> <li>Select file to upload.</li> <li>Click "Submit" button.</li> <li>Highlighted original document and summary are on the left and right panel of result page respectively.</li> <li>Click "Download Highlighted Original Document" button.</li> </ol>	Both original documents on the result page and downloaded pdf have important words highlighted.	Both original documents on the result page and downloaded pdf have important words highlighted.	Pass
8	Error handling.	<ol> <li>Click "Choose File" button.</li> <li>Select file (in .pdf, .docx, .txt) to upload.</li> <li>Click "Submit" button.</li> </ol>	Error message of unsupported file type displayed.	Error message of unsupported file type displayed.	Pass
9	Frontend and backend communication using Flask.	<ol> <li>Click "Choose File" button.</li> <li>Select file to upload.</li> <li>Click "Submit" button.</li> <li>Check backend process.</li> </ol>	Successful communication with documents uploaded and processed.	Successful communication with documents uploaded and processed.	Pass

### **CHAPTER 6: CONCLUSION**

#### 6.1 **Observation on Weakness and Strengths**

The project has shown a combination of both weaknesses and strengths that reflects its current state and recommendations for future development. One of the notable weaknesses is the moderate performance of the AI model, which does not consistently deliver the high accuracy and quality expected from advanced text summarization systems. The performance may be due to various factors, such as improper training parameters or limitations in the dataset used.

Another area that needs attention is the user interface of the web-based application, which will further affect the user experience. Although it serves its purposes and gets most of the good feedback, some users are still unsatisfied with the visual appeal like line spacing and the content layout. The modern users required more creative and intuitive design which can enhance the overall user experience and satisfaction.

On the other hand, the project strength lies in its successful integration of explainable AI that increases the transparency of the AI model. By using the feature, users have insights into how and why the summary was generated during text summarization. This feature is particularly valuable in understanding the rationale behind AI-generated content, especially in the legal field. The ability to explain decisions made builds trust with users and sets the system apart from other summarization tools that operate as "black boxes".

### 6.2 **Propositions for Improvement**

After the identification of the strengths and weaknesses of the system, several key propositions for improvement can be made in future. First and foremost is modifying the training parameters. To enhance the system's performance, a detailed review and adjustment of the training parameters need to be done. This could involve experimenting with different model architectures, tuning hyperparameters, or using more diverse and extensive training datasets. The suggested ideas should be able to increase the model's accuracy and ability to generate high-quality summaries.

For the user interface of the application, a comprehensive overhaul is recommended. The enhancement should focus on making the user interface more visually appealing and user-friendly. This could involve updating the design to be more modern and responsive to ensure it meets the accessibility standards. User feedback should also be incorporated to improve the navigation through the system and overall usability.

A feature that some users required is the adjustable summary length, allowing users to adjust the length of the summary generated by the system. This feature will add a valuable level of customization as there are different needs between users. Some require a brief overview, but some claim a detailed summary. The target users would benefit from being able to tailor the output according to their specific requirements.

Last but not least, introducing a language translation feature will significantly broaden the system's appeal and usability as it enables the system to serve a more diverse user base. The feature allows the system to generate summary in multiple languages and catering to non-native users or those studying or working in multilingual environments.

#### 6.3 **Project Contribution**

From the findings of the project, it makes several important contributions to the university, faculty, and individual, especially in the field of artificial intelligence text summarization and the integration of explainable artificial intelligence.

To the university and faculty, the project provides a practical example to implement an AI-driven solution with a focus on model transparency and interpretability. The project can be used as a learning tool or a basis for further academic research, potentially leading to future innovations or collaborations. On a personal level, the project contributes to the individual's expertise in artificial intelligence, specifically in the areas of natural language processing and explainable artificial intelligence. The experience and skills gained through this project can be precious for future career opportunities or advanced studies.

The detailed user manual which provides comprehensive instructions on how to use the system is attached in Appendix F. The manual is a crucial resource for users and stakeholders to ensure that they can fully leverage the system's capabilities.

# 6.4 Summary

In summary, the project successfully meets the set objectives as it delivers a functional and explainable AI-driven text summarization system. The system demonstrates significant potential especially with the integration of XAI. It also reveals some areas for improvement, such as performance optimization and user interface enhancement. The proposed improvements, including adjusting training parameters, upgrading the user interface, and adding new features like adjustable summary length and a language translator, will further enhance the system's functionality and user satisfaction. Concluding, the project not only contributes valuable insights and tools to the AI and legal field but also create a basis for further development. With the recommended improvements, the system has a high potential to become a leading tool in its domain, offering users a more powerful, customizable, and accessible text summarization experience.

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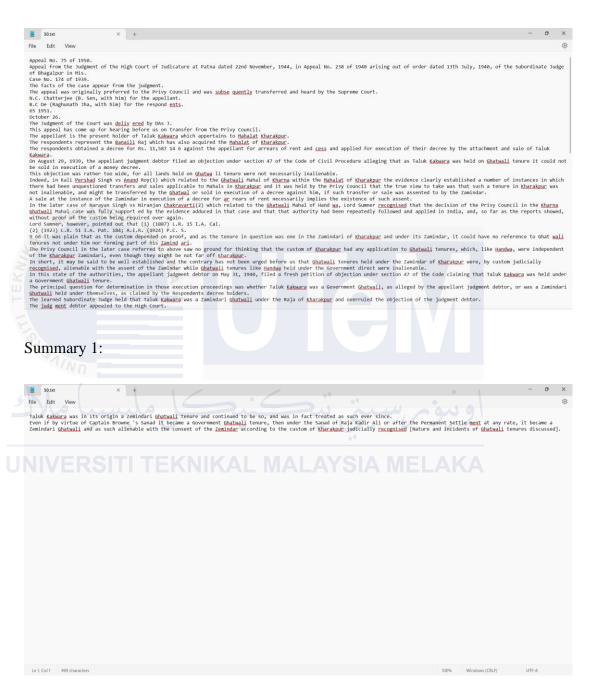
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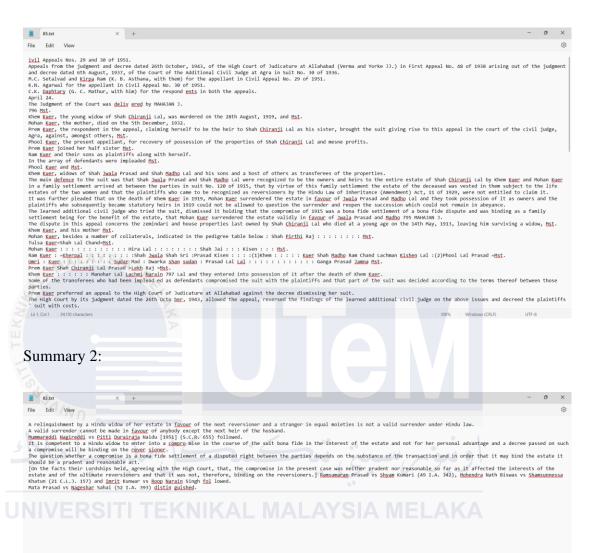
# APPENDIX A: 20 EXAMPLES OF TRAINING DATA SET

#### Judgement 1:



#### Judgement 2:

Ln 1, Col 1 1,297 characters



#### Judgement 3:

202.txt × + × Find the New
 A of 1933.
 A of 1935.
 A of 1935.
 A of 1935.
 A of a dist.
 A cit asks (section fr. Kagar, such thal) for the petitioners.
 A star is for the response of the constitution of india.
 A cit asks (section fr. Kagar, such thal) for the petitioners.
 A star is a splitation preserved by the petitioners on the constitution.
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unreasonable. Under cl. 4(3) of the Uttar Pradesh Coal Control Order, 1953, the licensing authority has been given absolute power to grant or refuse to grant, renew or refuse to renew, suspend, revoke, cancel or modify any licence under this order and the only thing he has to do is to record reasons for the action he takes. Not only so, the power could be exercised by any person to whom the State Coal Controller may choose to delegate the same, and the choice can be made in favour of any and every person. Such provisions cannot be held to be reasonable: Held, therefore that the provision of cl. 4(3) of the Uttar Pradesh Coal Control Order, 1953, must be held to be void as 104 804 imposing an unreasonable restriction upon the freedom of trade and business guaranteed under article 19 (d) (g) of the constitution and not coming within the protection afforded by cl. (e) of the article. Yick Wo vs Hopkins at 373) referred to.

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vs (CRLF) UTF-8

#### Judgement 4:

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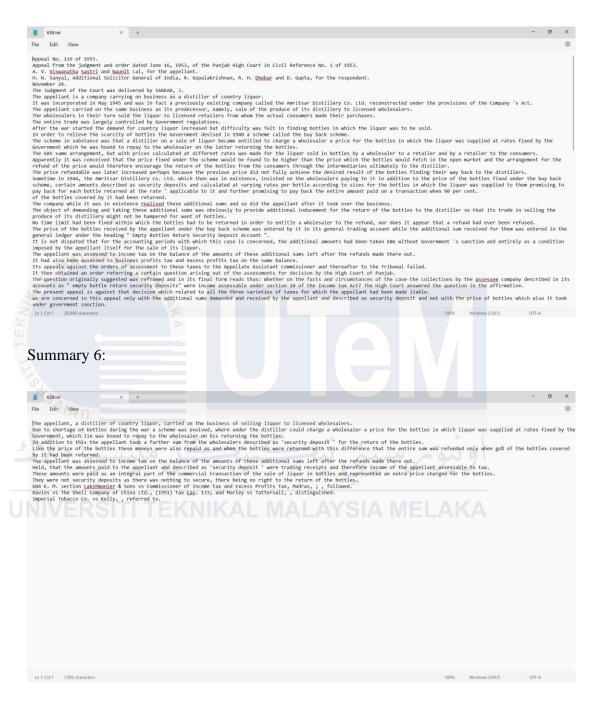
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# Judgement 5:

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A. Palkhizala, 7. N. Joshi and R. F. y 22. Le Judgeert of the his is an appeal be exclude an exclude and section tends, september 1 minor and the section of the minor and the section of the section of the section of the section of the agree	ave from the judgment as 8. Dadachamji, section 8. Dadachamji, section 8. Dadachamji, section 8. Dadachamji, section 9. Datachamic and 19 of the Excess 19. Jone 15, 1945, three br deed of trust, exhibit ther persons Lai Bandge ther persons and co., are the partners, acquir a special resolution on 5, a memorandum of agreen herein. are the five persons name agents ', 'unless exclu- for a period of 20 year were to gat a remuneration of the subject to a admin sent provided that, 'C	N. Addleg Rameshwar Nath i dent. ENKATARAMA AIYAR J. ENKATARAMA AIYAR J. the judgeent of the Bombas is profits Tax Act, 1940, is sprofits Tax Act, 1940, is observed. Second State State State State State is a sprofit of the State State State Conters Sir Eadaments Singh A, whereby they settled a 20dar and Sir Chunnilal I trustees may with the he or selling agency of any 1 or any of the objects a onduct of the business, and Ltd. were the managing aj d a controlling interest September 3, 1945, appoint ment, exhibit B, was duly d as trustees under exhibit ded by or repugnant to th s; but it was open to the on of 10 per cent. mon of 10 per cent.	and P. L. Vohra, for the ap y High Court passed in a re- and of the Business Profits h BL Jost and April 1, 198 mina, tala (aliashpat simp) sum of Rs. 1,00,000 on var- whetha as its trustees. Ip of the trust fund, for a company in such name or na- foresaid in the sid will by purch- ling the trustees of the J. executed by the Company co- it A were appointed as muna e context shall include the trustees to throw it up on ffice allowance of Rs. 1,06 this agreement, the Amagin	ference under section 66(1) of th Tax Act, 1947, respectively reac 0466 47, 1947 As and 1948 49 and 7, to March 31, 1948, and it aris nia and cala lacksmingat Singhani Jous charities specified therein and on behalf of and for the bene mes as they in their absolute dis d to "raise or borrow money requi alled the Raymond <u>socollem</u> Mills is se of the shares of Messrs. E. 1 K. Trust as managing agents of to nstituting the trustees of the J. ging agents in their character as Trustees for the time being of t giving three months ' notice.	e Indian Income tax Act, 1922 (he with section 66(1) of the Act. of excess profits tax for the ch sout of the same facts and invoi a dwo were carrying on business un and called the J. K. Trust, BomBaj it of the trust, carry on such bun cretion may think fit and proper . Gend for the purpose of the trust <sup>*</sup> td. The firm of JugeIlal Kamlagat Sassoon and Co. therein; and fo he Company in the place of Messrs K. Trust, BomBay, as its managin trustees, and it is expressly pro- te said Trust or 68 any other Tru Company a deposit of Rs. 1,00,000	argeable accounting lives the same points i y, and appointed siness including the and may close and re s of which the three liboxing on this, the r E. D. Sassoon and CC g agents on the terms ovided therein that th st with which the same	for ila sta o ' ar he e m
er annum on the amo Clause 8 laid an o warantee such loans ider el. 14, "Notwi progated by mutual The trustees enter ree Singhania brot i the annual income	unt of such deposit in a bligation on the managin or advances from time t thstanding anything here agreement. ed on their duties as ma hers as their representa which would be payable	ddition to their remuneral g agents "to arrange loam o time". in contained, all the terr naging agents under this a tive to carry on the mana to them under exhibit B.	tion. s and advances to the Compa ms and conditions of this A agreement, and by an agreem ging agency work on a remun	ny as and when required up to and greement including the period of ent dated May 14, 1946, they appo eration of 30 per cent.	not exceeding Rs. 10 lacs at any appointment of the Managing Agent inted one <u>Tej Marain Khaitan</u> , son property held under trust to be	s may be varied or in law of one of the	
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### Judgement 6:



### Judgement 7:



#### Judgement 8:

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#### Judgement 9:



#### Judgement 10:

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kppeal bo. 634 of 1965.

kppeal by certail leave from the Award (Part 11) dated April 23, 1964 of the Industrial Tribunal, Maharashtra, Bombay in Reference (IT) No. 271 of 1962.

K. K. Signdy, R. section Kulkarni, section (Kulkarni, section C. Aggregale and D. P. Singh, for the respondents.

The Judgement of the Court was delivered by <u>tidawatullan</u>, J.

This is an appeal against the Maward, April 23, 1964 of the Maharashtra Industrial Tribunal, Bombay (Mr. <u>tehen</u>) in reference (IT) 271 of 1962.

The Award was given in a dispute between the Kwami imployees union, bombay and the Kamani Metals Alloys Ltd. The Company is the appellant before us.

The Judgement of the Court was delivered by <u>tidawatullan</u>, J.

This is an appeal against the Ward, April 23, 1964, of the Maharashtra Industrial Tribunal, Bombay (Mr. <u>tehen</u>) in reference (IT) 271 of 1962.

The Award was given in a dispute between the Kamani metals approxed to marriage clause for monthly paid employees.

At first a reference was made to a conciliation Board by the Goverment on September 8, 1962.

The conciliation was frustrated for some reasons and on December 14, 1962, the Bombay Goverment acting under section 10(1)(d) of the referred the dispute to the Tribunal for adjudication.

By the Award now under appeal, some points were decided in facour of the Company and some others in <u>facour</u> of the work men.

The workeen have not appealed and the Company has also confined this appeal to some of the points of rolled products of non ferrous metals and alloys, copper and copper based
alloys, such as sheets, strips, coils etc.

According to the Company the process of manufacture, unlike the general engineering industry, involves only the melting of the non ferrous metals and casting them into suitable slabs for
the subsequent processes of hort and coil rolling to alter their shape, size and metallingical properties.

He and concernent with a Company the sa agemental ongineering industry.

Metal for making products such as atometalistic, the other. It submits that the Tribunal in revising the wages, pays and ' the dearness allowance has followed wrong principles and ignored those laid down by this Court. of the argument in respects of wages to daily rated workmen and pays to monthly rated workmen is common and it will not be necessary to refer to the argument twice over in the course of If the state with in respects of wages to daily rated workmen and pays to monthly rated workmen is common and it will net determine the state of this judgment. This judgment in respects of wages and the dearness allowance in this company during the last 20 years. The wage scales and the dearness allowance were fixed unliterally to start with. The minimum basic wage was fixed at Rs. 30 per month or Rs. 1.16 per day which was the minimum settled by the Bombay Textile Standardization Award and the First Central Pay Commission for Government servants in on about 1950. The Tribunal has raised the minimum wage to Rs. 1.35 per day, which is equivalent to a wage of Rs. 35 per month. The maxime have also been raised proportionately. Similarly, in the case of monthly rated workmen the minimum monthly 'salary, which was Rs. 60 for the lowest grade clerk, has been raised to Rs. 85/ and the maximum has been increased in almost the same way but with general engineering concerns and has taken an irrelevant factor, namely in the yield from incertive bonus into comsideration, has made among grades and unnecessary adjustemt in making fitnements without taking into account the financial burden thus involved and the capacity of the company to bear it. We shall consider these submissions. Summary 10: 2178.txt σ× Fie Eds New 

 He and of the industrial tribunal is an industrial dispute between the appellant company (manufacturing products of non ferrous metals and alloys) and its workmen, was challenged in appeal to this court on the following grounds: (1) there was no change of circumstances justifying a revision of Wages, pay scales and dearness allowance, (2) while making such revision by 
its ward, many of the matternes stated in the judgment of this Court in Moyxey by Cleaner's vs Its Workmen, were not considered by the tribunal: (3) the Tribunal had cons.

 pared dissimilar concerns and not compared similar ones; (4) the Tribunal took into account an inrelevant factor, namely, the yield from incentive bonus; (5) no case was made out for

 ribunal was in error in making the award retrospective from ist October 1962, when the reference was made to it only on 14th December 1962; (7) the Tribunal had gone beyond the reference
 inasmuch as the reference was in respect of special clargerises of monthly rated employees by designation, whereas the Tribunal had fixed the new scales of pay not only for those worken
 but for all clerical and other worken who were classified as Grades A, B, C, and D; and (8) the interibunal had fixed the new scales of pay not only for those worken
 but for all clerical and other worken who were classified as Grades A, B, C, and D; and (8) the precentage was third of the deformess allowance, after the consumer price index 21, to wages, has made a
 departure from in applying the law or some settled principle, or of some gross and palpable error or conscinning substantial injunction.
 or is austantial error in applying the law of some settled principle, or of some gross and palpable error or conscinning substantial injunction.
 Here a revision was justified.
 Ide f all (2) In order to make the fair wage meet the increase in the cost of living, a revision of wages and dearness allowance becomes necessary.
 This court in its doctions as merely laid dom the princip File Edit View particularly those in a concern where there is affinity, even though the appellant company could not be described as a general engineering industry.
 smaller concerns,
 where the scale of pay is considerably lower, do not furnish a just basis for comparison.
 [470 A, B, O. F. G Greaves Colton & Co. vs. The Workmen, j. followed.
 (4) The Tribunal fixed lower wages in the reference relating to the connected concern, because, a substantial ment by way of incentive bonus.
 the tribunal fixed lower wages in the reference relating to the connected concern, because, a substantial ment by way of incentive bonus.
 the scale of the appellant company, finding the yield from incentive bonus, low, the tribunal fixed the wages at the proper level without considering the yield from incentive bonus, that is, without being influenced by it in any way.
 [471 E, 61 H g27 A B] (5) In the present case the fixation of scales of pay has been very cautious, the starting wage and the annual increment were not high, and therefore, it cannot be said that the Tribunal was in error in departing from point dojustment in granting increments based on the length of service.
 [472 G B] (5) Survations in Hindustan Times V. Their Workmen, [1964] 15.(R. 234 d F) 249, followed.
 (6) In view of the facts that the workmen demanded retrospective revision from ist July 1961, and that the matter was referred to the Conciliation Board in "September 1962, the choice of the function of the present case. Ln 1 Col 1 6.277

#### Judgement 11:

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#### Judgement 12:

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# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

#### Judgement 13:

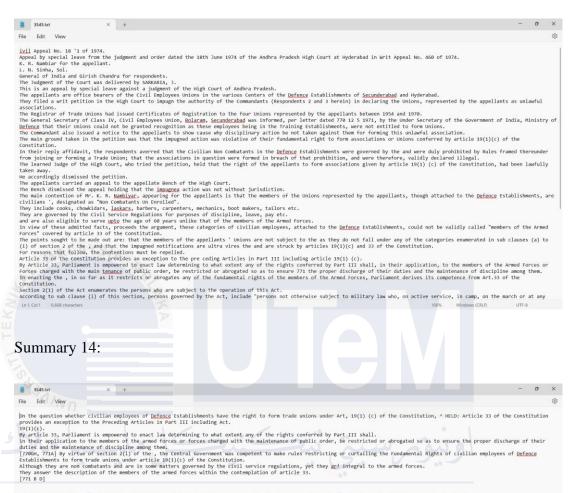
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3228.txt × + × File Edit View Appeal No. 1554 of 1970. kppals No. 1554 of 1970. April 2000 No. 1554 of 1970. April 2000 No. 1554 of 1970. April 2000 No. C. Natur and K. K. John, for appellant. 6. 8. Anja and section P. Mayar, for the respondent. 80 The Judgment of the Court was delivered by GUPA, J. This is an appeal by special leave from a judgment of the Madras High Court in a reference under section 66(1) of the Income Tax Act, 1922. The appellant, nesteries the Limited, is a public limited company incorporated in the 'year 1924 under the Companies Act, 1913. The appellant, referred to hereinsfer as the Company, derives its income from teag grown in its settle for which it is assessed to income tax. MS: Maritons and Crossield Limited have been the managing agents of the Company in the beginning. The following question relating to the assessment year 1939 60 was referred to the High Court : 'Mmether on the facts and in the circumstances of the case, the sum of Rs. 97,188/ representing question relating to the assessment year 1939 60 was referred to 11 per cent on all sales of tea and other produces of the Company and a further sum of Rs. 12,0000/ per annum for sectratial work. The relevant facts leading to the reference are these. The managing agents of the Company were entitled to commission at the rate of 11 per cent on all sales of tea and other produces of the Company and a further sum of Rs. 12,0000/ per annum for sectratial work. There see and adving the trans. April and the April 1, 1956 it was decided that there should be a fresh managing agents of the Company and its managing agents in conformity with the for sectratial work. The relevant of the said Act. Arrish are encent of and and subhitted by the managing agents was approved by the Company. The new agreement transposed the reappointment of MS. Narrisons & Constild Limited as the managing agents of the Company for a period of 19 years on a remuneration of 5 per cent commission on the net proposed the reappointment of MS. Narrisons & Constild Limited as the managing agents 3, 1957 by a letter adve subject to a minimum remuneration of Rs. 12,000/ (Rupees twelve thousand only) per annum payable to the managing agents, in the event or ausence or inscense of provide an any remember of provide an any remember of the approval, the company due to provide an any remember of the new agreement. This was disclosed in the published accounts of the company does not be accounted as an extraordinary general meeting of its shareholders held on October 4, 1957 reappointed M/s. Harrisons & <u>Crosfield</u> initiated on the terms stated above. In terms of the new agreement, the existing agency agreement between the parties stood cancelled with the expiry of March 31, 1956. 808 The Company follows the mercantile system of accounting. For the period April 1, 1956 to June 30, 1956, the Company credited a sum of Rs. 9320/ to the account of the managing agents as their remuneration in accordance with the terms of the proposed new agreement. This was disclosed in the published accounts of the company for the year July 1, 1955 to June 30, 1957 to its tavable income. In the next accounting year ending on June 30, 1957 relevant to the assessment year 1953 50 to the anaging agents. For the assessment of income tax, however, the company addeed back the said sum of Rs. 9,320/ to its tavable income. In the next accounting year ending on June 30, 1957 relevant to the assessment year 1953 60 for which the previous year was July 1, 1955 to June 30, 1958, a total sum of Rs. 97,188 was shown as managing agents 'remuneration payable during that the fully during the summer at 1977 windows (CMU) UT+0 (CRLF) UTF-8 Summary 13: 3228.txt σ× File Edit View ŵ The assessee who followed the mercantile system of accounting debited in its account books certain sums of money as remuneration of the managing agents for the assessment years 1957 58 to 1959 60. The assesses who followed the mercantlle system of accounting debited in its account books certain sums of money as remuneration of the managing agents for the assessment years 1957 58 to 1959 60. For the purpose of income tax the company added bat the sum to its taxable income and clamed the whole sum as a deductible expenditure in the assessment year 1959 60 on the ground that the sum became paperlo only during that year when the Government accorded tits approval to the new managing agency agreement. The income tax Officer rejected the claim holding that the approval of the central Government was necessary only for actual payment and the assessme should have ascertained the liability for each year and claimed th since he followed the mercantle system of accounting. This view was upheld by the Appellate Assistant Commissioner and the Income tax Appellate Tribunal. The High Court held that although at the time the debit entries were made in the account books of the eagensize. Year and papela to this Court, HELD : The High Court was in error in answering the question against the refusal of deduction by the Income tax Officer was right. Allowing the appeal to this Court, HELD : The High Court was in error in answering the question against the assessee. Year an assesses following the mercantile system of accounting is not entitled to claim a deduction until liability for the sum for which deduction or eapoIntement of managing agents. [909A; D; 1804] In the linstant case it is only when the Central Government conveyed its approval to the appointment of managing agents by its letter dated September 2, 1957 that the application the same size of the contains an absolute prohibition against the appointment or appointment of amanging agents by its letter dated September 2, 1957 that the application from any date prior to September 2, 1957 when the approval retrospective operation. The liability could not be said to had &risen from any date prior to September 2, 1957 when the approval retrospective operation. T

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#### Judgement 14:

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# JNIVERSITI TEKNIKAL MALAYSIA MELAKA

#### Judgement 15:



#### Judgement 16:



# Judgement 17:

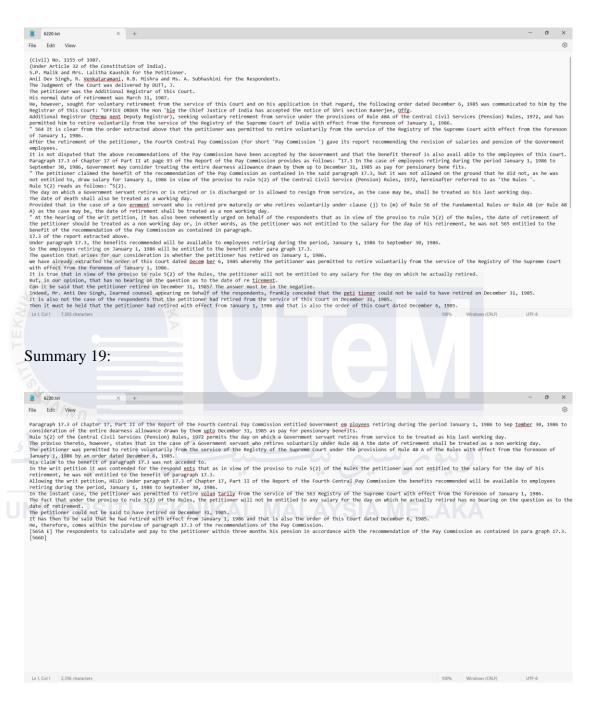
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wind Das, P.N. Misr	a, D.C. Taneja and P.K.	Judgment and Order dated 11.: Juneja for the Appellant. hini for the Respondent.	.1974 of the Orissa High C	ourt in Special Jurisdictio	n Case No. 62 of 1972.			
e Judgment of the C	Court was delivered by P	ATHAK, J. inst the judgment of the High	ו Court of Orissa and raise	s the familiar question whe	ther a loss suffered by the	<u>assessee</u> is a capital	loss or	• a
e assessee deals in or the assessment ye	n automobiles and also s ear 1963 64, the relevan	t accounting period being the	e year ended March 31, 1963	, the <u>assessee</u> claimed a lo	iss of Rs.53,650 sustained by	y it on disposing of i	ts	
claimed that the l Income tax Office	Drissa Government Floate loss suffered by it was er disallowed the loss i	revenue loss and, therefore on the view that it was 210 a	deductible against its prof capital loss.	its for the year.				
<pre>ie assessee 's appea it on second appeal ose in the course o</pre>	al was dismissed by the the Income tax Appellat of the business, and tha	Appellate Assistant Commission e Tribunal accepted the contro- it therefore, the <u>assessee</u> was r wrote separate but concurre	oner of Income tax. ention of the <u>assessee</u> that s entitled to a deduction o	the subscription to the Go	vernment Loan was conducive	to its business and t	hat the	los
the instance of th rcumstances of the	ne Revenue the Appellate case, the loss of Rs.53	r wrote separate but concurre Tribunal referred the case 1 ,650 sustained by the <u>assess</u> late Tribunal the High Court	to the High Court of Orissa age on the sale of the Gover	nment Loan is a capital los	s or a revenue loss.			inst
the outset, we fin	nd it necessary to note	that the High Court has taken ice and arrive at its own find	n the view that the factual					
think the High Cou is now well settle	urt fell into serious er	ror in doing so. ibunal is the final fact find		come tax Act and that the C	ourt has no jurisdiction to	go behind the stateme	nts of f	fact
e Court may do so o it even there the Co ilidity of the impug	only if there is no evid ourt cannot disturb the gned findings of fact on	lence to support them or the findings of fact given by the the ground that there is no	e Appellate Tribunal unless evidence to support them o	a challenge is directed sp or they are the result of a	ecifically by a question fra misdirection in law.	amed in a reference ag		
ere is a long line e India Cements Ltd 3; C.I.T. vs Madan	of cases decided by thi d. vs C.I.T., , 64; Haza Gopal Radhey Lal, ; , 6	s Court laying down this prop rat <u>Pirmahomed</u> Shah Saheb <u>Ro</u> 56; Hooghly Trust Ltd. vs C.1	vosition. ¿a Committee vs C.I.T, , 49 (.T., , 690; C.I.T. vs Impe of Income taw Pikan and Or	5 6; C.I.T. vs Greaves Cott rial Chemical Industries (I	on & Co. Ltd., 68 ITR200; C. ndia) Ltd., and <u>Aluminium C</u>	.I.T. vs Meenakshi Mil orpon.	ls Ltd.,	,
justify its re exa	amination of the evidence , the questions raised	relied on Com 211 missioner of e and to supersede the findin in the Reference before the F	ngs of fact rendered by the	Appellate Tribunal by find	ings of fact reached by itse the findings of fact reach	elf. ed by the Appellate Tr	ibunal a	35
the present case t rcumstances, the fi	the question referred to indings of fact set fort	the High Court was framed or h in the judgment of the High	h Court must be vacated.					
ing so and propose e case has remained	to dispose of the Refer d pending through its su	Court requiring it to answer ence ourselves on the stateme accessive stages for the last	ents of fact contained in t over 20 years, and it is a	he appellate order of the A ppropriate that it should b	<pre>wppellate Tribunal. we disposed of now without fu</pre>	urther delay.		ro
1. Col 1 9.060 characte		up on the basis of the appel	late order of the Appellat	e Tribunal the <u>assessee</u> was		for the Government Lo Windows (CRLF)		
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the assessment ye claimed that the 1 Income Tax Office on second appeal.	er and the Appellate Com	claimed a loss of Rs.53,650 revenue loss and, therefore, missioner of Income Tax negat accented the contention that	tived the claim of the asse	ssee.	we to its business and that t	the loss arose in the	course c	of
iness, and that th the High Court on High Court was of ive at its own fin	nerefore, the <u>assessee</u> w n a reference to it at t f the view that the fact addings of fact.	has entitled to a deduction of the instance of the revenue, h ual substratum of the case ha	the loss claimed by it. weld that the loss was a ca ad been misconceived by the	pital loss. Appellate Tribunal and that	t it was, therefore, entitle	ed to re examine the e	vidence	an
nce this appeal by lowing the appeal, ject of retaining t	special leave. the Court, 208 ^ HELD:	1.1 Whether Government bonds orities for the purpose of h	or securities were purchas is business, the loss incur	ed by the assessee with a v red on the sale of such bon	iew to increasing his busin ds or securities was allowa	ess with the Governmen ble as a business loss	t or wit	th
2F G] 1.2. ring regard to the ler to further the	sequence of events and sales of the assessee a	the close proximity of the in nd boost its business. We by way of commercial expedi	westment with the receipt	of Government orders it is	clear that the investment,	in the instant case, w	as made	in
le of the investmen L1H;212A B] 1.3 No	nt must be regarded as a enduring benefit was br	revenue loss. rought about by the assessee i	investing in the loan so fa	er as the orders from the Go	overnment Departments were co		sessee o	'n
ere was nothing to investment did no	show that there was any ot bring in an asset of	30, 1961 it was decided to pure reason for the assessee to be a capital nature, and that in	hold on to the investment i n the circumstances of the	<pre>and 4 one tonne pick up van n the loan indefinitely. case the loss suffered by t</pre>	5. he assessee was a revenue 1	err and not a capital	1	
<pre>iu V vs Dhandayutha is now well settle</pre>	r of Income Tax vs Indus	try and Commerce Enterprises	(P) Itd., : Additional Com	cost the abos surrered by t	the Manager was a referred a	oss and not a capital	1055.	1000
Court may do so o	apani Foundry (P) Ltd., ed that the Appellate Tr	approved. ibunal is the final fact find		missioner of Income tax, Ma	adras II vs B.M.S.(P) Ltd.,	; Commissioner of Inco	me tax,	
lidity of the impug	<pre>apani Foundry (P) Ltd., ed that the Appellate Tr in its appellate order, only if there is no evid burt cannot disturb the gned findings of fact on memory it use T</pre>	approved. ibunal is the final fact find lence to support them or the A findings of fact given by the the ground that there is no GA: Hazarat Pirabomed Shah 2	ding authority under the In Appellate Tribunal has misd e Appellate Tribunal unless evidence to support them o Sabeb Braz Committee ys GIT	missioner of Income tax, Ma come tax Act and that the C lirected itself in law in ar a challenge is directed sp or they are the result of a i 405 6 C I I vs Greave	<pre>idras II vs B.M.S.(P) Ltd., ; court has no jurisdiction to rriving at the findings of fa ecifically by a question fra misdirection in law. s Cotton &amp; Co. Ltd: C.L.</pre>	; Commissioner of Inco go behind the stateme act. amed in a reference ag T vs Moenakshi Mills	me tax, ents of f ainst th	fac he
lidity of the impug LOE G] 209 India Ce L.T. vs Madan Gopal nmissioner of Incom the case of a refe igment of the High Id question of law.	<pre>pani foundry (P) Ltd., de that the Appellate order. only if there is no evid ourt cannot disturb the gned findings of fact on memts ttd. vs C.I.T., , I Badhey Lal, ; , 656; H me tax, Bihar and Orissa erence under the Income Court, the case has to</pre>	approved. ibunal is the final fact find lence to support them or the / findings of fact given by the	ding authority under the In Appellate Tribunal has misd e Appellate Tribunal unless evidence to support them o Saheb <u>Boza</u> Committee vs CIT , 690; C.I.T. vs Imperial ending through its successi	missioner of Income tax, Ma accome tax Act and that the C lirected itself in law in ar a challenge is directed sp they are the result of a r, 495 6; C.I.T. vs Greave Chemical Industries (India) ve stages for the last seve	<pre>idras II vs B.M.S.(P) Ltd., ; court has no jurisdiction to riving at the findings of fi secifically by a question fri siddirection in law. s Cotton &amp; Co. Ltd., ; C.I.I. Ltd., ; Aluminium Corporat tral years and as a result of</pre>	; Commissioner of Inco go behind the stateme act. amed in a reference ag T. vs Meenakshi Mills ion of India Ltd. vs C f the Supreme Court se	me tax, nts of f ainst th Ltd., , .I.T., a tting as	fac he 61 and side
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# Judgement 18:

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ecial Leave Petitio om the Judgment and	d Order dated :	2.2.1988 of the Bo	ombay High Court in A	rbitration Petition	No. 234 of 1987.						
Ramaswamy, Additie	onal Solicitor	General, K.V. Kir	ni, section Bharthari Karanjawala for the D	and P.H. Parekh fo	or the Petitioner.						
e Judgment of the (	Court was deli	vered by SABYASACH	HI MUKHARJI, J.								
stated therein the	at we would in	had by our order licate the reason	dated 10th March, 19 s by a separate judgm	B8 dismissed the sp ent later.	ecial leave petit	:10n under Article 1	36 of the Const:	tution.			
do so by this jud is is a petition for	or leave to ap	eal under Articl	e 136 of the Constitu	tion from the judgm	ent and order of	the learned Judge o	of the High Court	of Bombay of	dated 2nd Febru	ary, 1988.	
the impugned judg	ment the learn	d Judge has rejea	cted the application	for revocation of t	he authority of r	espondent No. 1, Sh	ri K.D. Bali, so	le arbitrato	or under sectio	ns 5 and 11 of	f th
order to appreciat	te the content:	ions raised, it ma	ay be stated that the	International Airp	ort Authority of	India which was the	petitioner in f	he High Cour	rt and is the p	etitioner here	ein
invited tenders	for the work of s. Mohinder Si	construction of uph and Company.	terminal building of a partnership firm ha	new international ving registered off	passenger complex ice at Delhi and	(Phase II) at the carrying on busines	Bombay Airport a s in Bombay subr	t 375 Sahar, itted a ten	Bombay. der and it was	accepted for 1	the
lue of Rs.7,26,31, formal agreement fo	325.			0 0		, ,	,				
is not necessary	to refer to the	e clauses of the a	agreement for the pre-	sent purposes.							
competent author:	ity.		sion in the agreement		disputes through	appointment of sole	e arbitrator unde	r clause 25	of the Condit:	ons of Contrac	ct b
rtain disputes are	se in which the	petitioner sough	ht claims amounting to er by letter dated 22	o Rs.85 lakhs. nd Eebruary, 1985 t	o refer the disp	ites with regard to	claims amounting	to Rs.85 1;	who to the art	itration.	
Shri K.K. Sud, t	he Chief Engin	er of the petition	oner by his letter ap	pointed respondent	No. 1 as the arbi	trator and made the	reference with	regard to th	ne claim of Rs.	85 lakhs on 2	23rc
ruary, 1985. 8th March, 1985, :	it appears from	the narration o	f the events in the j	udgment impugned th	at the arbitrator	gave directions to	the parties rep	arding submi	ission of plead	ings.	
pondent No. 2 file	ed pleadings w	thin time, but th	he petitioner filed i tter to the Chief Eng	ts pleadings after	a delay of two ar	nd a half months.	whitration and a	ccordingly	on 16th May, 10	86 a second	
Ference was made re	eferring 11 fu	ther points of di	ispute.								
appears that in re	s sought by re espect of the	pondent No. 2 on second and third r	22nd May, 1986 in re- references the assert:	spect of seven more ion of the petition	e claims but the p er was that these	etitioner informed disputes were not	on June 12, 1986 referable to the	that the the arbitrator.	nind reference	was premature.	
arbitrator had d	irected the par	ties to submit th	heir statements in re the learned Judge and	spect of second ref	erence and though	respondent No. 2 s	ubmitted its cla	im within th	ne stipulated p	eriod, the	
16th May, 1986 the	e Chief Engine	er made reference	No. 2 with regard to	claims amounting t	o Rs.1.17 crores	to the arbitrator.			to Do E 01		
netitioner by it.	s applications	of 8th and 9th Ju	titioner made another une, 1987 expressed i	ts objections to th	erence No. 3 to Ne references Nos.	2 and 3 made by th	e Chief Engineer	as accordir	to KS.5.81 Cro ng to the petit	re. ioner the said	d
erences were null 26th June, 1987 tl	and void as t he petitioner	nese were irregula ov its written sub	arly made. bmissions took prelim:	inary objection bef	ore the arbitrato	or 376 to the said a					
itrator on account	t of the fact f	that he was not va	alidly appointed as fa 1985 noted that resp	ar as references No	s. 2 and 3 were d	oncerned.		• •			
petitioner by it:	s application (	on 15th of June, 1	1987 requested respon	dent No. 1 not to p	proceed with the a	rbitration proceedi	ngs till its pro	liminary obj	jections regard	ing jurisdicti	iona
ects were decided		it clear that it	was appearing under	protest in the proc	eedings before hi	.m.				1177.0	
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#### Judgement 19:



#### Judgement 20:

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a 6901.txt × + File Edit View 8 Civil Appeal No. 233 of 1991 etc.
From the Judgment and Order dated 21.6.1988 of the Central Administrative Tribunal, Bombay Bench in O.A. No. 58 of 1988.
V.C. Nahajan, S.N. <u>Terdal</u>, A.K. Srivastava, C.V. <u>Subba</u> Rao, S.K. Gambhir, Dr. B. L. <u>Wadhera</u>, Sudarshan Menon, P. <u>Parameshwaran</u> and G.D. Gupta for the appearing parties.
The Judgment of the Court was delivered by K. JAGANNATH. SHITTY, J.
To cater to the educational needs of children of persons employed in the ordnances factory at <u>Ambazari</u> the Central Government has sanctioned and is running a Primary School from classes I to V. The budgent of the Court was delivered by K. JAGAMANN SHETY, J.
To cater to the educational needs of children of persons employed in the ordnance factory at <u>Ambazari</u> the Central Government has sunctioned and is running a Primary School from classes I to V.
They are paid honorarius and not full salay.
They are paid honorarius and not full salay.
Their honorarius in and trut alay.
Their honorarius in and trut alay.
Their honorarius in and trut alay.
Their honorarius is paid out of fees from the children and other donations received by the school.
The respondents, however, approached the central Administrative tribunal iseking regularisation of their services and demanding equal pay for equal work.
The innohorarius is paid out of fees from the children and other donations received by the school.
The respondents will proced to create a sufficient number of additional teachers required for this purpose; (ii) After completing the above exercise respondents will take steps to fill up the needy created posts in accordance with recruitment rules to be frawed for the purpose.
The pailiants who have worked as teachers in past should be first considered for the posts and only if they are found unsuitable should candidates from sources like the Employment teachers or define universe.
The pailiants who have worked as teachers in past should be followed in respect of poots of poots pointed on a regular basis and on remuneration additional teachers or the ordance factory have challenged the validity of these directions in (ii) Append No. 323/1991.
The respondents who have not that 68 there is no evidence that the respondents were opointed on tackers on thomorarius in advisched to the secondary School and the post somethal the reliable directions in (iii) Append No. 323/1991.
The post are being occupied by the ordance factory have challenged the validity of these dinct on the advisched to the secondary School and the post conc Summary 20: E 6901.txt o × File Edit View The appellant i.e. the central Government sanctioned primary school from classes I V to cater to the educational needs of children of persons employed in the <u>ordance</u> factory at <u>Ambazaci</u>. The employees on their own in the same premises opened a secondary school with classes VI to X. The respondents are teachers in the Secondary School and are being paid out of fees and other domains received by the school, they approached the Central Administrative Tribunal seeking regularization of their service and demanded equal pay for equal work. The tribunal allowed their claim with certain directions to the appellants including the Union of India i.e. directing the Central Government immediately to take up an assessment of the needs of the School to carry on its activities at the present level and to create a sufficient number of posts to be filled up on a regular basis. Allowing (ivil appeal No. 36 1991 of the Union of Their service of the Union of Their service of the Union of the intervice of the Union of Their service of the Union of Their service of the Intervice of the purpose. Allowing (ivil appeal No. 360 of 1996 of the respondents who have not been needs of the service of the respondents who have not been needs of the service of the respondents who have not been needs of the service of the respondents who have not been needs of the service of the respondents who have not been needs of the respondent to take steps to the respondent as taken to the needs of the respondents who have not been needs of the respondent who have not been needs of the respondent to take steps to the respondent as taken to the needs of the respondent to take steps to the respondent as the needs of the respondent to take steps to the needs of the respondent to take steps to the needs of the respondent to take steps to the needs of the respondent to take steps to the needs of the respondent to take steps to the needs of the respondent to take steps to the needs of the respondent to take steps to the needs of the respondent to take steps HELD: 1. There is no evidence in record that respondents were appointed as teachers on honorarium by or on behalf of the central Government. There is no evidence that they were initially appointed in primary School and later shifted to the Secondary School. It is undisputed 666 that the central Government has not sanctioned the Secondary School nor created any posts thereto. It had only sanctioned the Primary School and the posts connected therewith which are being occupied by regularly recruited teachers. It had only sanctioned the Primary School and the posts connected therewith which are being occupied by regularly recruited teachers. [688x 8] 2. The directions of the Tribural are indeed amazing compelling the Central Government to sanction the Secondary School. The central Government has taken a decision that it will not involve itself in sanctioning or running classes beyond the Primary School level. It is a policy matter involving financial burden. No court or the Tribunal could compel the Government to change its policy involving expenditure. [6800 E] 3. to an and a policy by the Central Government No court or the Tribunal could compel the Government to change its policy involving expenditure. [6800 E] 3. The respondents are not paid by the Central Government. There is no relationship of master and servant between the Central Government and the respondents. The respondents are employed by the local officers so how the Central Government is accountable. [686] 4. Even section 14 of the Administrative Tribunal Act, 1985 confers no jurisdiction, power or authority on the Tribunal to deal with the service matters of the employees like the respondents. The respondents cannot claim the pay scale admissible to the Government school teachers and much less <u>regularisation</u> of their services by the Central Government. [6886] (6886 GM = 1000 C = 1

## **APPENDIX B: 10 EXAMPLES OF TESTING DATA SET**

#### Judgement 1:

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78.txt × + σ× File Edit View File Edit View (File Edit View (File View (F It was arranged that the complainant should bring with him Rs. 1,000, being the balance due in respect of the furniture and that the police would give him Rs. 29,500 to be paid to the appellant. The complainant and a but inspect tor, posing as the complainant 's brother, went to the appel lant on 4 12 1948, and paid him the two sums of noney; and the keys of the flat and the motor garage were handed over to the complainant. As the appellant, and his wife were leaving the flat, the man, who masqueraded as the complain and recovered the sum of Rs. 30,500 from the trear seat of the car and also some papers, a typed draft of a partnership agreement be tween the complainant and the appellant and recovered the sum of Rs. 30,500 from the rear seat of the car and also some papers, a typed draft of a partnership agreement be tween the complainant and the documents that were handed over to him by the appellant, manely, the letter handing vacant possession (Exhibit 1), a letter to the the babay Gas Company for transfer of the gas connection to the name of the complainant (1), a letter to the babay Gas Company for transfer of the gas connection to the name of the complainant (2) of the notive flat and lad toging throuse hates Control. Alory, for receiving a pugnee of Rs. 29,500 and he was further charged under section 19(2) of the notive flat and a cloging throuse hates Scontrol. Alory, for necediving a pugnee of Rs. 29,500 and he was further charged with align and abeting man debuting her husband in the complainant is retreated of his flat anal that it was in this documents prograd with align and abeting may have haves also to a caretaker. The defence of the appellant was that he was in search of a partner to carry on his business and a sch con plainant was also to act as caretaker of the flat anal that it was in the defence on the appellant here was also to act as caretaker of the flat anal that it was in the of the appellant duried and adding the plane during and abeting mas also to be a aretaker of the flat, the sum 100% Windows (CRLF) UTF-8 Ln 1, Col 1 Summary 1: **3** 78.txt × + - o × File Edit View Sub section (1) of sec. 19 of the Bombay Rents, Hotel and Lodging House Rates Control Act, LVI I of 1947, provided that "it shall not be lawful for the tenant or any person acting or purporting to act on behalf of the tenant to claim or receive any sum or any consideration as a condition for the relinquishment of his tenancy of any premises"; and sub sec. (2) provided that any tenant or person who in contravention of the provisions of sub sec. (1) receives any sum or consideration shall on conviction be purished with imprisonment and also with fine. A, who was a tenant of a flat, handed over vacant posses <u>sion</u> the flat to B on receiving "<u>purpe</u>", under a document which recited that A shall have no claim whatever over the flat and that B shall pay the rent directly to the landlord. A was convicted of an offence under sec. 10 (2) A was convicted of an offence under sec. 19 (2). Held, that there was no "relinquishment" of his tenancy by A, within the meaning of sec. 19 (1) and the conviction could not be sustained. There is a clear distinction between an assignment of a tenancy on the one hand and a relinquishment or surrender on the other. In the case of an assignment, the assignor continues to be liable to the landlord for the performance of his obligations under the tenancy and this liability is contractual, while the assignee becomes liable by reason of privity of estate. The consent of the landlord for an as <u>signment</u> is not necessary, in the absence of a contract or local usage to the contrary. But in the case of relinquish ment it cannot be a unilateral transaction; it can only be in <u>favour</u> of the lessor by mutual agreement between them. Relinquishment of possession must be to the lessor or ne who holds hitnerest; and surrender or relinquishment transact be lessee's rights and lets in the lessor. As sec.

Relinquisingent of possession must be to the assort the many second provide the second provided as a sec.
19 of BomBay Act LVII of 1947 creates an offence and imposes a penalty of fine and imprisonment, the words of the section must be strictly construed in <u>favour</u> of the subject.
The Court is not concerned so much with what hight possibly have been intended as with what has been actually said in and by the language employed in the statute.
Judgment of the Bombay High Court reversed.

#### Judgement 2:

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Appeal No. 251 of 1963. Appeal No. 251 of 1963. Appeal by special leave from the judgment and order dated March 20, 1957, of the Patna High Court in Civil Revision No. 40 of 1956. M. C. Stallvad, and M. C. Prasad, for the appellants. The respondent did not appear. March 24, 1964. The short question which arises in this appeal is whether the term "wages" as defined by section 2(vi) of the (No. 4 of 1936) (hereinafter called 'the Act ') includes wages fixed by an award in an industrial dispute between the employer and his employees. This question has to be answered in the Light of the definition prescribed by section 2(vi) before it was amended in 1958. The subsequent amendment expressly provides by section 2(vi) (a) that any remuneration payable under any award or settlement between the parties or order of a Court, would be included in the main definition under section 2(vi). The point which we have to decide in the present appeal is whether the remuneration payable under any award was not already included in the definition of wages before the said definition was amended.

the main definition under section 2(vi). He point which we have to decide in the present appeal is whether the remuneration payable under an award was not already included in the definition of wages before the said definition was amended. It is common ground that between the appellant, <u>Satamusa</u> Sugar works Ltd., and its workmen, the respondents, an award had been made by an Industrial Tribunal fixing the pay of the employees at 8x. 2/1/ per day, and in pursuance of the said award, the management of the appellant had entered into an agreement with the respondents that effect would be given to the wage structure, prescribed by the said award. In spite of the award and the agreement, the appellant captet as a part of the award. In spite of the award and the agreement, the applet in the applotes only As. // P or day and that led to the present claim made by the respondents under section 15 of the Act. // He respondents contended before the payment of lages authority that the refusal of the appellant to pay to the respondents the said parce. // He respondents contended before the payment of lages authority directing the appellant to pay to the respondents the said prescribed wages. // I used that section 15 of the Act was inapplicable, because the rates of wages fixed by the award did not fall within the definition of wages prescribed by section 2(vi) and it also argue, that the claim of the respondents was barred by limitation. // I meant that section 15 of the Act. In regard to the question is of the act. In regard to the question is of the act. In regard to the question is of the correctness of the conclusion of the authority did not decide the said question as a preliminary question, because it held, and, in our opinon, rightly, that it was a mide (Lot pay filling a petition under article 226 of the constitution. Let applicant challenged the finding of the authority and held that section 15 was applicable to the sage persceived by the award did momunt owages as defined by cont by filling a petition filed

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### Summony 2.

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In pursuance of an award made by an Industrial Tribunal fixing the pay of the employees at Rs. 2/2/ per day, the management of the appellant had entered into an agreement with its workmen, that the effect would be given to the wage structure prescribed by the said award. In spite of the award and the agreement, the appellant paid its employees only As. (3/) per day and that de to the present claim and by the respondents under section 15 of the Payment of Wages Act. (3/) per day and that de to the present claim and by the respondents under section 15 of the Payment of Wages Act. (3/) per day and that de to the present claim and by the respondents under section 15 of the Payment of Wages Act. (3/) per day and that de to the present claim and by the respondents under section 15 of the Payment of Wages Act. (3/) per day and that de to the present claim and by the respondents to pay the wald prescribed wages. Agrees prescribed by section 2(v) of the day by the appellant that section 15 of the Act was inapplicable, because the rates of wages fixed by the award did not fall within the definition of the appellant then challenged the correctness of the conclusion of the authority before the High Court under article 220 of the Constitution. The High Court dismissed the writ pertition and affirmed the finding of the authority the award did amount to wages as defined by section 2(vi) of the Act. On appeal by Special Leave the appellant contended that before it is held that the wages prescribed by the award fall under section 2(vi), it must be shown that they constitute part of the terms of the conflaved. When an award is note and it prescribes a new wage structure, in law the old contractual wage structure becomes inoperative and its place is taken by the wage structure prescribed by the award. In a sense, the latter wase structure may the deemed to be the contract to the markel and its place is the affect of lowburdel and inductation.

award. In a sense, the latter wage structure must be deemed to be the contract between the parties, because that, in substance, is the effect of industrial adjudication. The true legal position is that when industrial disputes are decided by industrial adjudication and awards are made, the said awards supplant contractual terms in respect of matters covered by them and are substituted by them. That being so, it is difficult to hold that the wages prescribed by the award cannot be treated as wages under section 2(vi) of the Act before it was amended. The amendment thas merely clarified what was included in the unamended definition itself. South Inclaim Bank Ltd, vs A. R. Khoo, A.I.A. 1958 Mass. 152, referres to. Modern Mills tut. vs V. R. Remainsteinflex, A.I.A. 1959 Mass. 1614. 342 and V. B. Godse, Manager, Prabha Mills ttd. vs R. M. Maick , approved L/P(0)[SCI 14(a) 420

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#### Judgement 3:



# Judgement 4:

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# Judgement 5:



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# Judgement 6:



# Judgement 7:

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#### Judgement 8:

a 6003.txt × + o × File Edit View it case for initiating any groces d ings for contempt against the respondents. [3096] & ORIGINAL JURISDICTIONE With Petition (civil) No. 530 of 1983 etc. (under Article 32 of the constitution of India): V.A. Bobde, Shyam Mudallar, V.M. Tarkunde, G.L. Sanghi, M.S. R. Karanjamala, Mrs. Meenakshi Karanjamala N.M. Popli and V.J. Francis for the Petitioners. No. A. Subhashini, D.M. Doluvid, Girish Chandray, C.V. section Rao, M.C. Dhingra and N.K. Sharma for the Respondents. The Judgeent of the Court was delivered by 03MA, J. The Dudgeent of the Court was delivered by 03MA, J. The Dudgeent of the Court was delivered by 03MA, J. The Dudgeent of the Court was delivered by 03MA, J. The Durgeent of the Court was delivered by 03MA, J. The Durgeent of the Court was delivered by 03MA, J. The Durgeent of the Court was delivered by 03MA, J. The Durgeent of the Court was delivered by 03MA, J. The Durgeent of the Court was delivered by 03MA, J. The Undgeent of the Court was delivered by 03MA, J. The Undgeent of the Court was delivered by 03MA, J. The three civil miscellaneous petitions referred to above on the other ha ngd have been made by the appellants of Civil Appeal No. 441 of 1981 asserting that the direction given by this direction. The exact nature of the prayer made in these miscellaneog was applications shall be indicated after referring to the relief granted on Ard rebruary, 1981 in Civil Appeal No. 441 of 1981.

Court on 2 nd February, 1981 has not been compled with in the manner as its ought to have been by the respondents and they should be consequently required to complet with the said direction. The exact nature of the prayer made in these miscellance us applications shall be indicated after referring to the relief granted on 2nd February, 1981 in Civil Appeal No. 441 of 1981. The 75 appellants of Civil Appeal No. 441 of 1981 if ad a writ petition in the Allahabad High Court in 1972 asser ting that they had been appointed as Supervisors Grade 'A' on various dates in pursuance of a circular dated the Movember, 1902 issued by the Director General of Ordnarce EatCorle s, the relevant portion wherefor reads as hereunder: 'Subject: NON MONSTRIAL ESTABLISHENT PROMOTION D.G.O.F. has decided that Diploma holders serving as of Supervisor' A' ('tech) sub nerve been appointed as Supervisor' A' ('tech) and in equily a lent grades. Should be treated as follows (1) All those Diploma holders who have been appointed as Supervisor' A' ('tech) and in equily a lent grades. Should be treated as follows (1) All those Diploma holders who have been appointed as Supervisor' A' ('tech) and in equily allent grades. ('tech) 'subject: NON MONSTRIAL estimates and the second approximate is the state of a state of the provide to Chargeman. Kingly as a subject in the state against and had not been so promoted to the post of the post of Chargeman grade II on comple e tion of the spars' 'statisfactory work they had been discrim in mate against and had not been so promotion in finds through the Director General O' ordnance EatCorles to the post of chargeman II. The write the factory level and then a Departmental Committee at the ectoral providion of a discretory. A' who comes within the range of eligibility and then finally the Director General of ordnance EatCorles to promote the factory level and then a Departmental Committee at the ectoral providion is seniority us and the direction of a supervisor' A' to chargeman II. The write the factory level

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#### Summary 8.

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the petitioners in the writ petitions were appointed as Supervisors Grade 'A ' in various ordnance factories between 1962 and 1966, in pursuance of circular dated 6th <u>Hovembe</u>r, 1962 issued by the Director General of Ordnance Factorie section The circular further provided for promotion from <u>Supervis</u> or 'A ' to Chargeman II, on completion of two years ' <u>satisfact</u> o ry

issued by the Director General of Ordnance Factoric section The Circular turther provides the promoted to the post of chargeman Grade II on completion of two years ' satisfactory work, in pursuance of the circular dated 6th November, 1962, they had been of Supervisors Grade 'A' had been promoted to the post of chargeman Grade II on completion of two years ' satisfactory work, in pursuance of the circular dated 6th November, 1962, they had been dis criminated against and had to been so promoted immediate ly on the expiry of two years ' service. The writ petition was contested on the ground that the promotions could be easily in accordance with the proceeding by the Indian Ordnance Factories (Recruitment a gd Conditions of Service of Grade III Personnel) Rules, 19 56 and such promotions could be easily in accordance with the procedure prescribed by Rule 8 of these Rules. The learned Single ludge disissed the write petition on the ground of unexplained latches. The learned Single ludge disissed the write petition on the ground of unexplained latches. The same state would mainted against and the circular that aft or two years of satisfactory service there would be automating promotion from Supervisor Grade 'A' to Chargeman II as sigh a view would militate against and had some Supervisors Grade 'A' to the abeen automatically promoted on completion of two years ' service, without the recommendation after screening by the Promotion Committee, as provided in Rule 8, no right would date and the appellants inasmuch as such promo tions could be in the thet of Rule 12.

Chargemain II as guid a view would maintake against while 12 of the Mults, and upprovided under a depointment shall be more contents to upprove the provided in Nule 3, no right would accrue in factor of the appellants instance as such provided be in the teeth of a space of the scenario by the brownowing with a space of the scenario by the brownowing with a space of the scenario by the brownowing with a space of the scenario by the brownowing with a space of the scenario by the brownowing with a space of the scenario by the brownowing with a space of the scenario by the brownowing with a space of the scenario by the brownowing with a space of the scenario by the brownowing with a space of the scenario by the brownowing with a space of the scenario by the brownowing with a space of the scenario by the brownowing with a space of the scenario by the scenaris by the scenario by the scenario by the scen

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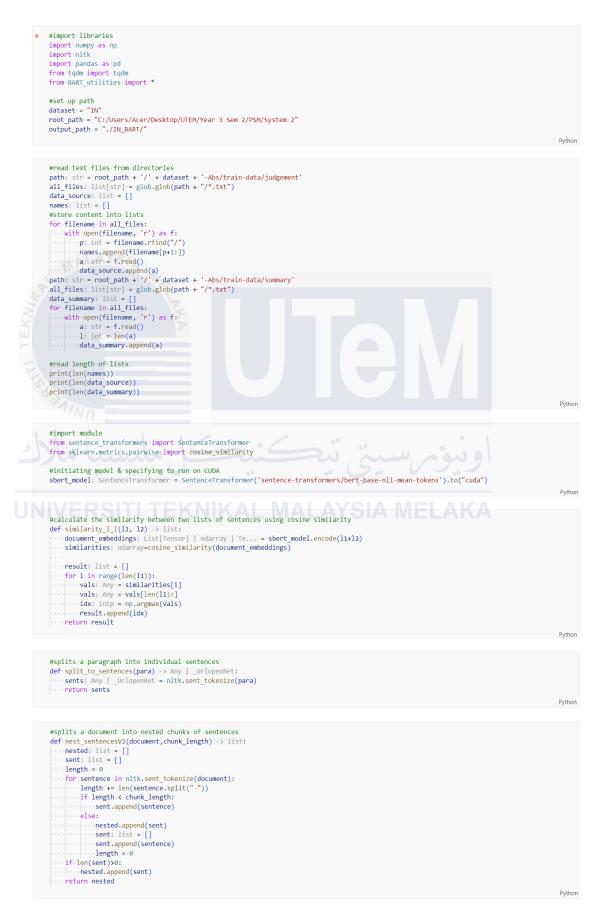
# Judgement 9:



## Judgement 10:

2 7109.txt × + File Edit View Appeal No. 1367 of 1980. From the Judgment and Order dated 19.7.1979 of the Rajasthan High Court in D.B. Civil Writ Petition No. 769 of 1979. Subhash Mallick and S.K. Jain for the Appellant. B.D. Sharma for the Respondents. The Judgment of the Court was delivered by YOGTSHARD DAVALJ. This is an appeal against the Rajasthan High Court dated 19th July, 1979 passed in D.B. Civil Writ Petition No. 681 of 1978 (<u>Raghubir</u> Singh vs The Board of Revenue for Rajasthan and others) and D.B. Civil Writ Petition No. 769 of 1979 (<u>Surendrapal</u> Singh vs The Board of Revenue for Rajasthan and others). These writ petitions were decided by the aforesaid common judgment. The first writ petition was filed by the father <u>Raghubir</u> Singh whereas the second writ petition was filed by his minor son <u>Surendrapal</u> Singh through his next friend Shri <u>Jagjit</u> Singh, maternal grand father of the minor. The facts of the case brieffy are that norceadings under Chante at the and the safe of the order dated 6th August, 1977 passed by the Board of Revenue for Rajasthan, The facts of the case brieffy are that norceadings under Chante at the and the safe of the order dated 6th August, 1977 passed by the Board of Revenue for Rajasthan, The facts of the case brieffy are that norceadings under Chante at the after base the safe of the order dated 6th August, 1977 passed by the Board of Revenue for Rajasthan, The facts of the case brieffy are that norceadings under Chante at the after base the more and the safe of the order dated 6th August, 1977 passed by the Board of Revenue for Rajasthan, The facts of the case brieffy are that norceadings under Chante at the after base the safe of the order dated 6th August, 1977 passed by the fact of the revenue for Rajasthan, The facts of the case brieffy are that norceadings under Chante at the after base the safe of the order dated 6th August, 1977 passed by the fact of the safe of the safe of the order dated 6th August, 1977 passed by the fact of the safe o The facts of the case briefly are that proceedings under Chapter III B of the Rajasthan Tenancy Act (Act No. 3 of 1955) (hereinafter referred to as "the Act of 1955) were commenced for determining the calling area for Raghubic Singh. The facts of the case briefly are that proceedings under Chapter III B of the Rajasthan Tenancy Act (Act No. 3 of 1955) (hereinafter referred to as "the Act of 1955) were commenced for determining the calling area for Raghubic Singh. The Sub Divisional Officer, Harumanagrih, by his order dated 10th August, 1972, determined the calling area, but an appeal by <u>Raghubic</u> Singh, the Revenue Appellate Authority, set aside the order of the sub Divisional Officer on Hards. Act of 1955) (hereinafter referred to as "the Act of 1955) (hereinafter referred to a "the Act of 1955) are commenced for determined the calling area for a datababic Singh. The sub Divisional Officer on Hards. Act of 1955 and to a construct when the data and the colling area for Raghubic Singh and tase of the divisional officer, Harumanagrih, by his order date Hards It was thus held that <u>Baghubir</u> Singh and his son <u>Surendragal</u> Singh are entitled to retain 124 Bighas and 16 Biswas only and the surplus land measuring, 4 Bighas and 6 Biswas may be resumed. Aggrisved by the order of the sub Divisional Officer, <u>Baghubir</u> Singh filed appeal before the Revenue Appellate Authority, Bikaner, who by his order dated 6th September, 1976 dismissed the same and upbeal the order of the the sub Divisional Officer, <u>Baghubir</u> Singh filed a revision application under Section 230 of the Act of 1955 before the Board of Revenue Appellate Authority, <u>Baghubir</u> Singh filed a revision application under Section 230 of the Act of 1955 before the Board of Revenue for Rajasthan. On behalf of <u>Faghubir</u> Singh filed and that the petitioner was in possession of 112 Bighas only and not 122 Bighas and a Biswas as beild by the lower courts. We swappt permission to adduce additional evidence in support of his contention. Weavever, the meaber of the Board came to the conclusion that <u>Superdragal</u> Singh Appellant here in) was born to <u>Baghubir</u> Singh on 14th March, 1963 and was only 13 years of age when the ceiling proceedings were finalized by the sub Divisional Officer on 5th May, 1976. He Gurdthen theid that the provisions of the old ceiling law applied to the case but the Sub Divisional Officer had committed an error of law in determining the ceiling area under the new law i.e. the Act of 1935. In the Utimate analysis the Meeber of the Board found that there was a gross and patent illegality in the order of the Sub Divisional Officer and, consequently, set aside the order of the Board found that there vas a gross and patent illegality in the order of the Sub Divisional Officer and, consequently, set aside the order of the Sub Divisional Officer faced 5th May, 1976, the said order became final and the Board of Revenue had no jurisdiction to set aside that append the state from the order of the Sub Divisional Officer 's and manageth, for fresh determination of the calling area for Baghubir Singh. (CRLF) Summary 10: **7109.txt** × σ File Ent View
Proceedings were commenced under chapter III B of the Rajasthan Tenancy Act 1955 for determining the ceiling area for Raghubir Singh, the father of the appellant.
The Beard of Revenue directed that the ceiling area for Raghubir Singh may be determined according to the old law, i.e. Act of 1955, and not according to the Rajasthan Imposition of Ceiling
on Agricultural Holdings Act, 1973.
Thereafter, By his order dt.
S.5. 76, the Son beld, inter alia, that tile father and the son, appellant, constituted two separate units and each of them was entitled to get 62 bights and a biawas.
Aggrieved by the 500 's order, Raghubir Singh file an appeal before Revenue Repellate Authority, which was disalised.
The tenang files are vision application under S.3. and the tot of 1955 before the Board of Revenue for Rajasthan.
The Rember of the Board held inter alia that the provisions of the old law applied to the case, but the 500 had committed an error of law in determining the ceiling area under the
new Act of 1973.
The Board further held that there is no provision for separate units in Chapter III B of the Act of 1955 before for 6 500 dated 5,5.76, it became final, and the Board of 723 Revenue had no jurisdiction to set
aids that prover of general superintendence and control over all revenue courts which vested in the Board out of the writ petitioners much
lass by way of Sugment exercise of powers.
The thigh Court disaissed the petition.
Heffer this court is usualited that the state not having filed an appeal, or a revision, the Board of Revenue could not, while hearing the revision petition of Resphubir Singh, set aside
the orders of the Son and Revenue Applicate Authority under 5.2.2 of the Act of 1955.
The file Court disaissed the petition.
Heffer this court is usualited that the state not having filed an appeal, or a revision, the Board of Revenue could not, while hearing the revision petition of Resphubir Singh, set aside
the orders of the Son and Revenue Applicate Authority under 5.2.2 of the Act of 1955.
T File Edit View 100% Windows (CRLF) UTF-8 Ln 1, Col 1 3.538 characters

# **APPENDIX C: TRAINING CODE**





# **APPENDIX D: TESTING CODE**





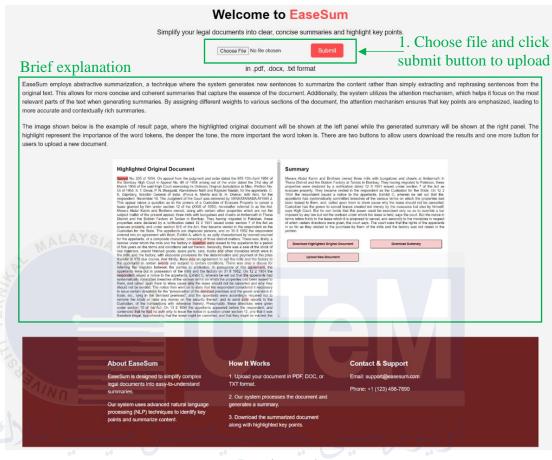
# **APPENDIX E: XAI CODE SNIPPET**



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

```
# Function to generate a highlighted PDF
def.generate_original_document.with_highlight_pdf(original_document, attention_weights, filename, output_folder) -> str:
....os.makedirs(output_folder, exist_ok=True)
    pdf_filename: str = os.path.join(output_folder, f"{os.path.splitext(filename)[0]}_H.pdf")
    c = canvas.Canvas(pdf_filename, pagesize=letter)
    width: float, height: float = letter
    # Set uniform margins
    margin = 72 · # 1 · inch · margin
    line_height = 18
    x_pos = margin
    x_pos = margin
y_pos: float = height - margin - # Start from the top margin
max_line_width: float = width - 2 * margin
    tokens: Any = original_document.split()
font_name = "Helvetica"
    font_size = 12
    c.setFont(font name, font size)
    # Add title to the first page
    title = "Highlighted Original Text"
    title_font_size = 16
c.setFont(font_name, title_font_size)
    c.drawString(margin, y_pos, title)
    # Adjust y_pos after title
    y_pos -= line_height + title_font_size # Add some space after the title
    # Reset font size for document text
   c.setFont(font_name, font_size)
   def start_new_page() -> None:
      nonlocal x_pos, y_pos
        c.showPage()
         c.setFont(font_name, font_size)
        x_pos = margin
      ···y_pos: float = height - margin
    def draw_token(token, attention_weight) -> None:
        nonlocal x_pos, y_pos
scaling_factor = 5 # Increase this factor for stronger highlights
         # Scale the attention weights directly
         adjusted_attention_weight: Any = np.clip(attention_weight * scaling_factor, 0, 1)
highlight_intensity = int(255 * adjusted_attention_weight)
         color = colors.Color(1, 1 - (highlight_intensity / 255), 1 - (highlight_intensity / 255), alpha=0.5)
         text_width: float = c.stringWidth(token, font_name, font_size)
         # Check if the text will fit in the current line; if not, move to the next line
         y_pos -= line_height
          if y_pos < margin:</pre>
           start_new_page()
         c.setFillColor(color)
         c.rect(x_pos, y_pos'-- font_size, text_width, font_size, fill=1, stroke=0)
         c.setFillColor(colors.black)
         c.drawString(x_pos, y_pos - font_size, token)
         x_pos += text_width + 2
    for token, attention_weight in zip(tokens, np.nditer(attention_weights)):
    draw_token(token, attention_weight)
    c.showPage()
    c.save()
return pdf filename
```

# **APPENDIX F: USER MANUAL**



#### Highlighted Original Document

Highlighted Original Document Appeal No. 205 of 1954. On appeal from the judgment and order dated the 978 13th April 1954 of the Bombay High Court in Appeal No. 49 of 1954 arising out of the order dated the 31st day of March 1954 of the said High Court exercising its Ordinary Original Juricdiction In Misc. Petition No. 55 of 1954. K. T. Desal, P. N. Bhagwaii, Rameshwar Nath and Rajinder Narain, for the appellants. C. K. Daphtary, Solicitor General of India, (Portos A. Mehta and B. H. Dhebay, with him), for the respondent. November 10. The Judgment of the Court was delivered by VENKATARAMA AYYAR J. This appeal raises a question as to the powers of a Custodinon of Evacuee Property to cancel a lease granted by him under section 12 of the (XXXI of 1950), hereinafter reforred to as the Act. Messrs Abdul Karin and Brothers owned, along with certain other properties which are not the subject matter of the present appeal, three mills with bungalovs and chawls at Ambernath in Thana the Bobbin Factory at Tardoo in Bombay. They having migraded to Pakistan, these properties were declared by a notification dated 12 9151 issued under section 7 of the Act as evacuee property, and under section 81(3) of the Act, they became vested in the respondent as the Custodian for the State. The appellants are displaced persons, and on 30 8 1552 the respondent to the appellants, of a composite character, consisting of three distinct matters. There was, firstly, a demise under which the mills and the factory in guestion were leased to the appellants for a period of five years on the terms and conditions set out therein. Secondly, there was a cale of the slock of the appellants, in a composite character, consisting of three distinct matters. There was, firstly, a systematically commit ded thirdly, there was an agreement. It was appellants unce this appellant, Exhibit C, where was a cale of the appellants to a clause for the appellants in certain events and subject to certain conditions. There was also clause for theref

### **Result** panels

#### Summary

Messrs Abdul Karim and Brothers owned three mills with bungalows and chawls at Ambernath in Thana District and the Bobbin Factory at Tardeo in Bombay. They having migrated to Pakistan, these properties were declared by a notification dated 12 9 1951 issued under section 7 of the Act as evacuee properties were declared by a notification dated 12 9 1951 issued under section 7 of the Act as evacuee properties. They became vested in the respondent as the Custodian for the State. On 12 2 1954 the respondent issued a notice to the appellants, Exhibit C, wherein be set out that the, appellants had systematically committed breaches of the various terms on which the properties bad been leased to them, and, called upon them to show cause why the lease should not be cancelled. Custodian has the power to cancel leases created not merely by the evacuee but also by himself, says High Court. But he con tends that this power could be exercised only as as to override a bar imposed by any law but not the contract under which the lease is held, asys the court. But the notice in terms refers firstly to the lease which it is proposed to cancel, and secondly to the movables in respect of which certain directions were given, the court says. The court use hat the rights of the appeliants in so far as they related to the purchase by them of the mills and the factory was not raised in the petition.

