DEVELOPMENT OF AN EYE GAZE DETECTION FOR NEURO-LINGUISTIC PROGRAMMING (NLP) APPROACH

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"I hereby declare that the work in this project is my own except for summaries and quotations which have been duly acknowledge."

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For my beloved father and beloved mother,

Ismail Bin Md Yusof and *Noorzila Binti Sulaiman*

family, friends and lecturers.

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ABSTRACT

Have you ever noticed that people's eyes move when they are thinking? The eye movement or eye gaze is valuable information that can provides us with clues as to whether they are thinking in image, audio or feeling. Eye Accessing Cue of Neuro-Linguistic Programming created in 1970s has provided analysis and explanation of the eye gaze. NLP practioner have been reading the eye gaze manually for ages but the manual eye gaze detection is low on accuracy and flexibility, thus this project is design to improve that deficiencies. This system is specially build to help the NLP practioner to detect eye gaze automatically and analyzed it based on EAC of NLP. MATLAB software is used to develop the algorithm and to design the Graphical User Interface (GUI). Kanade-Lucas-Tomasi (KLT) feature tracker is used as the implementation method. Outcome of this project shown in GUI will display the analysis of the eye gaze based on EAC.

ABSTRAK

Pernahkah anda sedar bahawa mata manusia bergerak apabila berfikir? Pergerakan mata atau renungan mata ini merupakan maklumat yang penting yang boleh memberikan kita klu sama ada mereka sedang berfikir dalam bentuk gambar, audio atau perasaan. Eye Accessing Cue daripada Neuro-Linguistic Programming yang tercipta pada tahun 1970an telah memberikan analisis dan penjelasan mengenai renungan mata ini. Pengamal NLP telah lama membaca renungan mata secara manual tetapi pengesan renungan mata secara manual adalah rendah pada tahap ketepatan dan fleksibiliti, maka projek ini terhasil untuk meningkatkan kekurangan itu. Sistem ini terhasil khusus untuk membantu pengamal NLP untuk mengesan renungan mata secara automatik dan menganalisi berdasarkan EAC daripada NLP. Perisian MATLAB digunakan untuk membentuk algoritma dan mereka bentuk Graphical User Interface (GUI). Kanade-Lucas-Tomasi (KLT) digunakan sebagai kaedah pelaksanaan. Hasil daripada projek ini yang ditunjukkan dalam GUI akan memaparkan analisis daripada renungan mata berdasarkan EAC.

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LIST OF ABBREVIATIONS

NLP	-	Neuro-Linguistic Programming
EAC	-	Eye Accessing Cues
GUI	-	Graphical User Interface
KLT	-	Kanade-Lucas-Tomasi
LEM	-	Lateral Eye Movements
UTeM	-	Universiti Teknikal Malaysia Melaka
FKEKK	-	Fakulti Kejuruteraan Elektronik Kejuruteraan Komputer

CHAPTER 1

INTRODUCTION

1.0 Introduction

Eye gaze of a person define their internal thinking. This project will focus on detecting and analyzing eye gaze of a person based on Eye Accessing Cues (EAC) of Neuro-Linguistic Programming (NLP). Further in this chapter, explanation of NLP and EAC will be explained in the project background. In addition, problem statement of the project will also be elaborated along with the objectives, scope of project and thesis plan.

1.1 Background of Project

Neuro-Linguistic Programming (NLP) is an approach to communication, personal development and psychotherapy created by Richard Bendler and John Grinder in the early of 1970s. The creators claim that there is a connection between the neurological processes (‗neuro‘), language (‗linguistic‘) and behavioral patterns learned through experience (‗programming‘) [11]. Through the years, NLP has developed some very powerful tools and skills for communication and change in a wide range of professional areas including counseling, psychotherapy, education and various others.

The creators introduced Eye Accessing Cues (EAC) as a part of NLP. This EAC model describes the eye movements that are not used for visual task (non-visual movement) and suggest that the direction of gaze can be an indicator for the internal thinking mechanism of a person. NLP practitioners have been reading eye gaze of people based on EAC model for ages but there are limits for them to do so as they are doing it manually. This project is generated to help the NLP practitioner to read the eye gaze automatically.

In this project, the eye gaze is detects and process by using image processing tools. The algorithm is developed in Matlab Platform. Videos of three subjects with their eye gaze are recorded in the database. The sequence of developing the algorithm will be start with the face detection and follow by the eye detection and iris detection. The expected outcome of this project is to produce algorithm that able to detect the eye gaze using image processing tools to help the NLP practitioner. The outcome will be show based on Graphical User Interface (GUI). The GUI will show the detected facial of the person and the mindset of the person based on their gaze.

1.2 Problem Statement

NLP practitioners have been reading people‘s mindset by reading the person‘s eye gaze for ages. As it is manually, the practitioner need to be really focus on reading the eye gaze. Therefore it is worth to look into the possibility to increases the accuracy and flexibility of the tiresome manual labeling by using automatic eye gaze detection.

1.3 Objective

The aim of this project is to detect the eye gaze of a person based on Eye Accessing Cues (EAC) of Neuro-Linguistic Programming (NLP). In order to achieve that, below objectives are drafted:

1. To develop algorithm to detect the eye gaze using image processing tools
2. To analyze and evaluate the performance of algorithm

1.4 Scope of Project

The scope of this project is to analyzing the eye gaze by detecting the relative position of the iris based on the concept of Eye Accessing Cues (EAC). The algorithm is set to be effective only on daylight and the MATLAB software is used to program the algorithm. DSLR camera will be used as for the hardware to record the eye gaze of people.

1.5 Thesis Plan

This thesis consists of 5 chapters organized as follow:

I. Chapter 1 is Introduction. It discusses about the outline of this project. In this chapter, the background study of the project and the objectives are described for a better understanding about this project.

II. Chapter 2 is Literature Review. It is about the literature review of the eye gaze detection method based upon previous research done. It also includes relevant information related to the concept of Neuro-Linguistic Programming (NLP) and Eye Accessing Cues (EAC).

III. Chapter 3 is Methodology. It discusses the implementation of the project. This chapter will show the methods that will be used in every stage and how it work, the steps and flow of the project.

IV. Chapter 4 is Results and Discussion. It describes the expected result from this project and its discussion of findings. It justifies its performance to make sure it meets the objectives of the project.

V. Chapter 5 is Conclusion and Future Work. It concludes the whole project followed by a number of recommendations for future development.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter will describe and discuss relevant literature reading which related to this project. The brief explanations about the perspective and methods of eye gaze detection and also methods used from the previous research are presented in this chapter. Besides, concept of Neuro-Linguistic Programming (NLP) and Eye Accessing Cues (EAC) will be further explained as these concepts will be used in this project.

2.1 Neuro-Linguistic Programming (NLP)

The NLP theory aims at describing the behavior patterns created by the interaction between brain, language and body. NLP presents unexplored opportunities for understanding the human patterns of thinking and behavior. Created in the 1970‘s, NLP has achieved considerable popularity as an approach to communication and personal development. NLP was developed by Richard Bandler and John Grinder. They claim that there was a connection between the neurological processes ("neuro"), language ("linguistic") and behavioral patterns learned through experience ("programming") and that these can be changed to achieve specific goals in life [11].

Bandler, whose background was in mathematics and gestalt therapy was studying at the University of Santa Cruz in the 1970‘s, where he developed a fruitful collaboration with John Grinder, a professor of linguistics. NLP is a growth-orientated rather than pathology-orientated approach, emphasizing learning as the key to personal change and development. NLP is increasingly familiar nowadays in professional arenas of education, management training and coaching.

Neuro-Linguistic Programming explores the inner workings of the human mind; how we think, how we develop our desires, goals and fears and how we motivate ourselves, make connections, and give meaning to our experiences. NLP is like the ‗user‘s manual‘ for the mind, and allows us to use the language of the mind to consistently achieve our specific and desired outcomes.

When someone learn NLP, they can learn specific skills and patterns necessary to make positive changes, create new choices, be more effective with others, break free of old habits, self-destructive patterns and behaviors, and think more clearly about what it is in life that they want and how to get it.

2.1.1 Some Tools and Techniques from NLP

There are many tools and techniques used in NLP. Here are four tools and a brief introduction of it [13]. To find out more, one could go on a reputable NLP course or read Richard Bandler‘s books.

The first tool is Moving Images. When someone annoys you, try to imagine an image of that person. Concentrate on how the picture appears in your mind. Try to make the image smaller and put it in black and white. Then, imagine it moving away from you. Notice how that process makes you feels after doing it. When something makes you feel good, try to make it bigger and brighter, and move it closer to you. Try to notice how this thought process makes you feels after doing it.

The idea behind this thought process is that it helps you see how people or events affect you and understand the way you feel about them. By manipulating images in this way, you are teaching your brain to magnify good feelings and make bad feelings weaker.

The second tool is Undermining the Critical Voice. Many of us will admit to having a critical voice in our heads that pops up at inopportune moments and says things like _You couldn‘t possibly do that‘, or _That sounds way too difficult for someone like you‘. Next time whenever you hear the critical voice, try to imagine it sounding silly. Make the voice sounds like Donald Duck or Tweetie Pie. Notice how this changes the way that you regard the voice‘s _wisdom‘. If the voice no longer sounds like someone real, it‘s much easier to silence it.

The third tools is Running the Movie Backwards. If you‘ve had a bad experience that you‘re struggling to get over, this NLP tool can help to make it go away by imagine it backwards. Start from a point in time where you realized the experience was over. Then imagine the whole incident happening backwards, until you‘ve gone back to a time before it happened. Do this a few times until you‘re familiar with the way that the _film‘ plays backwards. Now make it really small in your mind. Make it as in view on a mobile phone screen and play it again backwards. Finally, think of a different end to the experience, one that makes you smile.

Notice how the way that you feel about it has changed. The key to this technique is that you are showing your brain a different way of looking at a memory, which will change the way that you feel about it too.

The fourth tool is ‗Brilliance Squared'. This Brilliance Squared exercise is where you imagine yourself to be really confident or strong with turning up the brightness, intensifying the colors in your imagination.

The first step of the process is to take an emotion that you would like to feel, for example confidence. Next, you have to imagine a colored square in front of you filled with the color that you associate with that emotion. Imagine yourself standing in the square, filled with that emotion.

Notice how you would stand, the look on your face and everything about you when you stand in the square. Step into the square and take on the mantle of the imaginary ‗you'. Feel the feeling spreading through you. Repeat this a few times, until you can do it easily.

The ‗trick' here is that you have trained your mind to associate an image with a feeling. By conjuring up the image, you can now conjure up the feeling too. This NLP tool helps in power up your mentality and feeling great about yourself.