EMOTION MODELLING USING NEURAL NETWORK

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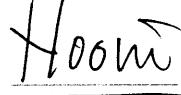
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ABSTRACT (ENGLISH)

Emotion has become an important interface for the communication between human and machine. Human's emotion can be detected by the machine, and machine can respond to it and interact with human in a more natural and adaptive environment. This study attempts to model emotion using neural network technique. Six primary emotions considered in this study are *anger*, *disgust*, *fear*, *happiness*, *sadness*, and *surprise*. For data preparation, front views of child facial expression images have been captured with Sonny Cybershot DSC U50 digital camera and extracted using MATLAB Image Processing toolbox. A dataset consists of 120 patterns with 82 attributes and emotion targets have been gathered at the end of image processing activity. The dataset was tested on Multilayer Perceptron with back-propagation learning algorithm. The emotion model obtained in this study uses parameters such as; learning rate 0.1, momentum rate 0.1, Sigmoid activation function, 200 epoch learning stopping criteria, with its architecture, 82 input units, 10 hidden units, and 6 output layer units. The Neural Network performance achieved 97.50 percent accuracy whereas the regression model obtained 66.67 percent accuracy. This result indicates that neural network has high potential to be used as emotion.

ABSTRACT (BAHASA MELAYU)

Emosi merupakan antaramuka yang penting dalam komunikasi antara manusia dan mesin. Emosi manusia dikesan oleh mesin yang dapat bertindak balas dengannya serta berinteraksi dengan manusia dalam persekitaran semulajadi dan adaptif. Kajian ini bertujuan memodelkan emosi dengan menggunakan teknik rangkaian neural. Enam emosi utama yang digunakan dalam kajian ini ialah *marah, jijik, takut, gembira, sedih,* dan *terkejut.* Untuk menyediakan data bagi kajian ini, imej pandangan hadapan wajah kanak-kanak telah dirakamkan oleh Sony Cybershot DSC U50 kamera berdigit dan diekstrak dengan MATLAB Image Processing Toolbox. Satu dataset terdiri daripada 120 rekod dengan 82 attribut dan jenis emosi telah dibentuk pada hujung akhir aktiviti pemprosesan imej. Dataset ini telah diuji dengan algoritma pembelajaran rambatan balik. Model emosi yang diperolehi dalam kajian ini menggunakan parameter seperti; kadar pembelajaran 0.1, kadar momentum 0.1, fungsi aktivasi sigmoid, kriteria penghentian pembelajaran 200 pusingan dengan senibinanya 82 uint input, 10 unit tersembunyi dan 6 unit output. Rangkaian neural mencapai 97.50% berbanding model regresi yang berupaya mencapai 66.67% ketepatan. Hasil kajian menunjukkan bahawa rangkaian neural mempunyai potensi untuk digunakan sebagai model emosi.

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TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

CHAPTER 2: LITERATURE REVIEW

CHAPTER 3: METHODOLOGY

CHAPTER 4: RESULTS AND DISCUSSION

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

REFERENCES

APPENDICES

Appendix A: Anger Facial Expressions and Facial Component Form

Appendix B: Disgust Facial Expressions and Facial Component Form

Appendix C: Fear Facial Expressions and Facial Component Form

Appendix D: Happiness Facial Expressions and Facial Component Form

Appendix E: Sadness Facial Expressions and Facial Component Form

Appendix F: Surprise Facial Expressions and Facial Component Form

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

1.1 Overview

Emotion is also known as mood (Columbia Encyclopedia, 2005) has always been used for showing human's feeling. There are many types of human's emotion until no people can tell the total amount of it. Nevertheless, there are six primary emotions are shown in the similar way by people throughout the world regardless of culture, which are happiness, surprise, sadness, fear, disgust, and anger (Morris and Maisto, 2002).

To date, a communication not only occurs among the human, human and animal, but also human and machine. In order to develop intuitive, effective and smoother human-machine interaction system, "Active Human Interface" that has the functions such as understanding human's emotion was proposed. Based on the understanding, the machine will calculate what kind of response to be taken and the calculated results will act as a reference by the machine to determine the response toward a human being (Kobayashi and Hara, 1992).

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