Real-Time Emotion Estimation System Using Face API of Microsoft Azure

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ABSTRACT

This paper presents real-time emotion estimation system using the Face API of Microsoft Azure. The system can display the results of estimated emotion extracted from face image with color light. We introduce the Face API of Microsoft Azure which is a kind of cognitive service to identify and analyze content within images. Experimental results showed that the proposed system is effective for implementing an estimation of not only emotion but also age and gender in real-time.

1. INTRODUCTION

There will be more opportunities for communication between human and AI (Artificial Intelligence) using natural language. Emotional intelligence of computer systems is increasingly important in human-AI interactions. For example, a humanoid robot “Pepper” of SoftBank is the personal communication robot that can read emotions, with the ability to analyze people’s expressions. Facial image holds important quantity of attributes and information about a person, such as facial expression, ethnicity, gender, and age. To predict emotions from facial expressions images, many methods are proposed in recent years. In this paper, we propose a new system to predict emotion from facial image in real-time. The system uses cloud computing platforms provided by Microsoft Azure. The results of the estimated emotion display text words in a monitor and show a color light in smart lighting system. In the next section, we introduce the cloud computing and Microsoft Azure. The proposed system is explained about configuration of hardware and software in section 3. Experimental results show in section 4. Finally, we conclude and summarize work in section 5.

2. FACE API OF MICROSOFT AZURE

2.1 Cloud Computing

Cloud computing platforms provide servers, storages, networking, applications over the Internet cloud with lower cost. There are some representative services such as AWS (Amazon Web Services), Microsoft Azure, and GCP (Google Cloud Platform). Since these commercial services give more secure, reliable and flexible platforms than on-premises servers, and more people are starting to use cloud computing services. The proposed system utilizes Microsoft Azure which can operate hybrid and seamless servers integrated into edge computing environments.

2.2 Azure API (Application Programming Interface)

Among various cloud computing platforms provided by Microsoft Azure, we applied Face API to the vision part of cognitive services. Face API can detect and compare human faces. In addition, Face API integrates emotion recognition, returning the confidence across a set of emotions for each face in the image, such as anger, contempt, disgust, fear, happiness, neutral, sadness and surprise. These emotions are understood to be communicated universally across cultures with particular facial expressions.

3. SYSTEM CONFIGURATION

3.1 Hardware Setup

The system comprises a web camera as an input device, a PC based Window 10, a 60-inch monitor as a display, and color lights Hue in Philips as an output device. Hue in Philips is a smart lighting system with a bridge. The bridge acts as a smart hub, connecting with our PC to output color light. Fig. 1 shows the appearance of the system in the cololab gallery in Tokyo Polytechnic University. To implement the system, the user has to put a switch called the action button as shown in Fig. 2. We prepared another monitor displaying the manual about the usage of the system with the action button.

Fig. 1 The appearance of the proposed system in the gallery of cololab

3.2 Application Program

The application program is compiled by Python. By using the specified threshold value, we can estimate an emotion among the various trained data by deep learning model. We can display the results to text words in the monitor and the size of the text represents the estimation performance. Bigger text means higher performance. When the application is executed in real-time, all results are back up in the system.

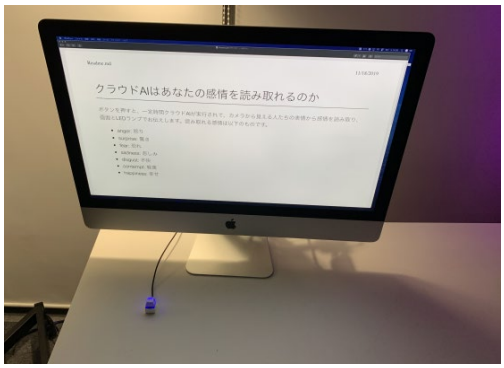


Fig. 2 Display of the manual about the usage of the system with the action button of the other monitor

4. EXPERIMENTAL RESULTS

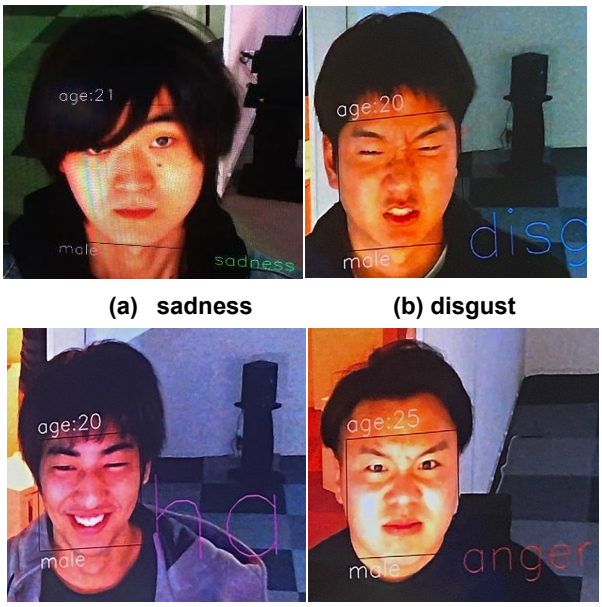
In this section, we show the results of the proposed system. Fig. 3 shows the sample images of a display for emotion estimation, age, gender. The application program is able to recognize faces from many people. Therefore, recognized faces are simultaneously shown in the display monitor. In addition, the smart color light system shows the result from a person shown in Fig. 4. The smart lighting system has the color of the rainbow such as red, orange, yellow, green, blue, indigo, and violet. Each color corresponds with the estimated emotion as shown in Table 1.

5. CONCLUSION

In this paper, we estimated emotion, age, and gender extracted from facial image in real-time. The system can display the color of light according to the emotion results with the Face API of Microsoft Azure. The relation of color and emotion should be investigated in psychological effects for future work. Since colors and emotions are closely linked, we can develop the communication system using colors psychology and smart lighting system.

Table1 Corresponding color lights from the estimated emotion

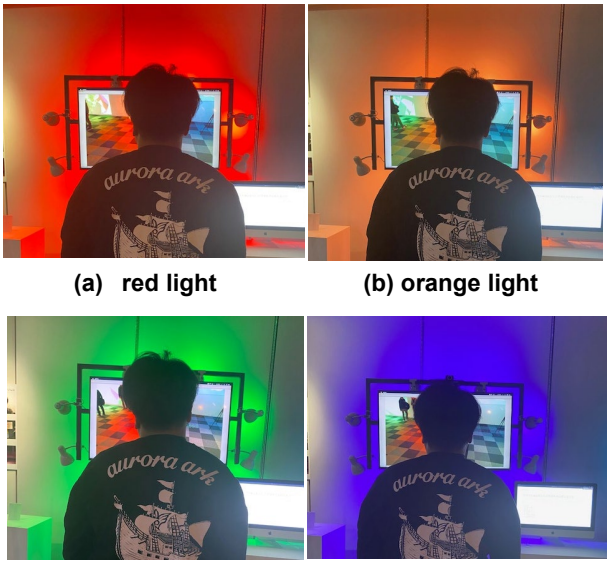
Colors lights	Estimated emotion
Red light	Anger
Orange light	Surprise
Yellow light	Fear
Green light	Sadness
Blue light	Disgust
Indigo light	Contempt
Violet light	Happiness



(a) sadness (b) disgust

(c) happiness (d) anger

Fig. 3 Results of estimated emotion in display monitor



(a) red light (b) orange light

(a) green light (b) violet light

Fig. 4 Results of various color light system according to estimated emotion

6. REFERENCES

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