

## Introduction

Emotion recognition is an interdisciplinary research field, which has attracted more and more attention in recent years. We can get emotional state from speech signal, facial expression signal or physiological signal. Based on the requirements of the project, we need to recognize user' emotions from their speech with the purpose of displaying the animation expression corresponding to their emotions. The paper aims to analyze the facial expressions of users under different emotions, which is helpful for us to design and select reasonable Animoji to represent the emotions at DS2.

## Analysis

Facial expression is caused by the fluctuation of emotion, which expresses personal psychological state, communication intention, personality differences and so on. It is thought that human facial expressions can be divided into six categories: Happy, Sad, Fear, Angry, Disgust and Surprise (Ekman et al., 1987). Here are Six examples of facial expressions from the CMU-PITTSBURGH AUCoded face expression image database, as shown in the following figure.



(a) Anger (b) disgust (c) fear (d) happiness (e) sadness (f) surprise.

*Figure1. Examples of six facial expressions*

According to Linlin (2017), facial expression refers to various emotions expressed through the changes of facial muscles, eye muscles and mouth muscles. Among them, the muscle groups near the eyes and mouth are the most abundant parts of facial expression. When we design and select Animoji, we can pay more attention to these two parts of muscle groups to better show facial expressions under certain emotions. And from the examples of facial expression, it can be further proved that the muscle groups near the eyes and mouth of each facial expression with different emotions vary greatly, meaning we may clearly understand the emotion expressed by the facial expression from these features. For example, fear is to see something frightening or hear bad news. It is usually expressed by frowning, narrowing your eyes and opening your mouth. Sadness indicates that you want to seek comfort. The most obvious point is the pull-down of the corners of your eyes and mouth.

Because Chunseng and I choose to analyze the happy emotion to design and select happy Animoji at DS2, the happy emotion will be specifically analyzed in the following content. For one thing, according to the experimental data, Eisenbarth et al. (2011) have drawn the conclusion that people tend to spend more time looking at the mouth area when the other person shows a happy facial expression. A U-shaped

mouth may be responsible for identifying happy faces because only happy faces have such salient features (Kirita & Endo, 1995). The muscles near the mouth will also show an upward trend, showing people a comfortable and friendly feeling. Therefore, when designing Animoji, we will lay emphasis on the design of mouth with U-shape to achieve that the mouth can show happy feelings as much as possible. For another, the eye area is also one of the most expressive areas. When detecting fake smile, when the eyes are unhappy, it will inhibit the bias effect of smile in mixed expression. The main factor of happiness on a face with a smiling mouth is happy eyes. In a truly happy expression, the contraction of happy eyes raises the cheeks, narrows the opening of the eyes, and produces wrinkles around the eyes (Calvo et al., 2018). Based on literature, we will also pay attention to the design of eyes to make people confirm that the emotion expressed is happy.

To sum up, the mouth and eyes are the focus of our design and selection of Animoji and the truly happy facial expression should be as follows.

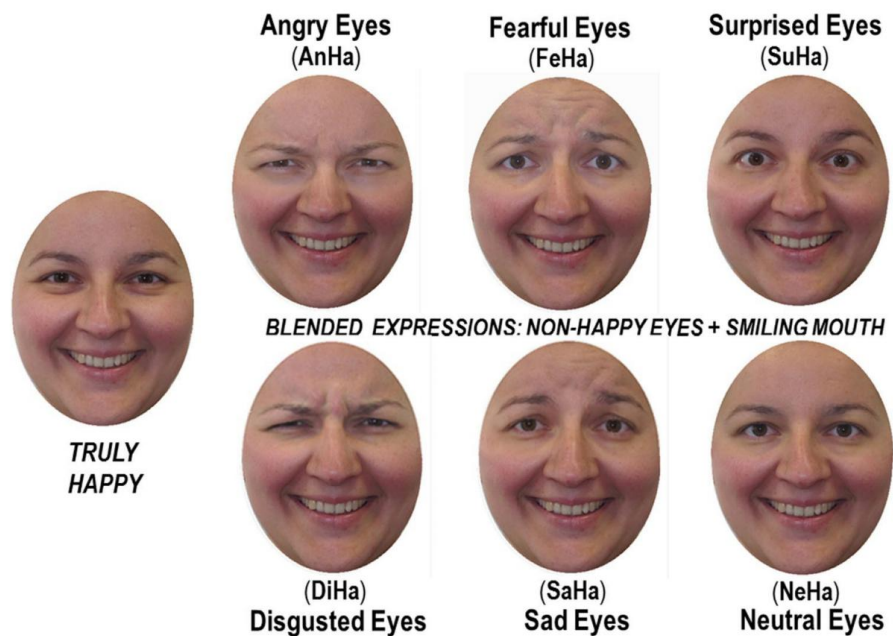


Figure2. Sample of face stimuli with truly happy and blended expressions

## References

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