A PROPOSAL FOR AUTOMATIC ANALYSIS OF EMOTIONS USING FACIAL CHARTS

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ABSTRACT. *In recent years computer technology has led to a remarkable increase in personal use. To be more user-friendly the computer must be more in synch with the user's character and mood. The ultimate purpose of our research is the development of a system that can automatically classify facial expressions and evaluate the emotions of each expression. At this point we have created a system that can recognize "joy", "anger", "sadness", "fear", "surprise", and "disgust". This system uses a graph which we call a "facial chart"—an image that expresses an emotion is compared with a neutral image. "Joy", "sadness", and "surprise" now show recognition rates of more than 50%.*
Keywords: Facial chart, Emotion, Expression analysis

1. **Introduction.** In recent years computer technology has led to a remarkable increase in personal use. To be more user-friendly the computer must be more in synch with the user's character and mood.

Humans are able to communicate, in large part, because we are able to recognize facial expressions. If a computer could read the emotions of a user, the user would be able to operate the computer more easily and smoothly. Moreover, the computer may be able to assist a person who is poor at communicating with others.

The ultimate purpose of our research is the development of a system that can automatically classify facial expressions and evaluate the emotions of each expression. To judge emotions, a system with a neural network [1], and another system that makes comparisons with a facial expression dictionary utilizing a minimum distance method [2] have been proposed.

Our aim is to develop a system that can judge the emotions of a person; a system that can analyze facial expressions from changes in facial images. In developing this system we have created a Facial Chart [3]. The Facial Chart is a graph that shows degrees of changing expressions as taken by a CCD camera.

In this report, we first explore the basic idea of evaluating facial expressions. Next we describe our emotion analysis method using the Facial Chart. Finally, we show some experimental results applied to sample face images.

2. **Evaluation of Facial Expression.** First, a definition of the terms "emotion" and "expression" as used in our research: *Emotion* is the movement of mind driving facial expression. *Expression* is a unit of change of facial features.

Ekman found "Joy", "Anger", "Sadness", "Fear", "Surprise", and "Disgust" as basic emotions [4,5]. These 6 emotions are universal, and so are used in our analyses.