

M.S. Thesis defense by Dimitriy Labunsky
“Facial Emotion Recognition System Based on Principle Component
Analysis and Neural Networks”

Friday, November 6, 2009 at 1pm

Location: FAB 20-05

Advisor: Dr. Marek Perkowski

ABSTRACT

In order for autonomous systems to learn through interaction, they must have the ability to collect data about their surroundings. Computer vision research has resulted in many viable approaches being presented for face detection, face recognition and face tracking. In contrast, few approaches have been presented for emotion recognition. Until computer systems have the ability to recognize emotion, realistic human-computer interaction cannot take place.

A system for human emotion recognition, through the analysis of facial expressions is presented. The system consists of two phases. The first phase preprocesses the image by implementing principle component analysis. This results in a compressed representation of image data. The output of the first phase is used as the input into the second phase. The second phase consists of an artificial neural network which is trained to identify emotions based on facial expressions. The output of the emotion recognition system consists of seven probabilities corresponding to each of the seven select emotions: angry, disgusted, fearful, happy, neutral, sad and surprised.

The presented system performs well in a controlled environment. It has the ability to be implemented in real-time and requires very few computational resources to function. This system can be easily combined with the eigenface face recognition system, resulting in a multimodal system which is able of both, identifying an individual and recognizing their emotion.