Project Proposal

Project Name
Hidden Emotion Detection through Analyzing Facial Expression

Project Group
Tianhe Wang (Tianhe@stanford.edu)
Jing Xiong (jxiong1@stanford.edu)
Enhao Gong (enhaog@stanford.edu)

Project Goals
Facial expression plays an important role in human communication and interaction. We plan to develop an Android App using DROID camera phones to detect easy-and-hard-to-notice facial expressions and make suggestions about potential emotional state. Along the way accomplishing our project, we plan to finish the drawing orchestra project as described in the EE368 suggested project page to locate and mark essential features, such as inner-lip line and chin. In addition, we plan to apply advanced computer vision scheme and algorithm to extract the hidden or micro emotions that can hardly be detected by eyes through analyzing the motion of those essential features.

Project Plan
This app will be based on image processing on both static images and frame-by-frame video.

For static emotion detection, we will first applied face detection method to locate face in the images. Then we will use local feature detection method to locate important facial features such as eye, lip and nose positions and contours. Based on the position and contours of these facial features, we can extract canonical points, which will be used as features for intransient emotion detection.

Moreover, in order to extract hidden or micro expression, we will mainly focus on the extraction of the inter-frame displacement. We plan to implement efficient multi-scale optical flow scheme to quantify the micro facial actions. Spatial temporal displacement pattern can be used to magnify the hidden facial expression and possible emotion changes.
Besides, our project is also collaborated with Pamela Davis (mentor of the drawing orchestra project) for feature classification, potential resources, and emotion study scoring system.

We plan to test our algorithm and app using CK database\(^1\) and other databases online or provided by Pamela and in-person testing.

Potentially, if time allowed, we would also explore extracting color feature on the face, such as blushing, in our emotion detection.

**Schedule:**

<table>
<thead>
<tr>
<th>Week of</th>
<th>Task</th>
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<tbody>
<tr>
<td>04/28</td>
<td>Proposal, project setup and initial algorithm</td>
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<tr>
<td>05/05</td>
<td>Implement contour detection in simple environment</td>
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<td>05/12</td>
<td>Improve contour detection on precision and generalization.</td>
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<td>05/19</td>
<td>1. Write up for contour detection;</td>
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<td>2. Implement spatial displacement extraction;</td>
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<td>3. match emotion to contour spatial displacement.</td>
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<tr>
<td>05/26</td>
<td>1. Testing and collect data</td>
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<td>2. write up for emotion matching</td>
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<td>06/02</td>
<td>Finish paper and poster</td>
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</table>

\(^1\) (http://www.pitt.edu/~jeffcohn/CKandCK+.htm)
References:


POLIKOVSKY, Senya, and Yoshinari KAMEDA. "Facial Micro-Expression Detection in Hi-Speed Video Based on Facial Action Coding System (FACS)." *IEICE transactions on information and systems* 96.1 (2013): 81-92.