A novel method for finding similar facial expressions based on Structural Similarity (SSIM) metric and Active Appearance Models (AAM).

System
- **Tracking Using Active Appearance Models (AAM)**
  - AAM are used to extract the shape vector from the face.
- **Normalisation And Expression Image**
  - The shape vector is normalised for rotation, translation and scaling. Expression Image (EI) is formed from the shape vector which represents just the expression.
- **Structural Similarity (SSIM) Distance Metric**
  - SSIM calculates the similarity between two images. EI images are compared with SSIM to find the similarity. SSIM used as distance metric in nearest neighbor and KMeans clustering.

Performance

82% accuracy on 260 images constituting 125 different speakers from Multi-PIE database. Results submitted to ACCV 2010 conference.

Proposed System

- AAM Fitting
- EI on Original Image
- Normalised EI
- K Nearest Neighbor
- SSIM distance metric
- K Means clustering

Applications

- **Facial Expression Based Auto Album Creation**
- **Finding Corresponding Facial Expressions For Facial Expression Transfer.**
- **Facial Expression Example Based Image Album Creation.**

Classification Results For SSIM-NN

<table>
<thead>
<tr>
<th>Emotion</th>
<th>Surprise</th>
<th>Happy</th>
<th>Neutral</th>
<th>Sad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surprise</td>
<td>78.2%</td>
<td>8.9%</td>
<td>9.0%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Happy</td>
<td>62.2%</td>
<td>75.8%</td>
<td>18.5%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Neutral</td>
<td>16.6%</td>
<td>16.6%</td>
<td>16.6%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Sad</td>
<td>0.0%</td>
<td>16.6%</td>
<td>16.6%</td>
<td>85.0%</td>
</tr>
</tbody>
</table>

Correct classification results on the images from the Multi-PIE database.

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