

# Facial Expression Recognition

Group 21

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# Introduction

- Facial expressions are the facial changes in response to a persons internal emotional states, intentions, or social communications.
- Facial expression analysis is rapidly becoming an area of intense interest in computer science and human-computer interaction design communities.
- Facial expression analysis refers to computer systems that attempt to automatically analyze and recognize facial motions and facial feature changes from visual information.
- In light of the important role that facial expression plays in communicating emotion in humans **Facial action coding system FACS**: is a human-observer-based system designed to detect subtle changes in facial features.
- Automatic facial expression analysis can be applied in many areas such as emotion and paralinguistic communication, clinical psychology, psychiatry, neurology, pain assessment, lie detection etc.
- This project is aimed to recognize the facial expression of static image captured from the camera.

# Model Explanation

- In our facial expression recognition problem first step is to detect of faces in images.
- **Viola Jones** algorithm is used to detect the face from the given image. But, Viola Jones requires full view frontal upright faces
- Characteristics of ViolaJones algorithm which make it a good detection algorithm are
  - Robust very high detection rate (true-positive rate) very low false-positive rate always (strong)
  - Real time For practical applications at least 2 frames per second must be processed.
  - Face detection only (not recognition) - The goal is to distinguish faces from non-faces (detection is the 1st step in the recognition process).
- Viola-Jones algorithm has 4 different stages

## • Haar Feature Selection

- The system is designed with the help of giving input by some faces and some non-faces. We will make our system to learn that which is face and which is not. We will apply the convolution kernel to the all over image.

## • Integral Image

- Integral Image means get the new pixel value by just adding the pixel values from left and top region.

## • Adaboost Training

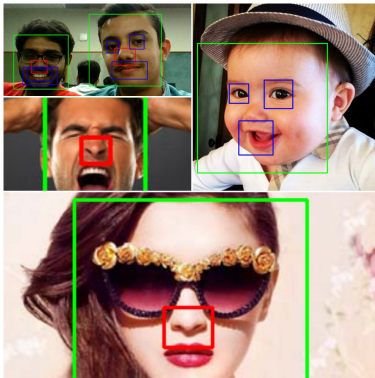
- It helps in finding the best features and will eliminate the redundant ones. After identifying the features it will give weight to the features. A good feature or a Weak Classifier and a linear combination of this features is used to decide whether its a face or not and it will together form a strong classifier

## • Cascading

- After adaboost we will have less no of features. The overall form of the detection process is that of a degenerate decision tree, what we call a cascade. A positive result from the classifier triggers evaluation of second and so on and a negative outcome leads to immediate rejection.

# Results

- The simulation results here shows that detection of eyes,nose and mouth is done successfully but whenever there is any object in front of eyes,nose and mouth the detection is not done correctly also when eyes are closed it is not detected correctly.



- Methods like Support Vector Machine, Naive Bayes Classifier, LDA. Also many features like eye brows, chin can be extracted in future.

# References

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- Paul Viola,Michael J. Jones Robust Real-time Object Detection,2001
- Arushi Raghuvanshi, Vivek Choksi Facial Expression Recognition with Convolutional Neural Networks