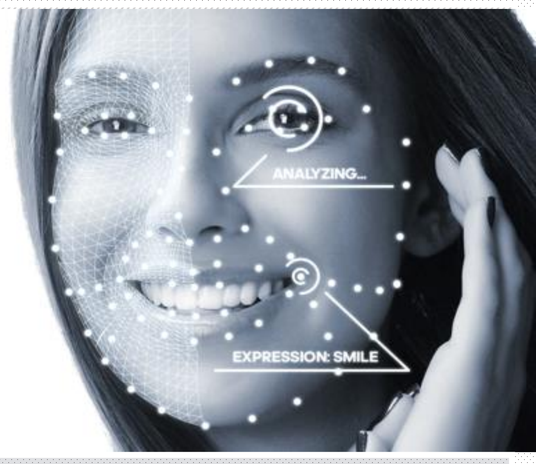
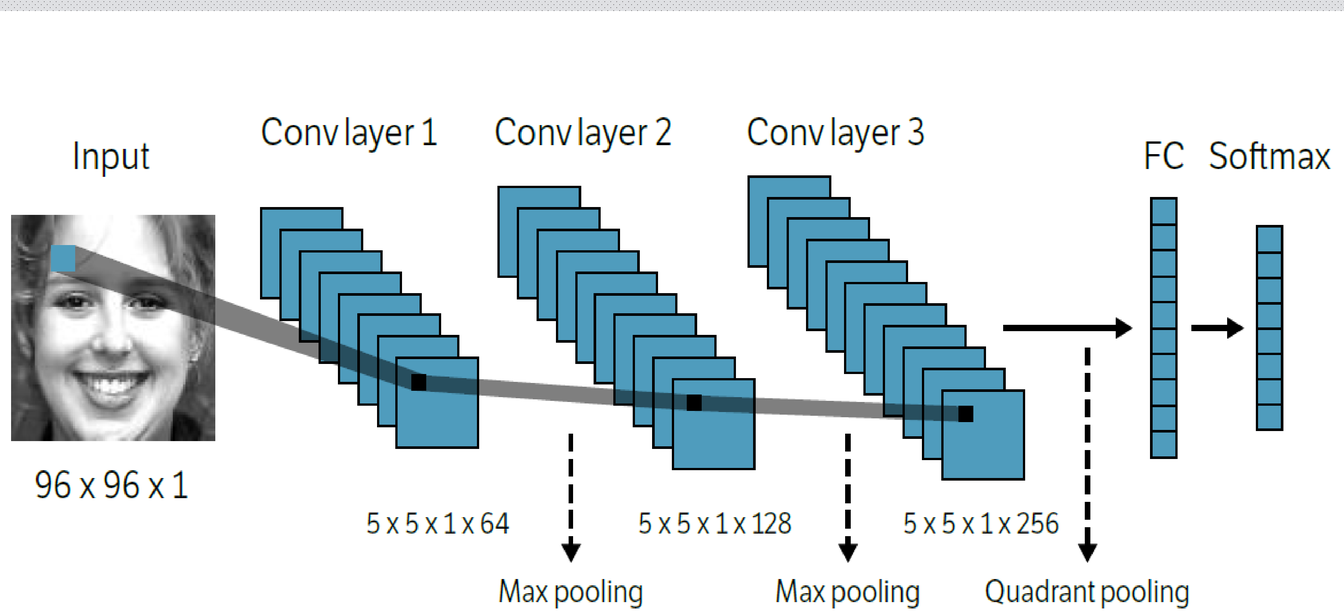
Deep-Glance Classification



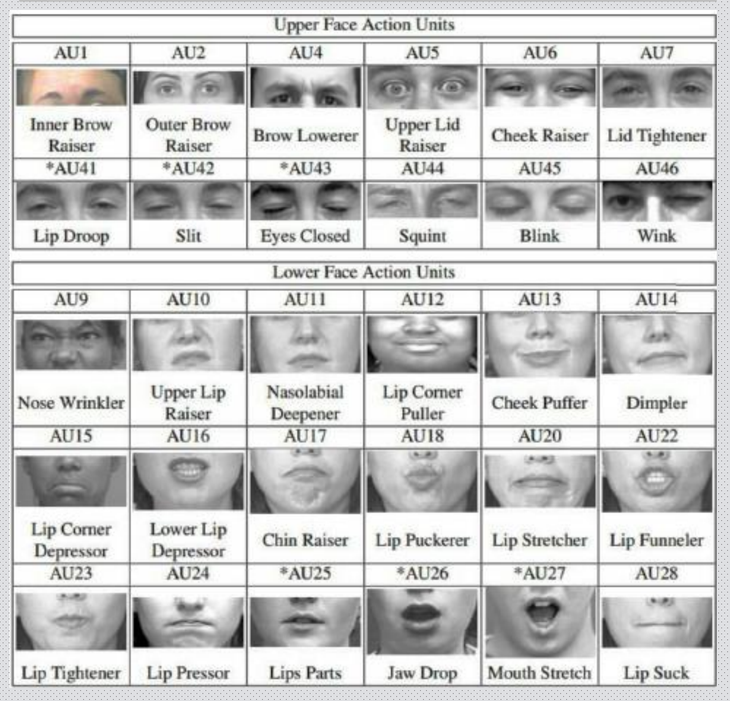
Is it possible to detect expression & emotions using Deep Learning ?

Our end goal is to predict human emotions & generate user feedback for a video using an Emotion based Computer vision framework. This application finds use cases in domains such as neuro marketing content development and testing of online applications for providing a robust framework which analyses features of detected attributes obtained from live videos. To do so we make use of a combination of histogram of gradients and convolutional neural networks to detect facial feature in the form of action units. Each of the features are then iteratively analyzed with sequential temporal analysis to measure the natural breaks in transitions between the features. The features thus obtained are then used to predict their likeliness to a video using Support Vector Machines & Collaborative Filtering algorithm. All these factors will contribute to the detection of expression & emotions in real-time.

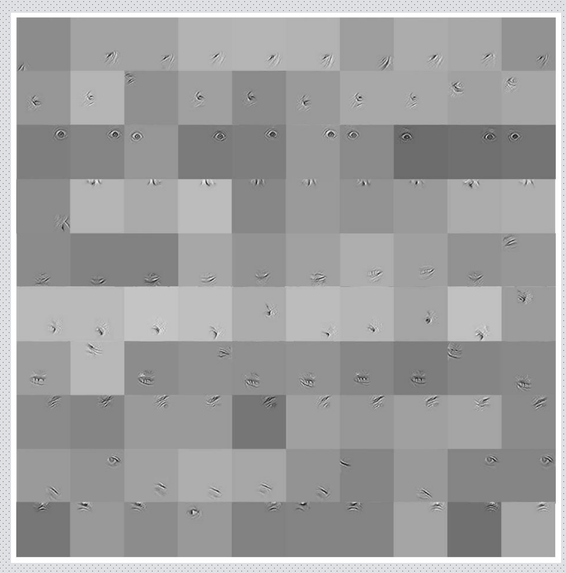
Convolutional Neural Nets (Architecture)– for Facial Expression Recognition



Facial Action Coding System

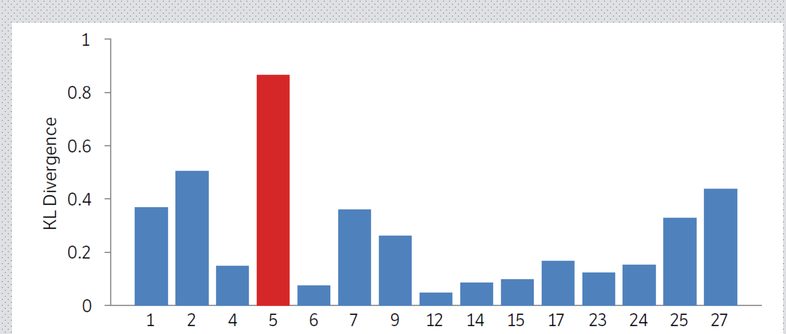


Filters Used to Detect the Expression



These are the 10 filters (each row is a filter) we will be using in Layer 3 of the convolutional Network for the given below mentioned dataset.

Output (Above Network)

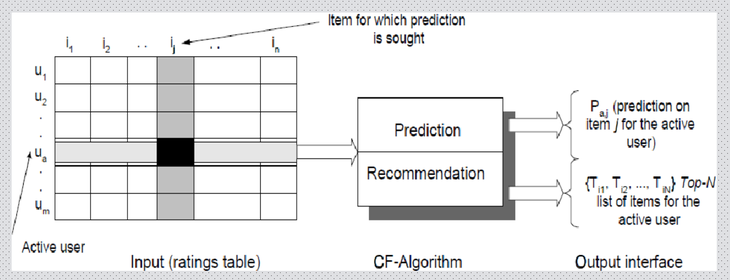


Information Gain for each Action Unit [AU] against the filter for each image. In our network we will be getting 10 outputs [1 for each filter] for each image.

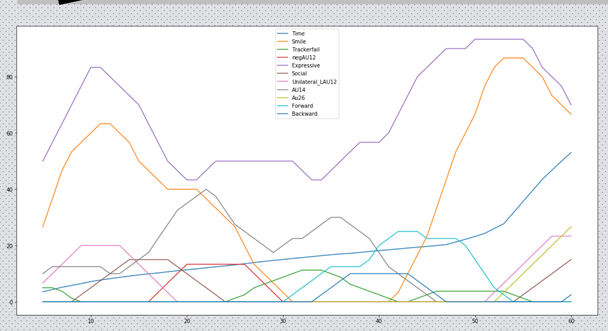
Detecting Emotion with Action Unit

Emotion	Action Unit
Happy	AU6 + AU12
Sadness	AU1+ AU4 + AU15
Surprise	AU1+AU2+AU5B+AU26
Fear	AU1+AU2+AU4+AU5+AU7+AU20+AU26
Anger	AU4+AU5+AU7+AU23
Disgust	AU9+AU15+AU16
Contempt	R12A+R14A

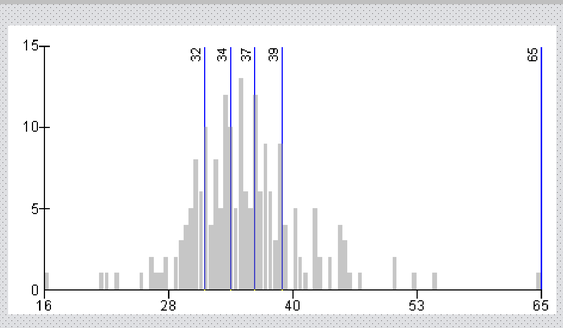
Collaborative Filtering



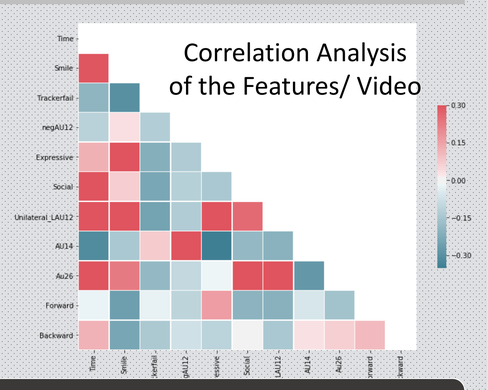
Temporal Analysis of the Regressed Video Features



Moving Averages of the Action Units



Jenks Natural Breaks in Emotion Features



The hope of **Moving Averages** is to remove redundancies and better expose underlying causal processes.

Calculating a moving average involves creating a new series where the values are comprised of the average of raw observations in the original series which requires that you specify a window size called the window width

The **Jenks Natural Breaks** classification method, is a data clustering method designed to determine the best arrangement of values into different classes.

This is done by seeking to minimize each class's average deviation from the class mean, while maximizing each class's deviation from the means of the other groups. In other words, the method seeks to reduce the variance within classes and maximize the variance between classes.

Datasets Available

- Extended Cohn Kanade Facial [CK+]
- Affectiva---MIT Facial Expression

Use Cases

- Know which videos to invest in to maximize return.
- Can emotional performance predict the social success of your automotive ad?
- Know how your video resonates with your target audience before you launch.
- Know which soundtrack will make your video sing.

INDIANA UNIVERSITY
FULFILLING the PROMISE

Arun Nekkalapudi – Shreyas Fadnivas – Khusaal Giri – Aditya Singh Kushwah