




# Facial Emotion Recognition (FER)

Ankita Nallana, Ritvika Reddy,  
Ashok Koduru  
Team - 17



# What, where, why

- ❖ Given the image of a human's face, correctly identify the emotion.
- ❖ Sometimes even humans aren't good at this!!!!  $60\% \pm 5\%$  accuracy
- ❖ Has many applications in Robotics, Marketing, Security even in Driving!
- ❖ Essentially a **CLASSIFICATION** problem!

# Target Classes (Emotions)

Neutrality



Disgust



Sadness



Happiness



Fear



Surprise

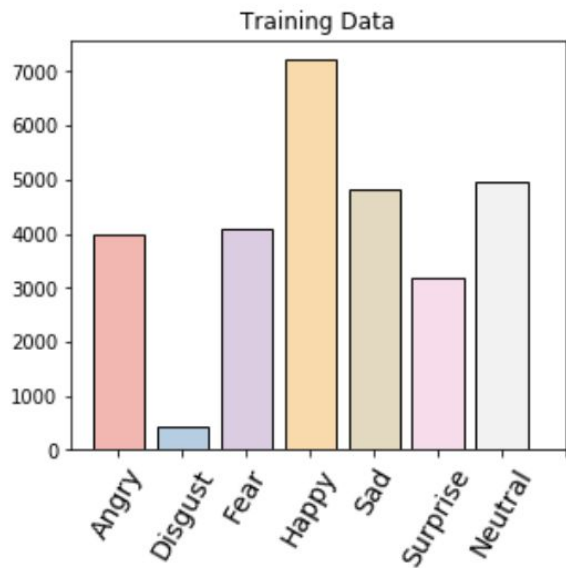


Anger

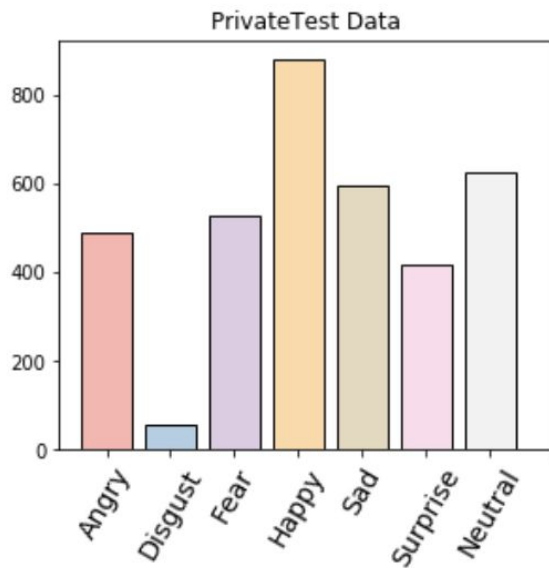


# Dataset

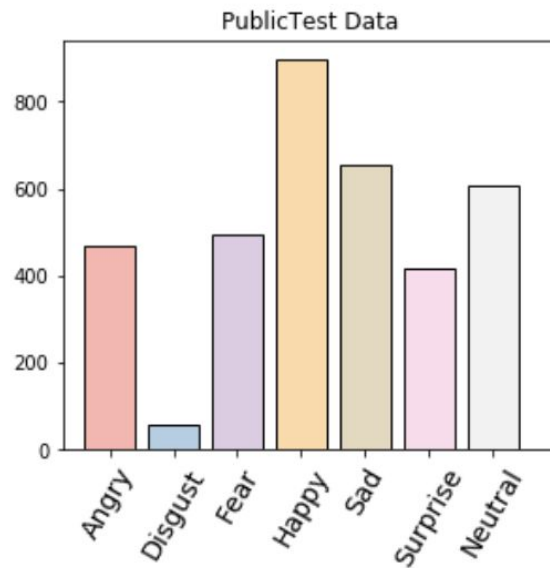
Training Set - 28,709



Validation Set - 3,589



Test Set - 3,589

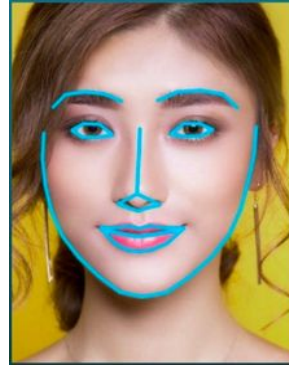


# Baseline: SVM

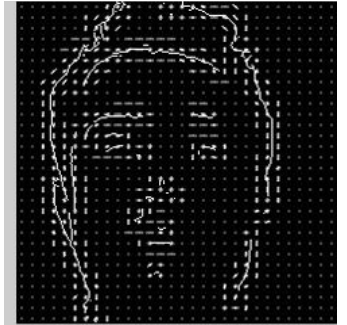
SVM through three kinds of data :

167	153	174	168	150	152	129	151	172	161	155	156
155	182	163	74	75	62	33	17	110	210	180	154
180	180	50	14	34	6	10	33	48	106	159	181
206	109	5	124	131	111	120	204	166	15	56	180
194	68	137	251	237	239	239	228	227	87	71	201
172	105	207	233	233	214	220	239	228	98	74	206
188	88	179	209	185	215	211	158	139	75	20	169
189	97	165	84	10	168	134	11	31	62	22	148
199	168	191	193	158	227	178	143	182	106	36	190
205	174	155	252	236	231	149	178	228	43	95	234
190	216	116	149	236	187	86	150	79	38	218	241
190	224	147	108	227	210	127	102	36	101	255	224
190	214	173	66	103	143	96	50	2	109	249	215

Raw Pixel Data



Face Landmarks



HOG Features

# Results: SVM

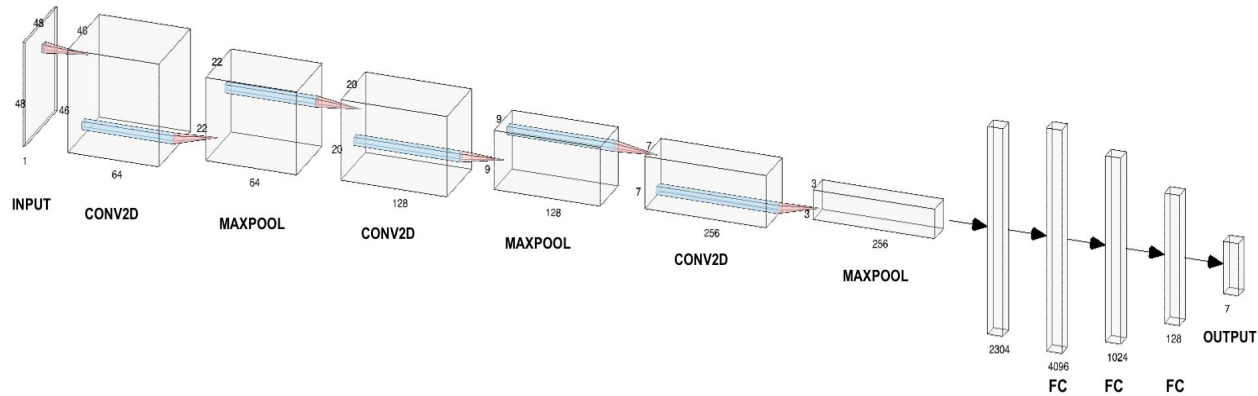
Dismal accuracy rates! [Emotion: Sad ☐

Raw Pixel Data	22.0%
Face Landmarks	47.1%
HOG features	15.0%

# Shallow CNN

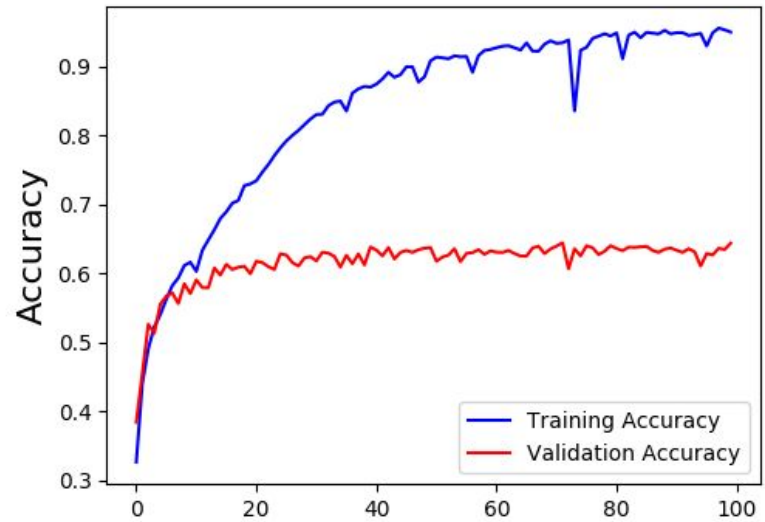
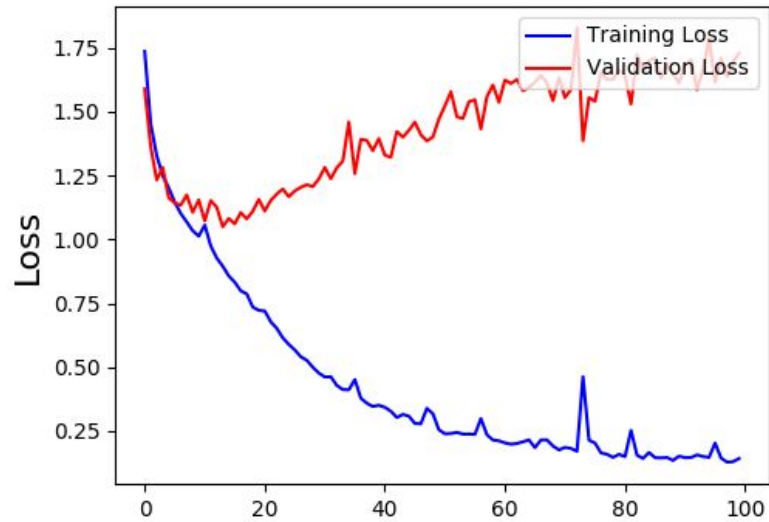
Baseline Model - Accuracy: 53.3%

Model 1 : 3 Convoluted Layers with Raw Pixel Data - Shallow Model



# Shallow CNN - Training

Training of Model B for 100 epochs

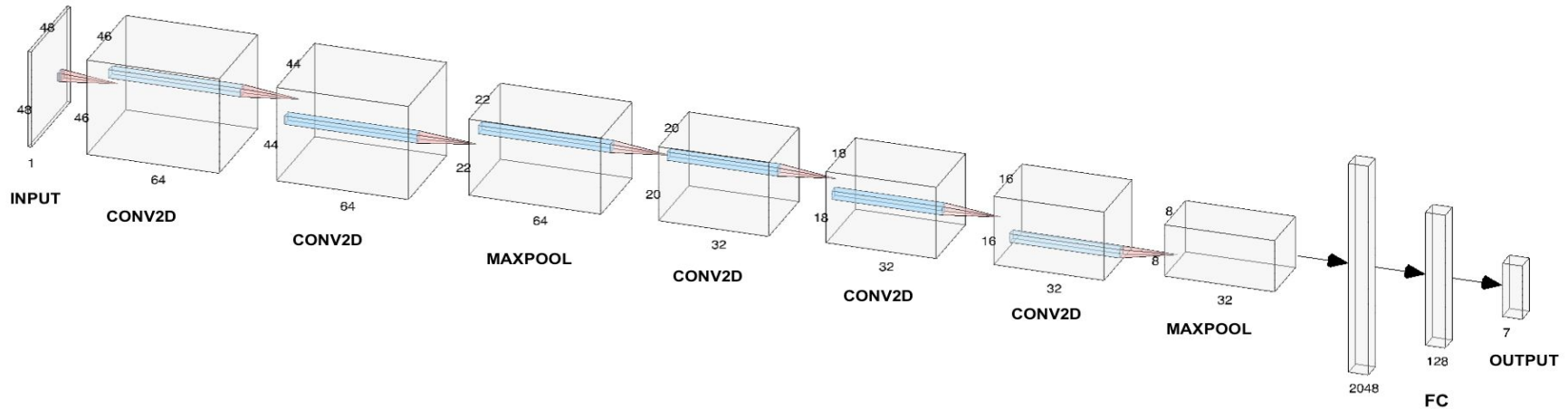




# Deep CNN

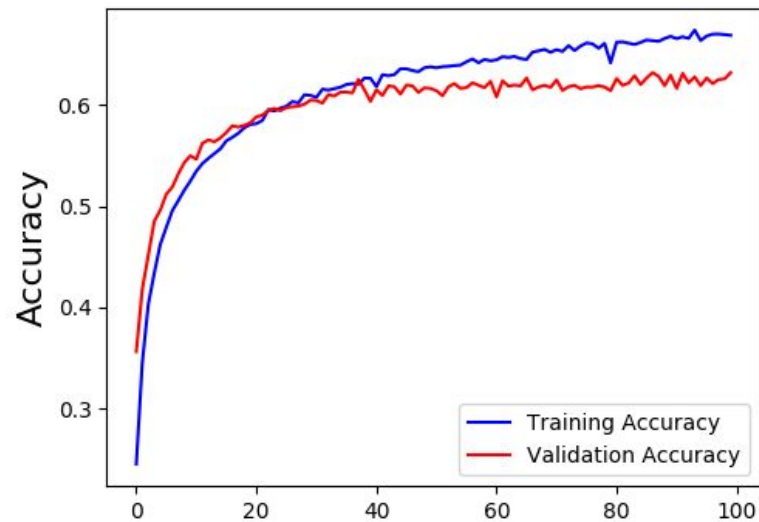
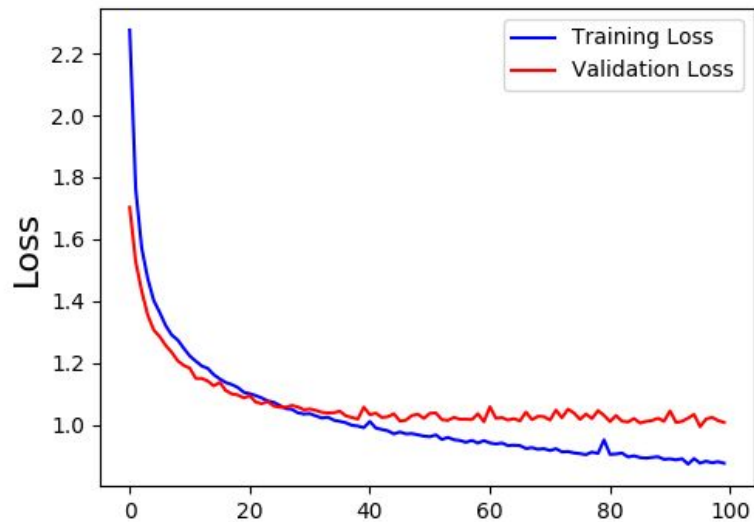
Model 2 : 5 Convoluted Layers with Raw Pixel Data - Deep Model

Accuracy - 64.8%

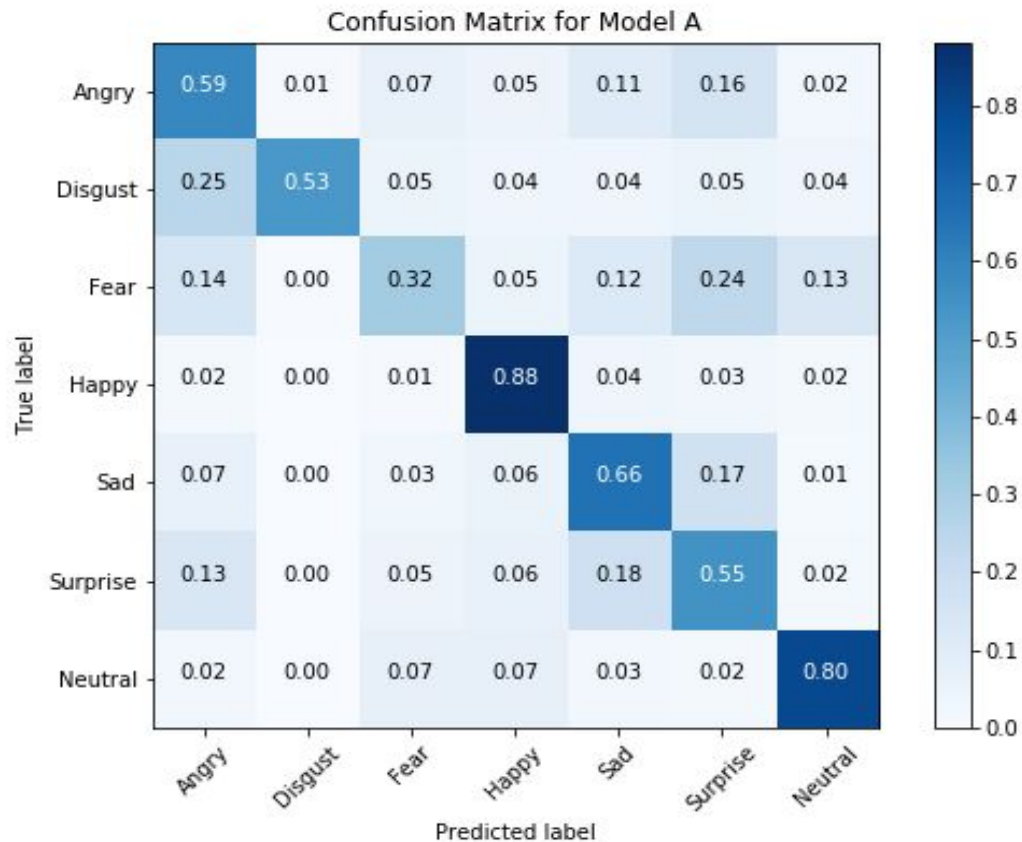


# Deep CNN - Training

Training of Model A for 100 epochs

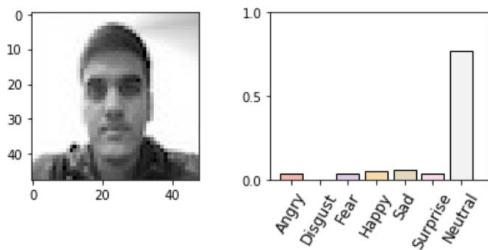


# Results - Deep CNN

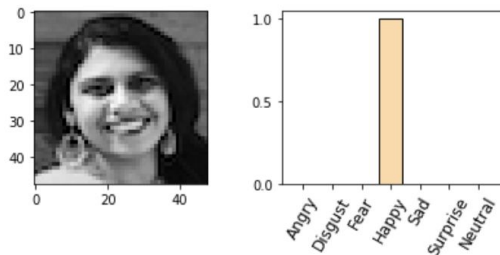


# Results (what really matters!)

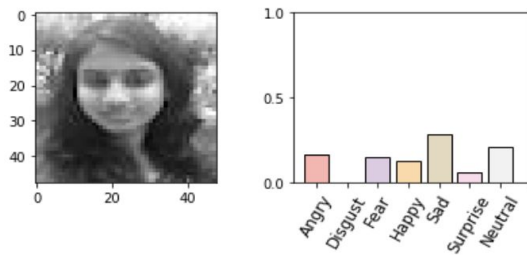
This image is classified to be Neutral with 77.07% confidence



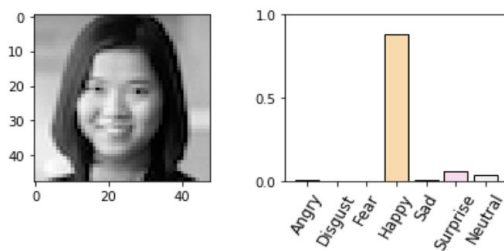
This image is classified to be Happy with 99.73% confidence



This image is classified to be Sad with 28.48% confidence



This image is classified to be Happy with 88.02% confidence



# Related Work

- ❖ State of the Art
  - Accuracy of 75.2%
  - Data Augmentation during both training and testing time.
- ❖ Special Image correction techniques
  - Normalizing the histogram to reduce the noise.
  - Domain adaptation techniques with different datasets to the above features

# Conclusions and Future Work

- ❖ Pretty good model right now considering it uses just raw pixel data
- ❖ Combine with other datasets like CK+, JAFFE
- ❖ Try to apply ensemble learning and transfer learning methods
- ❖ Move from static images to a continuous feed of images

Thank You!