Major Project Documentation

Q1. Which neural network was used and why?

Since, this project involved Image processing, **Convolutional Neural Network (CNN) was used as this neural network is preferred for projects dealing with Image Processing.**

Q2. Which optimizer was chosen and why?

'adam' is an adaptive optimizer, i.e., it adjusts the learning rate automatically. It also has advantages above other adaptive optimizers like '*Adadelta'* and '*RMSprop'*. So, there were mainly 3 reasons for using the *adam* optimizer:

- **Adam is the best among the adaptive optimizers** in most of the cases.
- **Good with sparse data**: the adaptive learning rate is perfect for this type of datasets.
- **There is no need to focus on the value of learning rate.**

Q3. Which accuracy metric was chosen and why?

Since, the algorithm uses classification at its core to accomplish its purpose, accuracy metric for classification was used and the metric used was **'Categorical Accuracy'** as this project uses one hot encoding.

Q4. Which loss function was chosen and why?

Since, the algorithm uses classification at its core to accomplish its purpose, loss function for classification was used and the loss function used was **'Categorical Crossentropy'** as this project uses multiple target features and one hot encoding.

Q5. How was the cleaning/pre-processing done?

For cleaning and pre-processing, the image was first converted into grayscale from a Coloured BGR image so as to lose details as we could afford here to. Then the image was resized to a resolution of 100 x 100 before one-hot encoding.

Q6. How was the data got into the right shape?

First, the frames generated by cv2.VideoCapture were converted into *grayscale* from *BGR*. Then by using *haar-cascade* file for detecting face, faces in the frames were detected and cropped. Then the cropped images were resized to get the images into the right format. Also, the target features were *One-Hot Encoded*.

Q7. What functions/features of OpenCV were used?

Following functions/features of OpenCV were used:

1. cv2.VideoCapture( )
2. cv2.imread( )
3. cv2.imwrite( )
4. cv2.cvtColor( )
5. cv2.imshow( )

Q8. Which dataset have you used? Or if generated data using webcam?

The data used for training was generated using webcam and was stored in a directory named *data_for_training* so as to make it reusable in case of restarting the program.