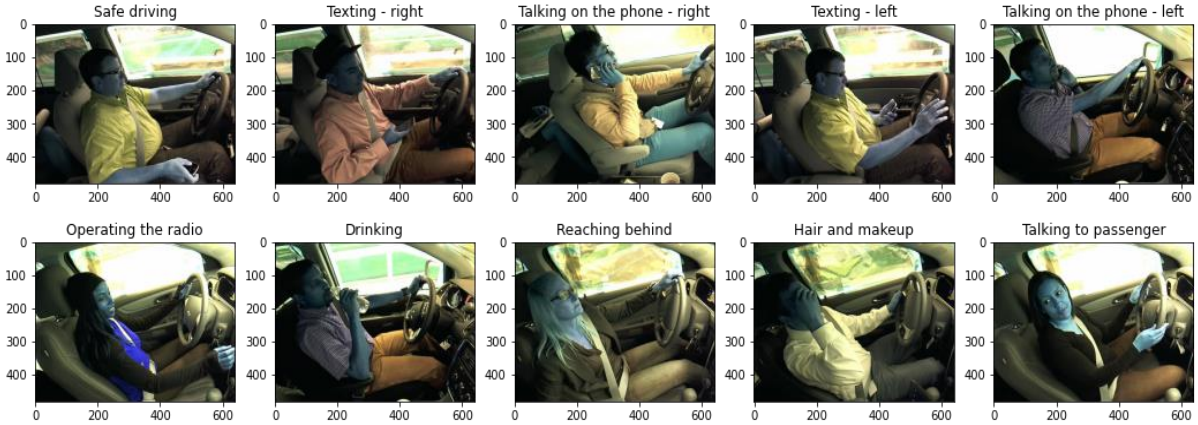
Detection of Driver Position

Abstract: -

The distraction of drivers from the safe driving position is considered one of the major reasons for most road accidents. In this below project I am going to use some deep learning models to detect the position of a driver and classify the posture of a driver. The dataset is obtained from the kaggle which has 10 different classes of driver positions. The models used in this project are state of art algorithm VGG-16 and another CNN model. VGG-16 has obtained an accuracy of 96% and the CNN model has obtained an accuracy of 99%.

Dataset: -

This dataset has 22424 of training images and 79726 which are unlabeled test images. Viewing the all types of images below from training samples.



Models & Test Results: -

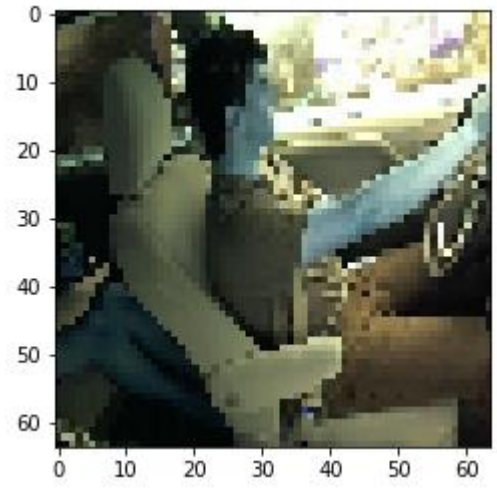
I) VGG-16: -

From the VGG16 top layer is removed and added dense layer with activation function as softmax. The classification report as follows

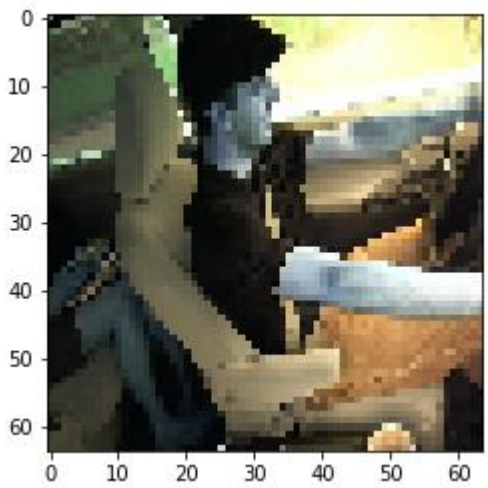
	precision	recall	f1-score	support
c0	0.89	0.98	0.93	498
c1	0.99	0.96	0.97	453
c2	0.99	0.97	0.98	464
c3	0.99	0.95	0.97	469
c4	0.98	0.95	0.96	465
c5	1.00	0.93	0.96	463
c6	0.99	0.95	0.97	465
c7	0.88	0.98	0.93	400
c8	0.96	0.96	0.96	382
c9	0.95	0.97	0.96	426
accuracy			0.96	4485
macro avg	0.96	0.96	0.96	4485
weighted avg	0.96	0.96	0.96	4485

Now predicting true label of image on the unlabeled test images. For computation purpose images are compressed to 64 * 64, images are blur.

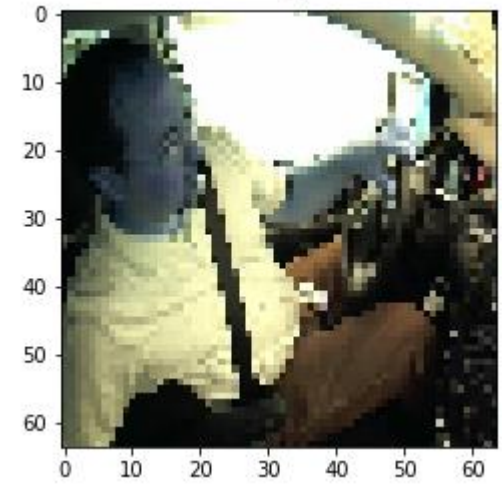
Predicted: Safe driving



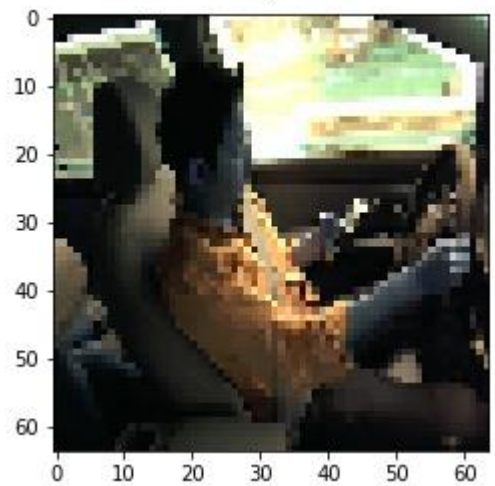
Predicted: Operating the radio



Predicted: Reaching behind

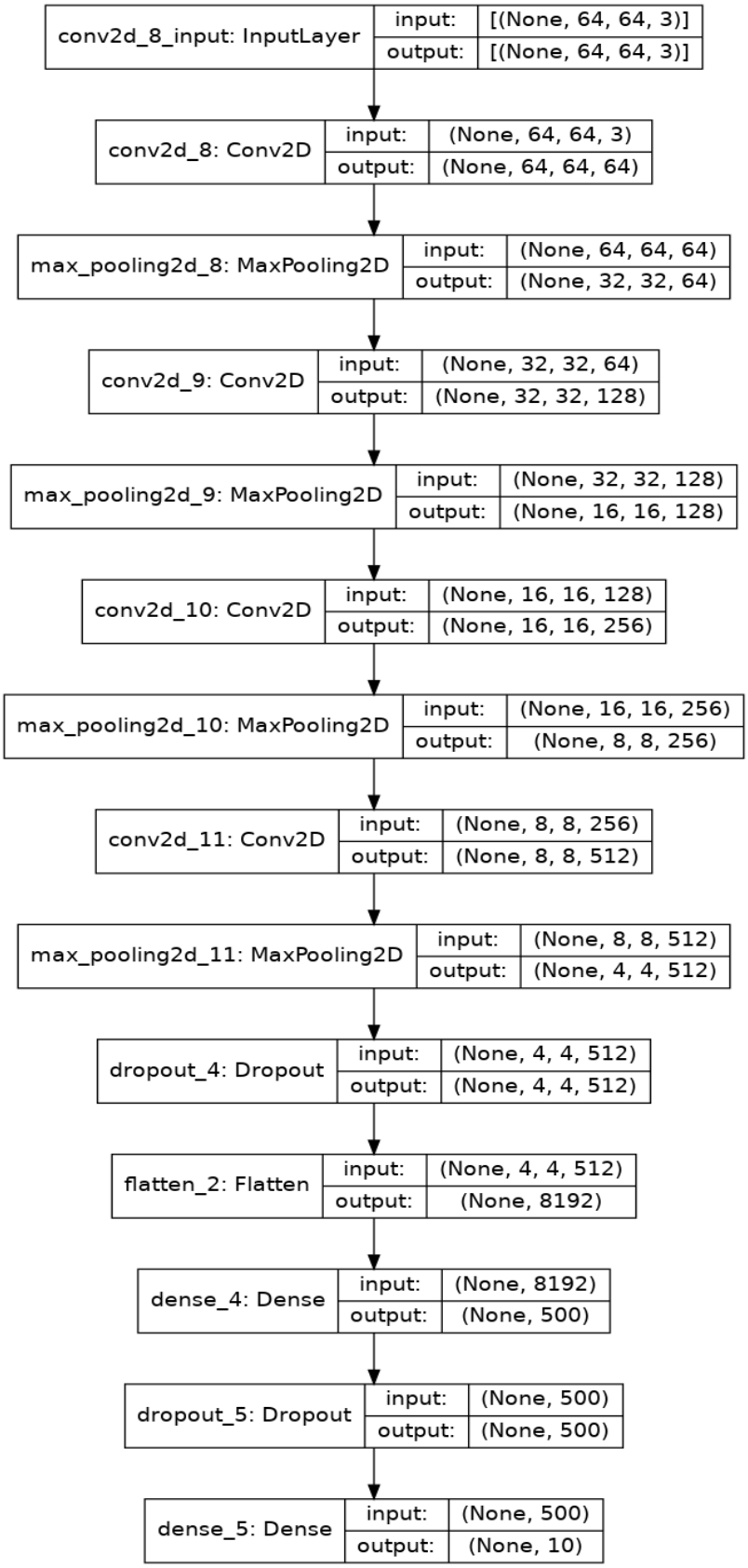


Predicted: Texting - left



2) CNN Model: -

The summary of CNN model is



The classification report of cnn model as follows.

	precision	recall	f1-score	support
c0	1.00	0.97	0.98	498
c1	0.99	1.00	0.99	453
c2	0.99	0.98	0.99	464
c3	1.00	0.99	1.00	469
c4	0.99	0.99	0.99	465
c5	1.00	0.98	0.99	463
c6	0.99	0.99	0.99	465
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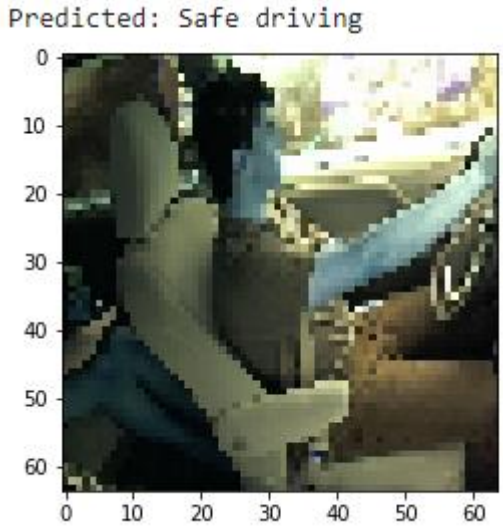

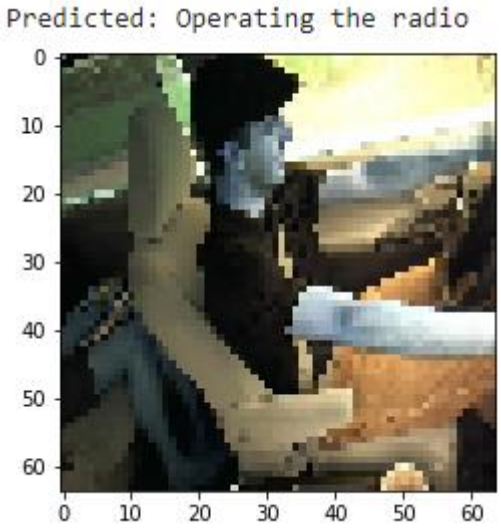

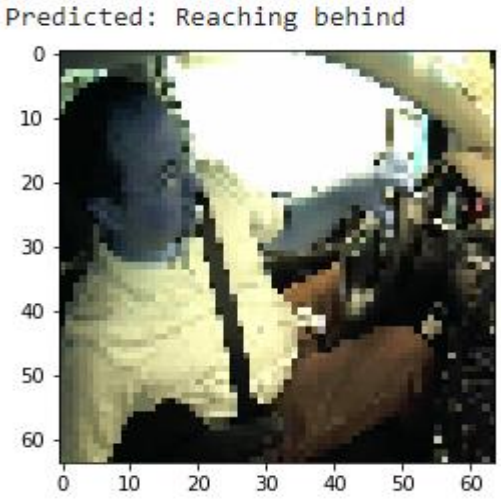

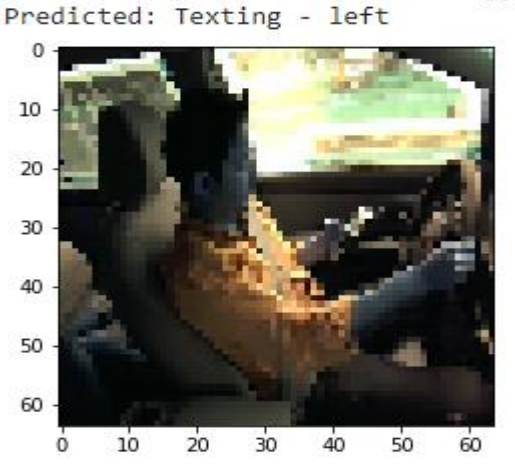

Conclusion:-

From the above experiments, both vgg16 and cnn model has performed well with accuracy of 96 and 99 respectively. These models are able to predict the correct label from the unlabeled test images. From the future work perspective would like to perform the same experiments with more classification models like SVM, Naïve Bayes etc..