VISUAL COMPUTING LAB MINI PROJECT 1
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1. **PROBLEM STATEMENT:** Classification of Mens clothing fashion in 6 broad classes using Convolutional Neural Network.
2. **DATASET DETAILS:** Our MensWear Dataset consist of six classes:
    a. Full Sleeves: 13 unique objects
    b. Half Sleeves: 15 unique objects
    c. Bottoms (pants/jeans/loafers/trousers): 12 unique objects
    d. Shorts (Half pants/ knee-length pants): 14 unique objects
    e. Caps: 13 unique objects
    f. Footwears : 17 unique objects

    For each class 2 objects are clicked in low light
    Minimum angles clicked per object is 4 and maximum angles clicked is 5.
    Total of 411 images in datasets, 399 are used for training (Training (350 samples)+validation(rest 49 samples) and 12 for testing (2 objects per class).
    Note: Here the difference in bottoms and shorts is that of leg length. Like bottoms are for complete leg length clothes, where shorts for upto knee-length clothes.

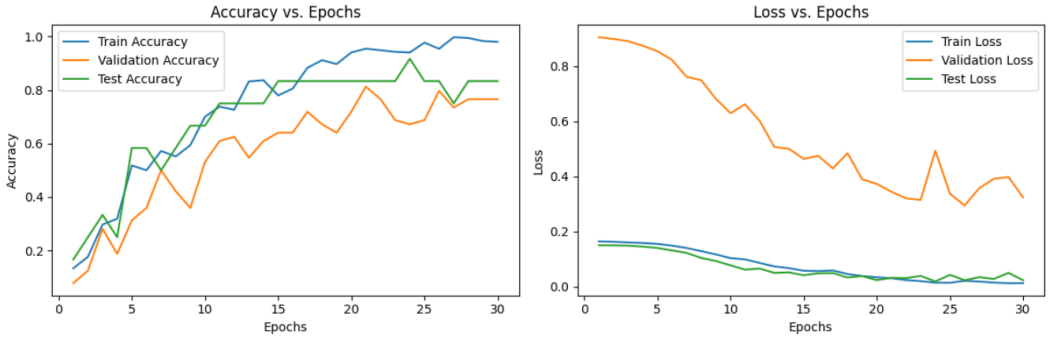
    Here is some demo images:

Low light image examples:

3. **Testing Accuracy on regular image:** On regular image, we got an accuracy of 83.33%
   Testing Accuracy on partially-masked images: On partially masked images, we got an accuracy of 83.33 % .
   This could be because the model was well trained, due to which it was able to predict well even on masked images. Also, the testing dataset is small.
   But, we know there could be a decrease in accuracy if the testing dataset had been large since there would be some spatial data loss due to masking.
   Keeping this in mind, we tried to improve our model, so that it can predict well on masked images.
   Strategy used for improving testing accuracy on partially masked images: We made two approaches:
   Approach1: Train a new CNN on masked image dataset.
   Observation: The model wasn't able to learn the masked images. It's loss as well accuracy wasn't improving.
   Approach2: **Transfer Learning :**
   Re-trained the CNN, which was trained on regular images, now on masked-images.
   Changed the optimizer from SGD to Adams.
   Used exponential learning rate decay.
   Observation: Since the model was already initially well trained with quite a good accuracy and was even able to predict well on masked images. Over the complete re-training, there is not much change in the loss as well as accuracy.
   But by the end of training, the model was more accurate on masked images and achieved an accuracy of 91.67% .
   Improved Testing Accuracy for partially masked images: We achieved 91.67% accuracy.

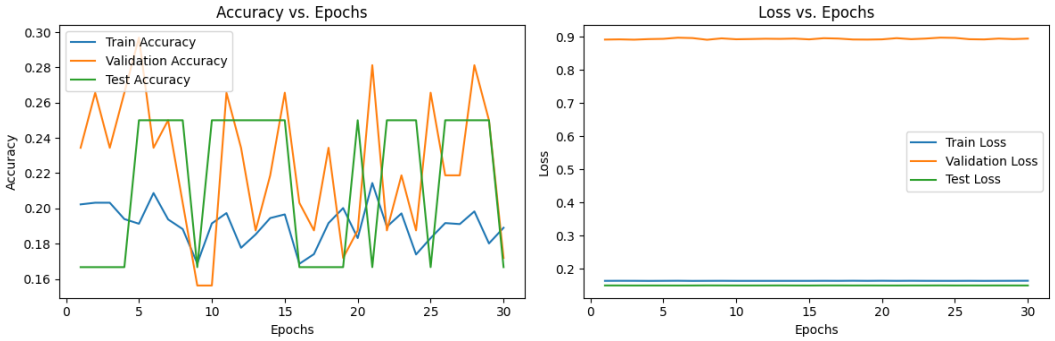
4. **Graphs showing the training loss, training accuracy, testing loss and testing accuracy across epochs**

   a. Accuracy and loss graphs of training, validation and testing of the model for regular images.

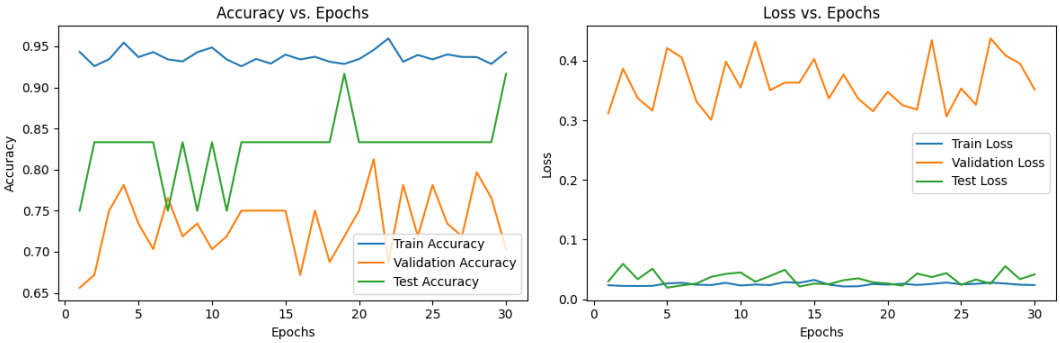


   b. Accuracy and loss graphs of training, validation and testing of the model for masked images.

      i. Results of approach1 (Worst Approach):

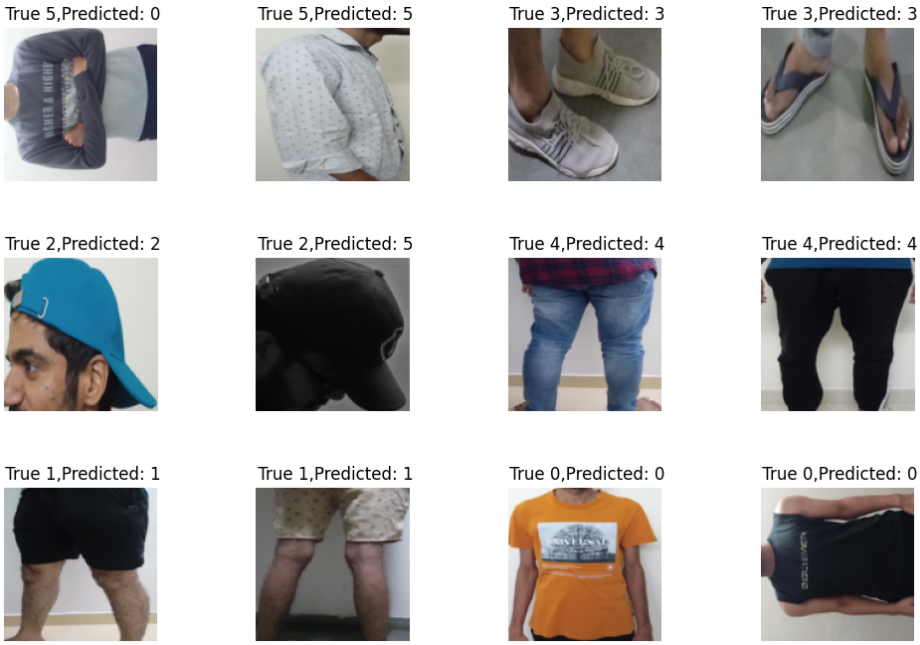


      ii. Results of approach2 (Best Approach):

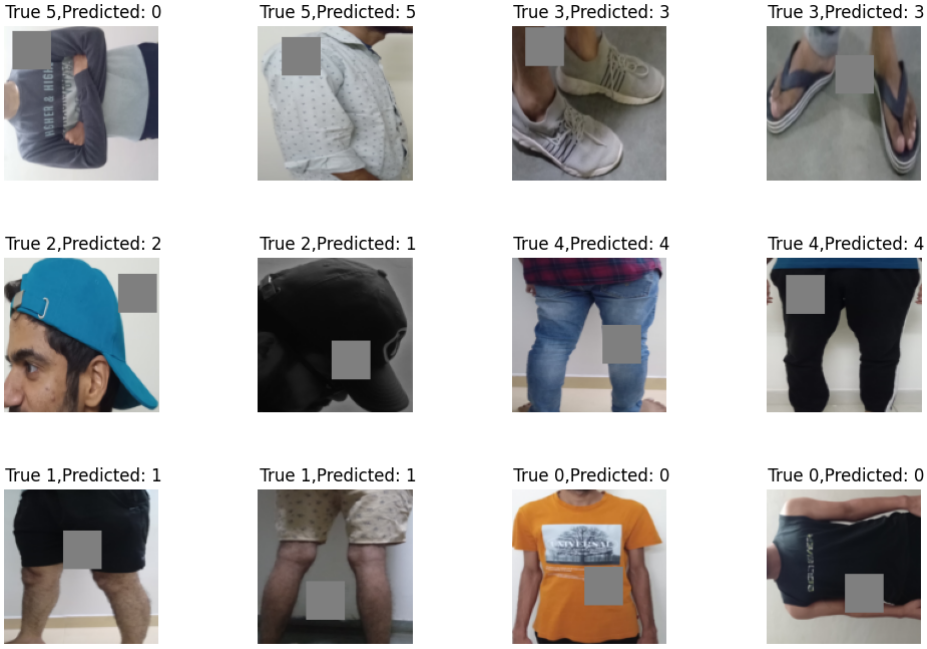


5. Visual results of model predictions on regular and masked images

a. Predictions of CNN trained on regular images



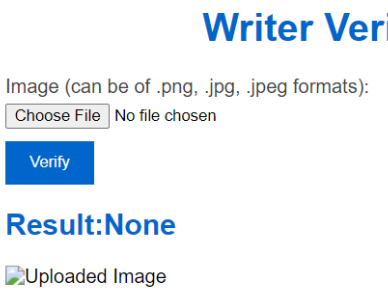
b. Predictions of modified CNN trained on masked images



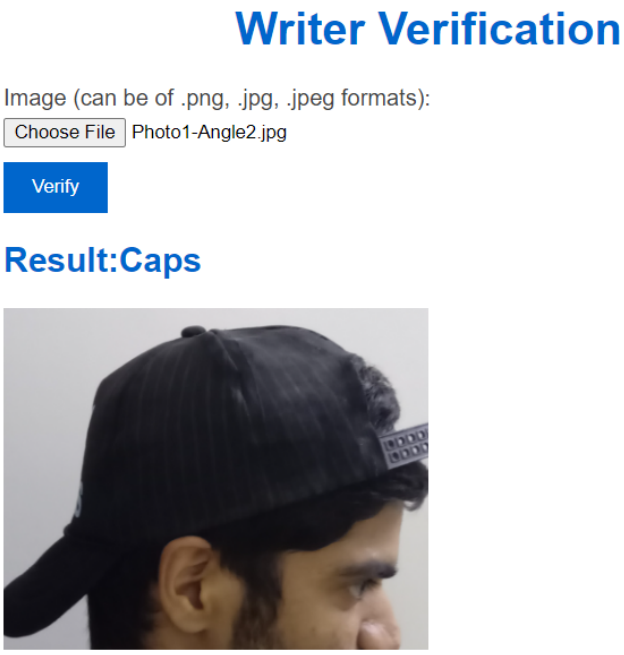
6. **Screenshots of the web deployed model before and after predictions**

Deployed the model using flask.

a. Before predictions



b. After Predictions



To access the dataset created and the saved models, click on this link:
https://drive.google.com/drive/folders/1bDsIJ1uLeOXyQPc9wYEWjh0C6iN9iOIU