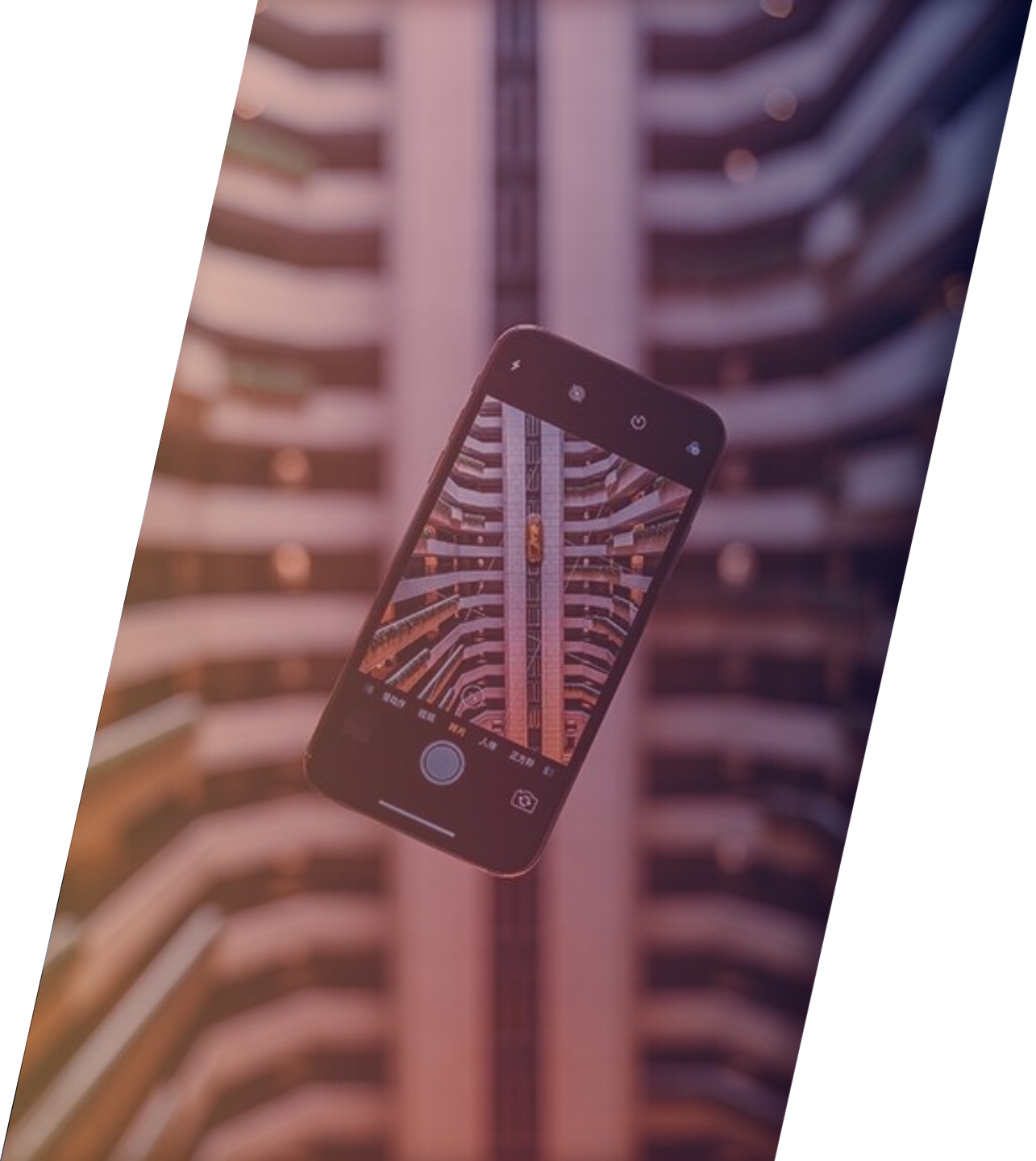
FACE DETECTION WHILE WEARING FACE MASKS

SIMULATION AND MODELLING



THE PROJECT AIMS TO DEVELOP A MACHINE LEARNING BASED MODEL WHICH WILL HELP IDENTIFYING A PERSON EVEN IF HE/SHE WEARS A FACE MASK.

Under the guidance of Dr. Partha Garai



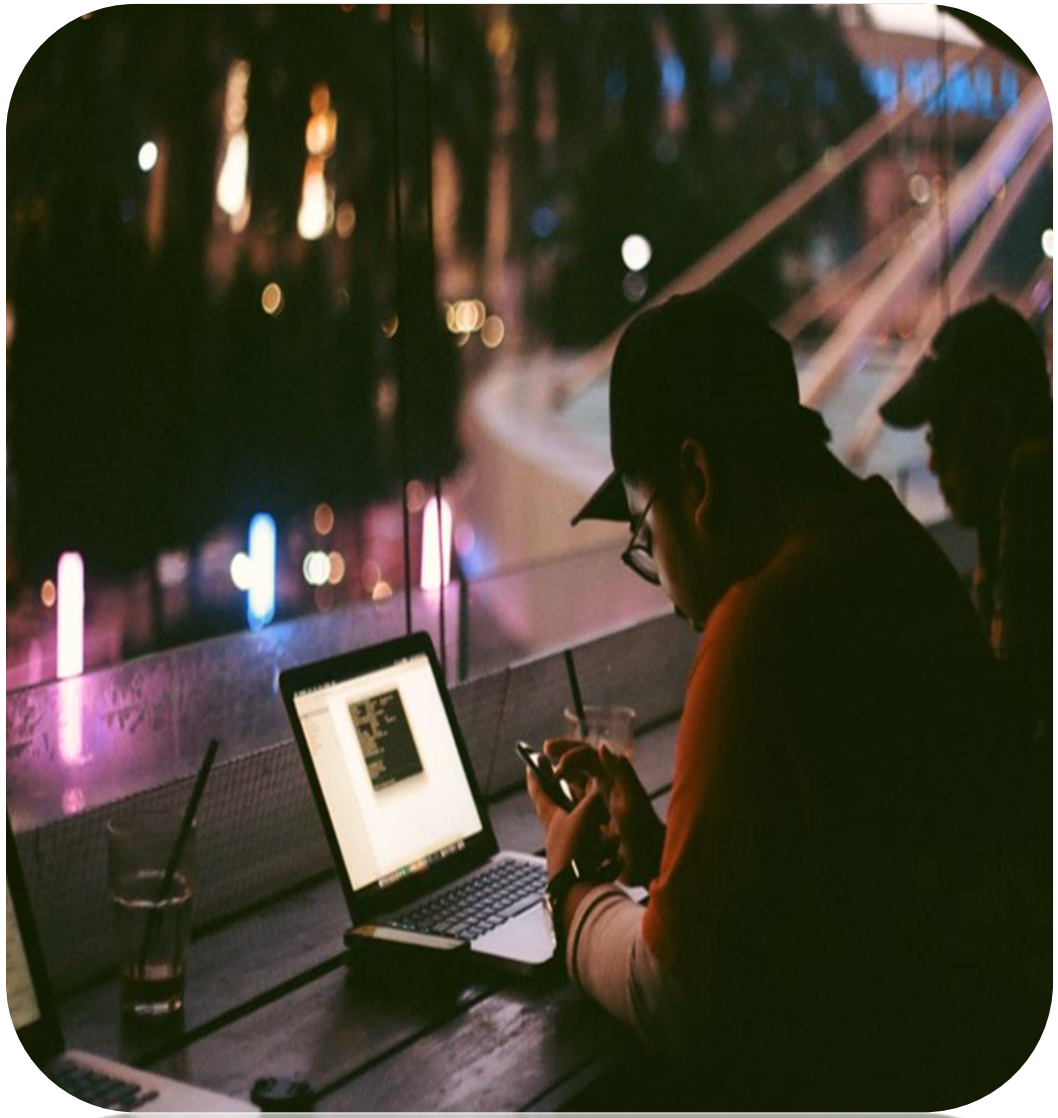
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INTRODUCTION:

Studies have shown that wearing masks helps prevent the spread of coronavirus during COVID-19 pandemic. However, the new situation has presented challenges to widely used Facial Recognition (FR) systems. impacts the current security systems based on facial recognition that has already been put by several corporations and government organizations in place. Face recognition-based security system however avoids unnecessary contact making it much safer than the former one. But such systems assume the that a picture of the entire face can be taken to perform recognition effectively. Widespread use of face masks thus renders the existing facial recognition systems in-efficient and they can make the entire infrastructure around facial recognition inoperable.



OBJECTIVE

In this paper we present a unified system for face verification (is this the same person), recognition (who is this person) and clustering (find common people among these faces). Our method is based on learning a Euclidean embedding per image using a deep convolutional network. The network is trained such that the squared L2 distances in the embedding space directly correspond to face similarity: faces of the same person have small distances and faces of distinct people have large distances.

Project aims to develop a machine learning based model which will help identifying a person even if he/she wears a face mask.

TECHNICAL APPROACH

DCNN

DCNN or deep convolutional neural network are widely used in object/face detection and recognition. However, facial recognition is different from the object classification problem. In object classification, DCNN only needs to classify particular objects according to the training set labels.

TRANSFER LEARNING

It is a common approach in machine learning. It is a common approach in machine learning. Some pre-trained models have been trained on some large datasets. Using those pre-trained models to train on other datasets can let the loss converge faster

TECHNICAL APPROACH

EMBEDDING'S

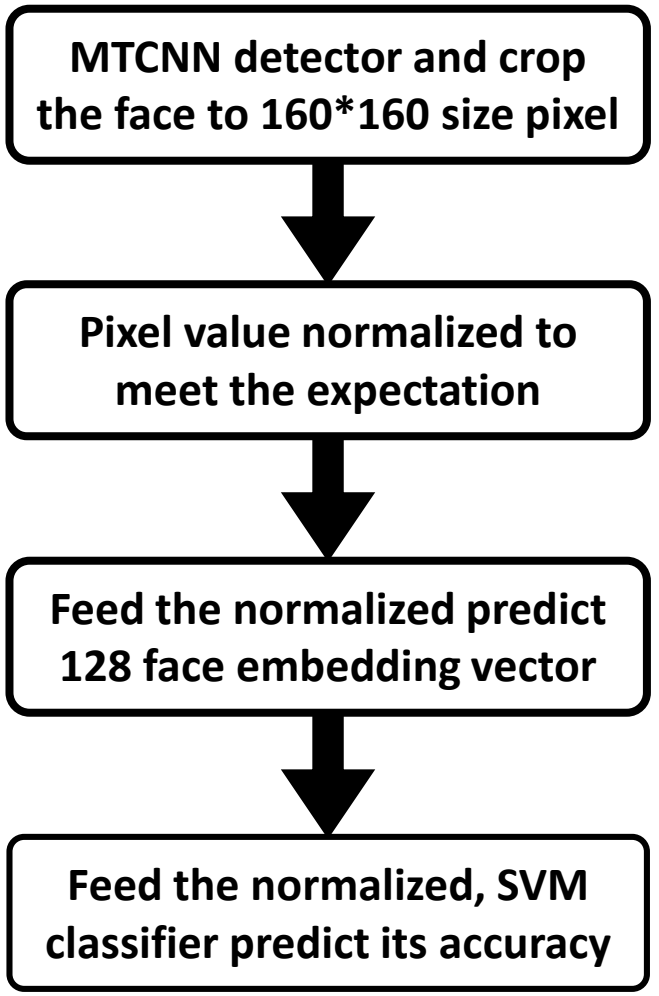
- Comparison of two image tensors with Euclidean distance directly is too inaccurate. Thus, an image embedding with higher representation is needed for the comparison of different images. Embedding is a vector representation of the original facial images which plays an essential role in our project.

TRIPLET LOSS FUNCTION

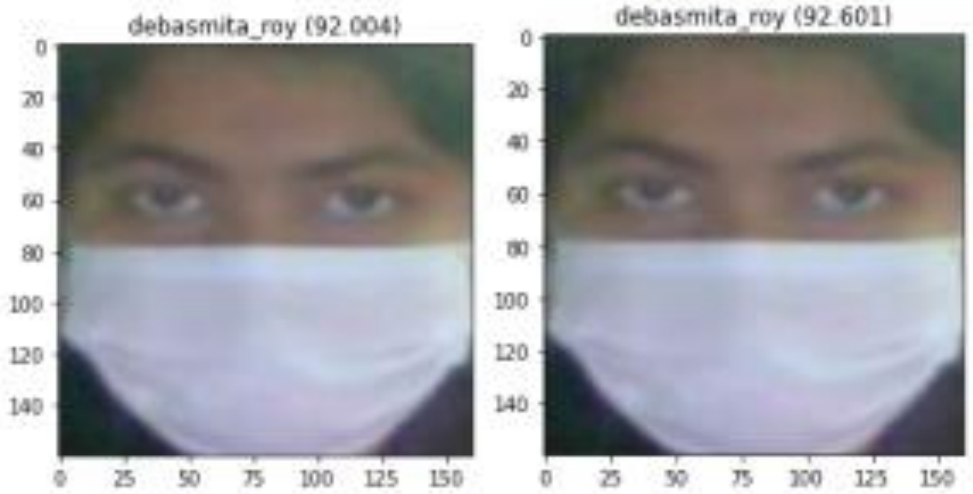
- Triplet loss is the function adopted in Google's FaceNet for normal face recognition problem. The intuition is to select an anchor, a positive and a negative image, where the positive one is from the same class as the anchor image while the negative one is from a different class.

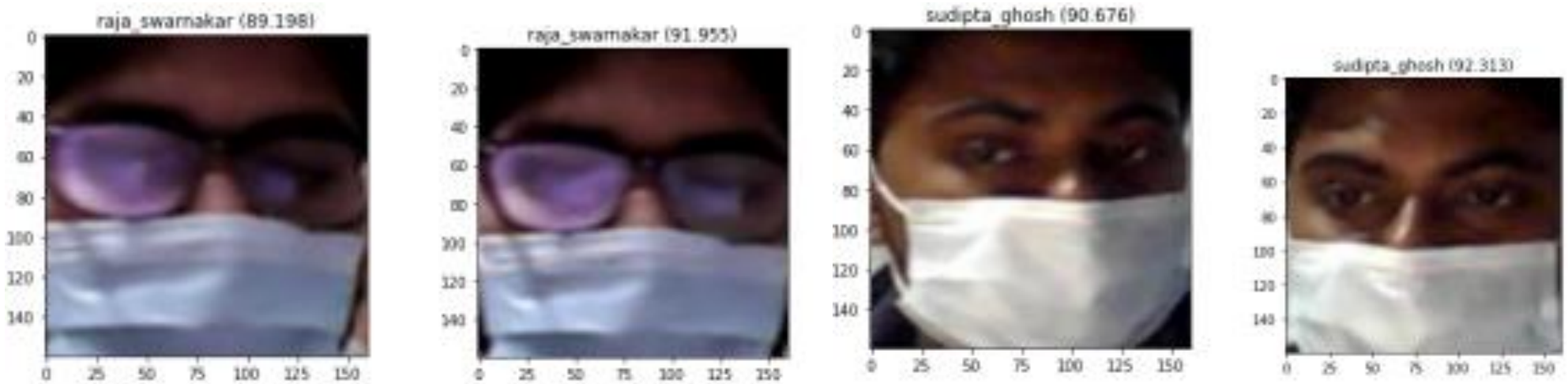
PROJECT ARCHITECTURE

Due to scarce of masked face date and limited time for this project, we create a dataset of masked face of real people. In the training phase we have trained our model on mixed unmasked face and masked face data and evaluated on masked face data.



RESULT


debasmita_roy (92.004)
debasmita_roy (92.601)


raja_swarnakar (89.198)
raja_swarnakar (91.955)
sudipta_ghosh (90.676)
sudipta_ghosh (92.313)

CONCLUSION AND FUTURE SCOPE

To summarize this project, we tried to solve the masked face recognition problem. In few cases we got an accuracy more than 80% but still to go 99% accuracy. In future we look forward to make more suitable changes to better the accuracy. In our primary focus, the masked face recognition model, we explored different deep learning methods, especially deep convolutional neural networks with transfer learning for representative embedding learning. We created a new masked face image dataset for training the DCNN mode. In future we look forward to make dataset more bigger and experiment with Resnet50 DCNN model to for better accuracy.

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THANK YOU