

PROFESSIONAL TRAINING REPORT
At
Sathyabama Institute of Science and
Technology (Deemed to be University)

Submitted in partial fulfilment of the requirements for the
award of Bachelor of Engineering Degree in Information
and Technology By:

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DECLARATION :

I, JOTHIKA K (Reg no:38120035) hereby declare that the Professional Training Report on “**COVID-19 HUMAN MASK IDENTIFICATION USING DEEP LEARNING TECHNIQUE**” done by me under the guidance of **Dr.P.JEYANTHI**, at Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Information and Technology.

DATE: 13 Nov 2021

JOTHIKA K

Place: Chennai

Signature of the candidate

Covid-19 Human mask identification using Deep Learning technique

Abstract:

In December 2019, transmission of the novel coronavirus (SARS-CoV-2) that causes coronavirus disease 2019 (COVID-19) occurred in Wuhan, China. And later, the virus began to be transmitted from person to person. Face masks are a type of personal protective equipment used to prevent the spread of respiratory infections, and it may be effective at helping prevent transmission of respiratory viruses and bacteria. Here, we share a case of face masks are being used to prevent the transmission of COVID-19 infection. Hence, the face mask recognition is still a challenging problem in computer vision. To propose a solution for face mask recognition that uses a combination of Convolutional Neural Network and specific image pre-processing steps. It described the innovative solution that provides efficient face mask and deep learning with convolutional neural networks (CNNs) has achieved great success in the classification of face mask like human safety. A variety of neuron-wise and layer-wise visualization methods were applied using a CNN, trained with a publicly available from given image dataset. So, it's observed that neural networks can capture the colors and textures of lesions specific to respective face mask, which resembles human decision-making.

Keywords: Face mask, deep learning, tensorflow

Existing System:

- The task of person search is first introduced by which unifies the pedestrian detection and person re-identification in a coherent system. A typical person re-identification method aims to find matchings between the query probe and cropped person image patches from the gallery, thus requiring perfect person detection results, which are hard to obtain in practice. A typical person re-identification method aims to find matchings between the query probe and cropped person image patches from the gallery, thus requiring perfect person detection results, which are hard to obtain in practice. In contrast, person search is closer to the real world applications, in the way of searching over the whole image, rather than only looking at each person locally. However, it brings domain-specific difficulties from the two tasks together: large appearance variance across cameras, low resolution, occlusion, etc. In addition, sharing features between detection and re-ID also accumulates errors from each of them, e.g. false alarms, misalignments and inexpressive person descriptors, which further jeopardizes the final person search performance. Furthermore, we simplify the whole pipeline by incorporating semantic segmentation into the re-ID network, which is trained by bounding boxes as weakly-annotated masks and identification labels simultaneously. The achieved success encourages us to further study the relationship between pedestrian detection and person reidentification, as well as the correlation between foreground and background so as to handle more complex scenarios in real-world video surveillance. Thorough experiments and analysis are conducted to investigate the whole process of person search, providing detailed behavior of our model and useful insights to the community. We also proposed a Confidence Weighted Stream Attention technique to improve the person search accuracy effectively. Experimental results show that our proposed method significantly outperforms state-of-the-art methods on two standard benchmarks. We obtain better results by training the detector and re-identification network separately, without sharing representations. We further enhance the re-identification accuracy by modeling the foreground and original image patches simultaneously to obtain enriched representations.

- **Drawback:**

- It has not focused on identifying CNN as classifier.
- It has not focused on increasing the recognition rate and classification accuracy of severity of face mask identification

Proposed System:

- To detect the face mask classification. We planned to design deep learning technique so that a person with lesser expertise in software should also be able to use it easily. It proposed system to predicting human face mask identification. It explains about the experimental analysis of our methodology.
- Samples of more number of images are collected that comprised of different classes such as masked, No_masked face. Different number of images is collected for each classes that was classified into database images and input images. The primary attributes of the image are relied upon the shape and texture oriented features. The sample screenshots displays the face mask detection using color based Sequence model.

Advantages:

- Increasing throughput & reducing subjectiveness arising from human experts in detecting the face mask identification.
- Here, we share a case of face masks are being used to prevent the transmission of COVID-19 infection

Environmental Requirements:

1. Software Requirements:

Operating System : Windows / Linux

Simulation Tool : Anaconda with Jupyter Notebook

2. Hardware requirements:

Processor : Pentium IV/III

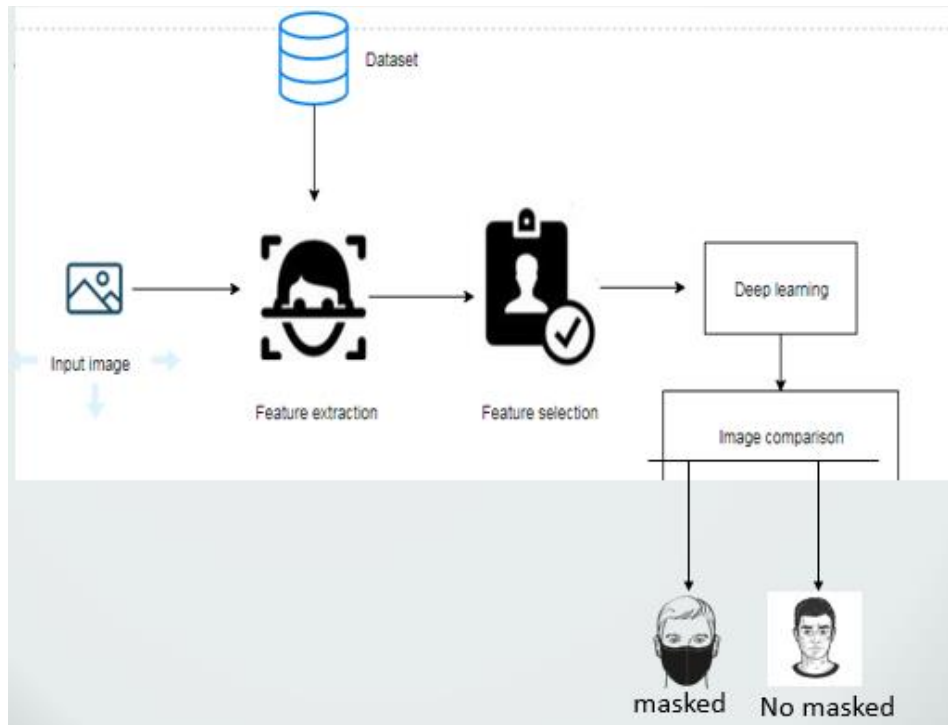
Hard disk : minimum 80 GB

RAM : minimum 2 GB

ALGORITHM:

- ▶ Deep learning is a machine learning technique that teaches computers to do what comes naturally to humans: learn by example. Deep learning is a key technology behind driverless cars, enabling them to recognize a stop sign, or to distinguish a pedestrian from a lamppost. It is the key to voice control in consumer devices like phones, tablets, TVs, and hands-free speakers. Deep learning is getting lots of attention lately and for good reason. It's achieving results that were not possible before.
- ▶ In deep learning, a computer model learns to perform classification tasks directly from images, text, or sound. Deep learning models can achieve state-of-the-art accuracy, sometimes exceeding human-level performance. Models are trained by using a large set of labeled data and neural network architectures that contain many layers.
- ▶ In a word, accuracy. Deep learning achieves recognition accuracy at higher levels than ever before. This helps consumer electronics meet user expectations, and it is crucial for safety-critical applications like driverless cars. Recent advances in deep learning have improved to the point where deep learning outperforms humans in some tasks like classifying objects in images.

Design architecture:



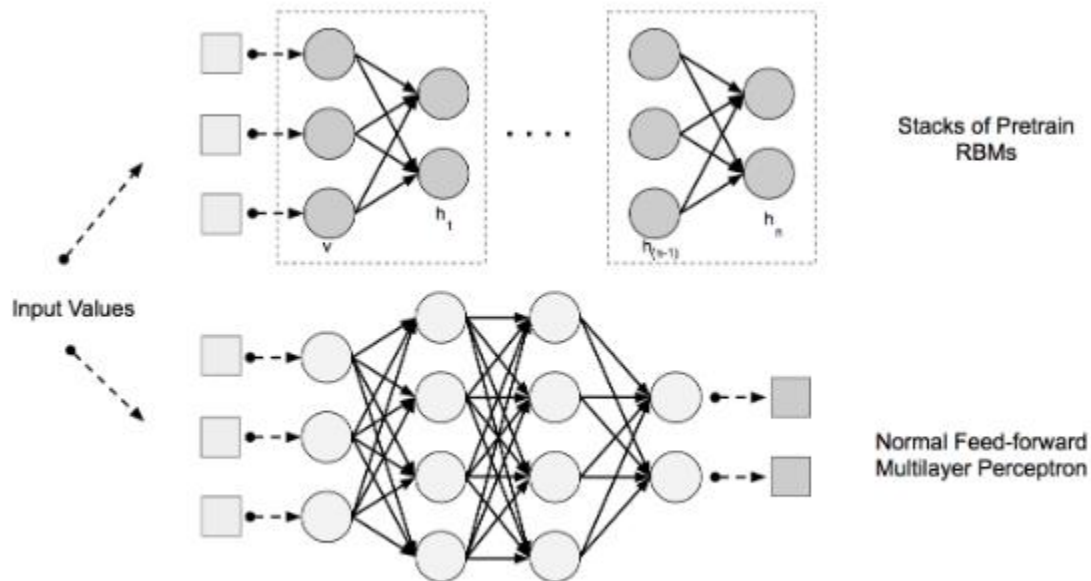
Future Work:

- To automate this process by show the prediction result in web application or desktop application.
- To optimize the work to implement in Artificial Intelligence environment.
- To deploy this model to AI on web application.

WORKING PROCESS:

- Download and install anaconda and get the most useful package for machine learning in Python.
- Load a dataset and understand its structure using statistical summaries and data visualization.
- machine learning models, pick the best and build confidence that the accuracy is reliable.

- Deep learning models are trained by using large sets of labeled data and neural network architectures that learn features directly from the data without the need for manual feature extraction.



How to Create and Train Deep Learning Models:

Training from Scratch

To train a deep network from scratch, you gather a very large labeled data set and design a network architecture that will learn the features and model. This is good for new applications, or applications that will have a large number of output categories. This is a less common approach because with the large amount of data and rate of learning, these networks typically take days or weeks to train.

Transfer Learning

Most deep learning applications use the transfer learning approach, a process that involves fine-tuning a pretrained model. You start with an existing network, such as AlexNet or GoogLeNet, and feed in new data containing previously unknown classes. After making some tweaks to the network, you can now perform a new task, such as categorizing only dogs or cats instead of 1000 different objects. This also has the advantage of needing much less data (processing thousands of images, rather than millions), so computation time drops to minutes or hours

Libraries Required:

- ▶ numpy : To process the image matrices
- ▶ os: To access the file system to read the image from the train and test directory from our machines
- ▶ random: To shuffle the data to overcome the biasing
- ▶ matplotlib: To display the result of our predictive outcome.
- ▶ tensorflow: Just to use the tensor board to compare the loss and adam curve our result data or obtained log.

INTRODUCTION

Deep Learning:

Deep learning is a branch of machine learning which is completely based on artificial neural networks, as neural network is going to mimic the human brain so deep learning is also a kind of mimic of human brain. It's on hype nowadays because earlier we did not have that much processing power and a lot of data. A formal definition of deep learning is- neurons Deep learning is a particular kind of machine learning that achieves great power and flexibility by learning to represent the world as a nested hierarchy of concepts, with each concept defined in relation to simpler concepts, and more abstract representations computed in terms of less abstract ones. In human brain approximately 100 billion neurons all together this is a picture of an individual neuron and each neuron is connected through thousands of their neighbors

ENVORNMENTAL REQUIREMENTS

1. Software Requirements:

- ▶ Operating System : Windows / Linux
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2. Hardware requirements:

- ▶ Processor : Pentium IV/III
- ▶ Hard disk : minimum 80 GB
- ▶ RAM : minimum 2 GB

Literature survey:

1 Title: Multi-angle Head Pose Classification when Wearing the Mask for Face Recognition under the COVID19 Coronavirus Epidemic

Author: Shuang Li, Xin Ning, Lina Yu, Liping Zhang

Classification is widely used for the preprocessing before face recognition and multi-angle problems, because algorithms such as face recognition often require the input image to be a front face. But affected by the COVID-19 pandemic, people wear face masks to protect themselves safe, which makes cover most areas of the face. propose a new method to solve the problem of head pose classification with masks during the COVID-19 coronavirus epidemic. This method that uses the color texture analysis of images and line portrait. By extracting and processing the pixel information of the Channel in the HSV color space to distinguish the face and mask in the image, The solution of this problem also provides help for the study of multi-angle problems. In practical applications, we can use a face detection algorithm that distinguishes between wearing a mask and not wearing a mask. e evaluation on MAFA dataset shows that compared with the algorithms based on facial landmark detection and convolutional neural network, the proposed method has achieved

2 Title: Temporal Similarity Analysis of Remote Photoplethysmography for Fast 3D Mask Face Presentation Attack Detection

Author: Si-Qi Liu, Xiangyuan Lan, Pong C. Yuen

The 3D mask face presentation attack, remote Photoplethysmography (rPPG), a biomedical technique that can detect heartbeat signal remotely, is employed as an intrinsic liveness cue. Although existing rPPG-based methods exhibit encouraging results, they require long observation time (10-12 seconds) to identify the heartbeat information, which limits their employment in real applications such as smartphone unlock and e-payment. To shorten the observation time (within 1-second) while keeping the performance, we propose a fast rPPG-based 3D mask presentation attack detection (PAD) method by analyzing the similarity of local facial rPPG signals in the time domain. In particular, a set of temporal similarity features of facial and background local rPPG signals are designed and fused to adapt the real world variations based on rPPG shape and phase properties.

3 Title: On Hallucinating Context and Background Pixels from a Face Mask using Multi-scale GANs

Author: Sandipan Banerjee, Walter J. Scheirer, Kevin W. Bowyer

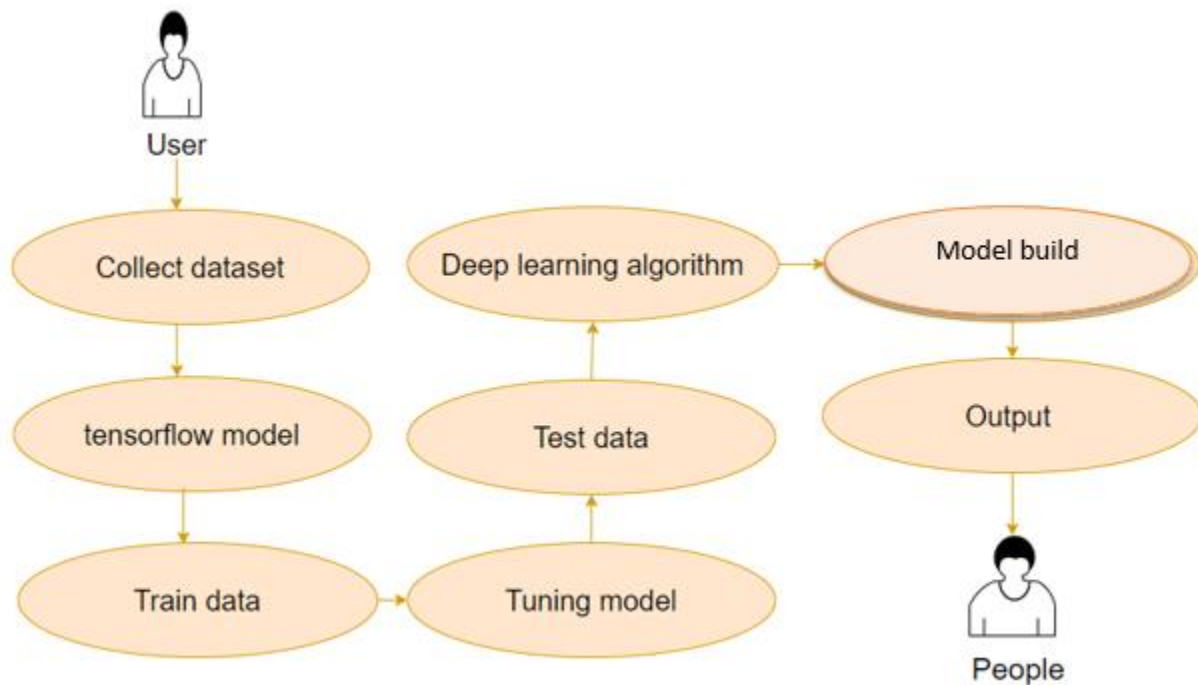
- A multi-scale GAN model to hallucinate realistic context (forehead, hair, neck, clothes) and background pixels automatically from a single input face mask, without any user supervision. Instead of swapping a face on to an existing picture, our model directly generates realistic context and background pixels based on the features of the provided face mask. Unlike facial inpainting algorithms, it can generate realistic hallucinations even for a large number of missing pixels. Our model is composed of a cascaded network of GAN blocks, each tasked with hallucination of missing pixels at a particular resolution while guiding the synthesis process of the next GAN block. The hallucinated full face image is made photo-realistic by using a combination of reconstruction, perceptual, adversarial and identity preserving losses at each block of the network. Propose a cascaded network of GAN blocks that can synthesize realistic context and background pixels given a masked face input, without requiring any user supervision. Instead of swapping a source face onto a target image or inpainting small number of missing facial pixels, our model directly hallucinates the entire set of context and background pixels, by learning their representation directly from the training data. Each GAN block learns to hallucinate the missing pixels at a particular resolution via a combination of different losses and guides the synthesis process of the next block.

Modules:

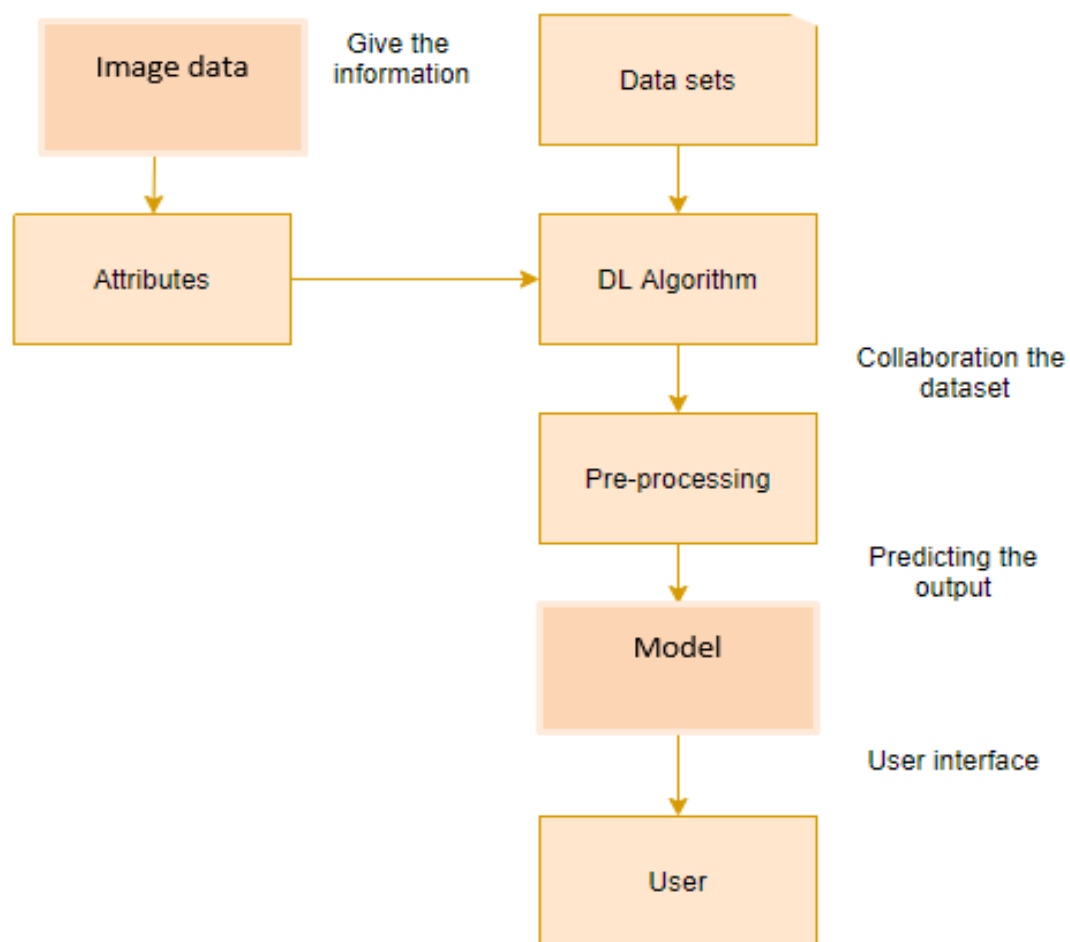
- ▶ Import the given human face masked and applying manual CNN(module01)
- ▶ To train the module by given image dataset through Le-Net (module02)

UML Diagram:

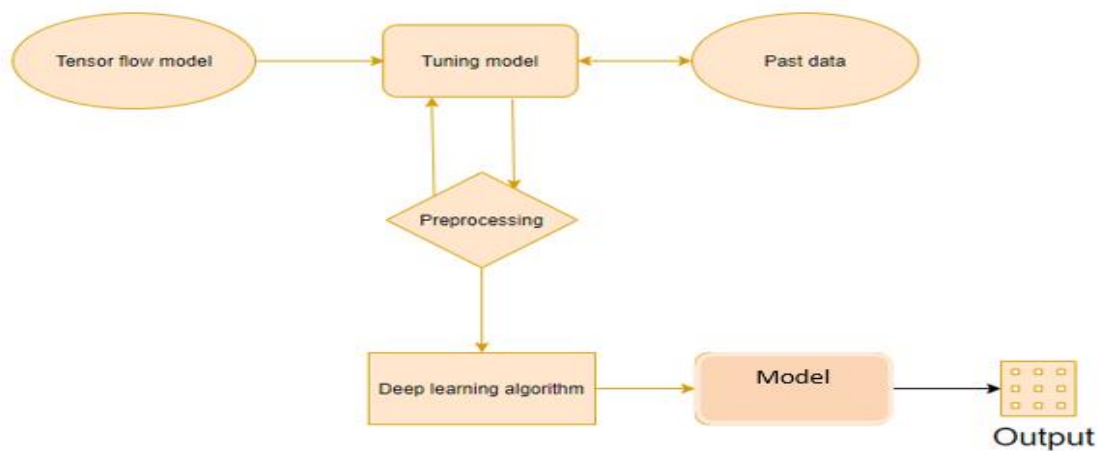
Use case Diagram:



Collaboration Diagram:



ER Diagram:



Module description:

- ▶ Mannula network
- ▶ To train the model using LeNet

1.Manual Network:

We have to import our data set using keras preprocessing image data generator function also we create size, rescale, range, zoom range, horizontal flip. Then we import our image dataset from folder through the data generator function. Here we set train, test, and validation also we set target size, batch size and class-mode from this function we have to train using our own created network by adding layers of CNN.

Module 02: To train the model using LeNet.

A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The pre-processing required in a ConvNet is much lower as compared to other classification algorithms. While in primitive methods filters are hand-engineered, with enough training, ConvNets have the ability to learn these filters/characteristics. The architecture of a ConvNet is analogous to that of the connectivity pattern of Neurons in the Human Brain and was inspired by the organization of the Visual Cortex. Individual neurons respond to stimuli only in a restricted region of the visual field known as the Receptive Field. Their network consists of four layers with 1,024 input units, 256 units in the first hidden layer, eight units in the second hidden layer, and two output units.