Deep Learning Techniques For Face Mask Detection

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***Motivation*—In the recent trend of the Novel coronavirus, it's mandatory to wear a mask every time. You cannot roam outside and in a public place without a face mask to protect yourself from the virus. There are security checks that have been set up at each public shop or public place to verify if people are following the rules for the face mask. There is a dedicated person who is always present as a security guard just to check if we are wearing a face-covering mask or not. So, from the current situation, we decided to build a model which will be helpful for society in this pandemic. A model which can detect if a person is wearing a face mask or not based on trained images with three colors channels (RGB). This analysis is based on deep learning and transfers learning algorithm which can process images.**

Deep learning is the process of computers learning to think by mimicking the architecture of the human brain. Masks are one of the few COVID-19 precautions accessible in the absence of vaccination, and they serve a critical role in preserving people's health from respiratory illnesses. It is feasible to build a model to recognize persons wearing masks, not wearing masks, or wearing masks incorrectly using this dataset. 7553 RGB pictures are divided into two folders: with mask and without a mask. Label with mask and without a mask are the two types of images. The number of photographs of faces with masks is 3725, while the number of photos of faces without masks is 3828.

Keywords— Deep Learning, Face Recognition, Image Processing, AlexNet, Personal Authentication, Security.

I. RESEARCH QUESTION

The research question framed in relationship with the dataset is given below.

1, To what extent building an exact face detection model can be achieved using deep learning neural **network to increase protection, reduce human interaction, and prevent fraud?**

II. LITERATURE REVIEW

There is an increasing amount of research into Face Mask Identification development as well as the number of surveys written specifically for this topic. In this study [1], the examination's route is indexing Face Mask Recognition (FMR) reports to understand the points obtained, the dynamic experts, and the nature of the evaluations identified. In addition, an extensive automated query was conducted to investigate SLRs organizing Face Mask recognition. The work distinguishes among both SLR studies and articles declaring those research papers.

In this paper [2], researchers built a model employing deep transfer learning and fine-tuning concepts. The platform is built upon on MobileNetv2 base model, with the head changed by a personalized face mask algorithm, allowing for the coaching of both faces masked and non-face masked pictures

This author [3] introduces a reconstructive way to obtain the least partly rebuilt characteristics of the overlapped part of the face, which were then used to detect the face to use an original deep learning technique. The easily visible part of a face will be first removed, and the remaining parts of the face are exposed to Principal component analysis (PCA).

For this study, author [4] suggests a new near the actual technique for identifying face mask wear which integrates human body position acknowledgment with a convolutional neural network (CNN). Throughout the actual pictures, the authors use the importance of human posture recognition to perform background sorting and spatial decline.

The strategy is divided into three major subsystems. [5] To indicate the existence of human volunteers in video content, the first element utilizes a deep learning technique that merges fully convolutional knowledge (ResNet-50) with Feature Pyramid Network (FPN). In this paper, the author proposed that the transceiver detects and extracts facial expressions from videos using Multi-Task Convolutional Neural Networks (MT-CNN).

For the pre-training of a convolutional neural network, AlexNet for recognition is used in this study [8]. The accuracy of this pre-trained network's transfer learning is 97.95 percent. It is used to categorize 1000 different individuals. For short sample data, a lightweight convolutional neural network (LWCNN) based on deep learning is created in this research study [7]. The features of the input facial image are extracted using two convolutional blocks in LWCNN. The network's robustness is then confirmed using k-fold cross-validation.

In this study [6], FPGA parallel processing is used to increase the network's computing speed to meet the goal of real-time facial recognition processing. According to the research's test results, the system's recognition speed has reached 400FPS, greatly above previous results.

III. DATA SOURCE

This dataset contains 7553 RGB pictures are divided into two folders: with mask and without mask available online on Kaggle.com Label with mask and without a mask are the two types of images. The number of photographs of faces with masks is 3725, while the number of photos of faces without masks is 3828.
Dataset link:
https://www.kaggle.com/omkargurav/face-mask-dataset

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