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Recognition of Masked Face Using Convolutional Neural Network Algorithm

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Abstract: ***The covid -19 is an unparalleled crisis resulting in huge number of casualties security problem. So has to scale back the spread of corona virus, people often wear a mask to guard themselves. Indeed, during this challenging context, the matter of face recognition is usually like periocular recognition involving iris, pupil, sclera, upper and lower eyelids, eye folds, eye corners, skin texture, fine wrinkles, complexion, skin color, skin pores etc. In this paper, we propose a reliable method supported discard masked region and deep learning based features so as to deal with the matter of masked face recognition process. The primary step to discard the masked face region. Next, we apply deep learning algorithm to extract the simplest features from obtained regions (mostly eyes and forehead regions). This leads to good accuracy than the previous work for detecting the masked face.***

Keywords: Face recognition error; Discard masked regions; deep learning algorithm; Good accuracy; Face detected;

I. INTRODUCTION

Nowadays, corona virus spreads all over the world and people are facing many problems in day-to-day life. In this pandemic situation, when employees went for office, they have to access recognition process like finger print recognition, voice recognition, face recognition access etc., before entering the company. Among this face recognition process is quiet best access which leads to recognize without any close contact. In face recognition, face detection is the process which extracts all the faces from an image and give their location. Face detector determines the size and location of the human faces and detect facial features. It ignores the things in background like tree, buildings etc. The input of a face recognition system is an image and the output is an identification or verification of the subject or subjects that appear in the image database. In a face recognition system, face detection is the first stage prior to recognition and it is the procedure to determine all the possible faces at different locations with different size in a given image. Face detection techniques has numerous computer vision applications and is a model that includes several iterations. Face detection and localization are performed at the same time in some system and in others face detection is first completed and then, if positive, face localization is accomplished. Thus, face detection is a two-class problem where in a decision has to be made as to whether there is face or not in the picture. Security and authentication of a person is a crucial part of any industry. Face recognition biometrics is the science of programming a computer to recognize a human face. When a person is enrolled in a face recognition system, a video camera takes series of snapshots of the face and then represent it by unique holistic code. Face recognition process comes under deep learning concept. Deep learning attempts to imitate how human brain process light and sound stimuli into vision and hearing. A deep learning architecture is inspired by biological neural networks and consisting of multiple layers in an artificial neural network made up of hardware and GPUs.

1) When someone has their face verified by the computer, it captures their current appearance and compares it with facial codes which already stored in the system.
2) If faces match, the person receives authorization; otherwise, the person will not be identified. The existing face recognition system identifies only static face images that almost exactly match with one of the images stored in the database.

II. EXISTING SYSTEM

However, the pretrained features cause performance degradation due to the texture discrepancy with the visual domain. With this motivational, (RGM) that extract global relational information addition to general facial features. Because each identity relational information between intra-facial parts is similar in any modality, the modeling relationship between features can help cross-domain matching. Through the RGM, relation propagation diminishes texture dependency without losing its advantages from pre-trained features. Furthermore, the RGM captures global facial geometrics from locally correlated convolutional features to identify long range relationship.

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In addition, we propose a Node Attention Unit (NAU) that performs node-wise recalibration to concentrate on the more informative nodes arising from relation-based propagation. Furthermore, we suggest a novel conditional margin loss function (C-SoftMax) for the efficient projection learning of the embedding vector in HFR. The disadvantages is unmasking and recognizing the face is time consuming process and its prediction accuracy is comparatively poor.

III.PROPOSED SYSTEM

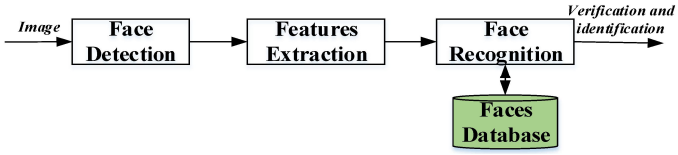
In this paper, we propose a reliable method on discard masked region and deep learning features in order to address the problem of masked face recognition process. The primary step is to detect the masked face from the input data. Next, we apply a pre-trained deep learning to extract the best features from the obtained region (mostly eyes and forehead regions). Finally, the Bag-of-features paradigm is applied on the feature map of the last convolutional layer in order to quantize them and to get a slight representation comparing to the fully connected layer of deep learning algorithm. Finally, deep learning is applied for the classification process. This process really works out in real time method. For example, if more number of employees are waiting for recognition access to enter into the industry, its works out really well and time consumption for authorization is less and face detection will have good accuracy. In this paper we overcome with better prediction of masked face and prediction accuracy is comparatively good.

IV.IMPLEMENTATION

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus, it can be considered to be the critical stage in achieving a successful new system and in giving the user confident that the new system will work and be effective. The implementation involves careful planning, investigation of the existing system and its constraints on implementation, designing of methods to changeover methods.

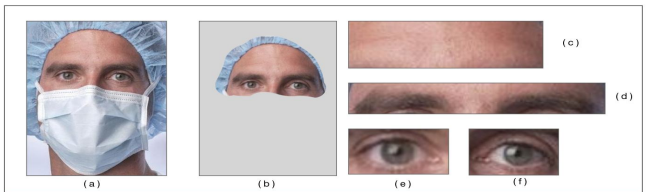
A. Data Collection

In the literature survey, many datasets have been constructed to assess face detection models. While early datasets mainly consist of images collected in the controlled environment, recent datasets like MALF etc., which tend to collect images from Interne. The rapidly growing face datasets constructs a more realistic testing platform for face detection models so that their application in real-world applications becomes much easier. Moreover, the presence of such large-scale datasets enables the usage of deep learning algorithms that are extremely powerful in learning effective face representations directly from data. In this project, the dataset is initially collecting for the training phase individually for learning process. Then the input data face with mask is processes in the testing phase.



B. Traning module

In this module, the model is initially fit on a training dataset, which is a set of examples used to fit the parameters (e.g. Weight of connections between neurons in artificial neural networks) of the model. After that the model (e.g., A neural net or native bayes classifier) is trained on the training data set using supervised learning method, for example using optimization method such as gradient descent or stochastic gradient descent. In practice, the training dataset often consists of pairs of an input vectors (or scalar) and the corresponding output vector (or scalar), where the answer key is commonly denoted as the target (or label) the current model is run with the training dataset and process a result, which is then compared with the target, for each input vector in the training dataset. Based on the result of the comparison and specific learning algorithm being used, the parameters of the model are adjusted.



Face parts detection : a. source image, b.after segmenting visible part of face , c.detect texture and color of skin , d. eyebrows shape and space between them , we also can detect color of eyes and center and radius of the eyeballs , e. left eyes , f. right eyes

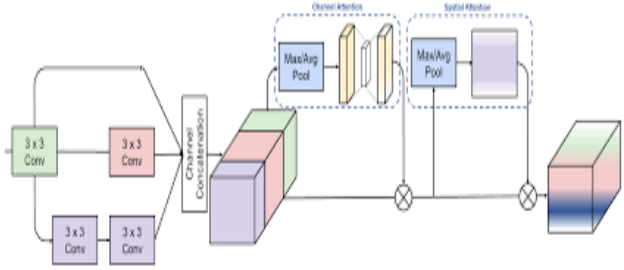
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C. *Testing Module*

Finally, the test dataset is a dataset used to provide an unbiased evaluation of a final model fit on the training dataset. If the data in the test dataset has never been used in training (for example in cross-validation), the test dataset is also called a holdout dataset.

D. *Prediction Module*

Machine learning is a way of identifying patterns in data and using them to automatically make predictions or decisions. The evaluation of the model by first using it to make predictions on the training dataset by calling predict() and then comparing the predictions to the expected class labels.



V. ALGORITHM

A. *Convolutional Neural Network Algorithm*

The Convolutional Neural Network Algorithm is one of the main categories to recognize images and classification. CNN image classification collect an input image, access it and classify it under certain category. The preprocessing required in a ConvNet is a whole lot decrease compared to different class algorithm. While in primitive strategies filters are hand-engineered, with sufficient training, ConvNet. The structure of a ConvNet has similarities to that of connectivity sample of neurons with inside the human brain and become simulated via way of means of the organization of the visual cortex. Individual have the capacity to research those filters or characteristics. A series of such fields overlap to cowl the whole area. In the beyond few decades, Deep Learning has proved to be a completely effective device due to its capacity to deal with huge quantities of data. The hobby to apply hidden layers has exceeded convolutional techniques, specially in sample recognition. One of the famous deep neural networks is Convolutional Neural Network.

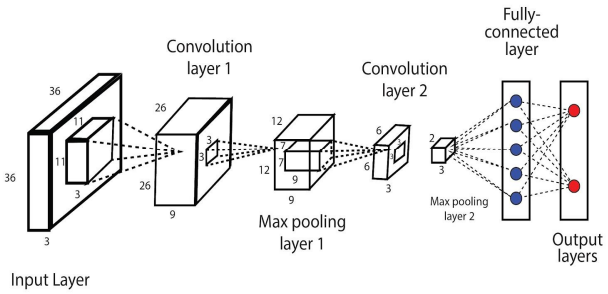


Fig: Convolutional Neural Network

B. *Deep Learning Algorithm*

Deep Learning is a group of algorithm stimulated via way of means of the workings of the human mind in processing statistics and growing styles to be used in selection making, that are increasing and enhancing at the concept of a unmarried version structure known as Artificial Neural Network. Deep Learning is the software of more than one layers of synthetic neural networks for mastering task. The Deep Learning neural networks are stimulated via way of means of the functioning of the human mind. Deep Learning fashions have big variety of processing devices known as neurons. These neurons carryout diverse obligation which

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includes category and textual content representation. Recently deep learning fashions are displaying marvellous overall performance in herbal language processing obligations which includes sentiment category obligation such as file and sentence category. Deep learning fashions also used to research state-of-the art functions from the dataset. Deep Learning methods has various distinctive strategies may be used to create robust deep learning models. These strategies encompass learning rate delay, transfer learning, training from scratch and dropout.

1) *Learning Rate Delay:* The learning rate is a hyperparameter—a thing that defines the device or units situations for its operation previous to the learning method—that controls how a great deal extrude the version reviews in reaction to the anticipated blunders whenever the version weights are altered. Learning charge which are too excessive may also bring about risky education procedures or the studying of a suboptimal set of weights. Learning charge which are too small may also produce a prolonged education method that has the capacity to get stuck. The learning charge decay method—additionally known as learning charge annealing or adaptive studying fees—is the method of adapting the learning charge to boom overall performance and decrease education time.
2) *Transfer Learning:* This procedure includes perfecting a formerly learning model; it calls for an interface to the internals of pre-existing community. First, customer feed the prevailing community new records containing formerly unknown classifications. Once modifications are made to the community, new duties may be finished with extra precise categorizing abilities. This approach has the benefit of requiring a whole lot much less records than others, as a consequence decreasing computation time mins or hours.
3) *Training from Scratch:* This approach calls for a developer to accumulate a massive categorised information set and configure a community structure that may study the functions and model. This method is mainly beneficial for brand new packages, in addition to packages with a massive variety of output categories. However, overall, its miles a much less not unusual place approach, because it call for inordinate quantities of information, inflicting learning to take days or weeks.
4) *Drop Out:* This technique tries to clear up the trouble of overfitting in networks with massive quantities of parameters through randomly losing devices and their connections from the neural community all through training. It has been demonstrated that the dropout technique can enhance the overall performance of neural networks on supervised studying obligations in region which include speech recognition, record category and computational biology.

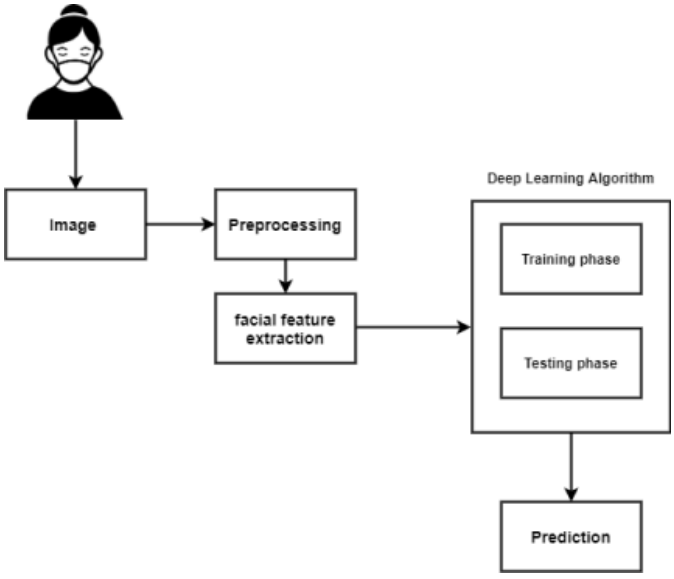


Fig: System architecture of masked face recognition

VI.CONCLUSIONS

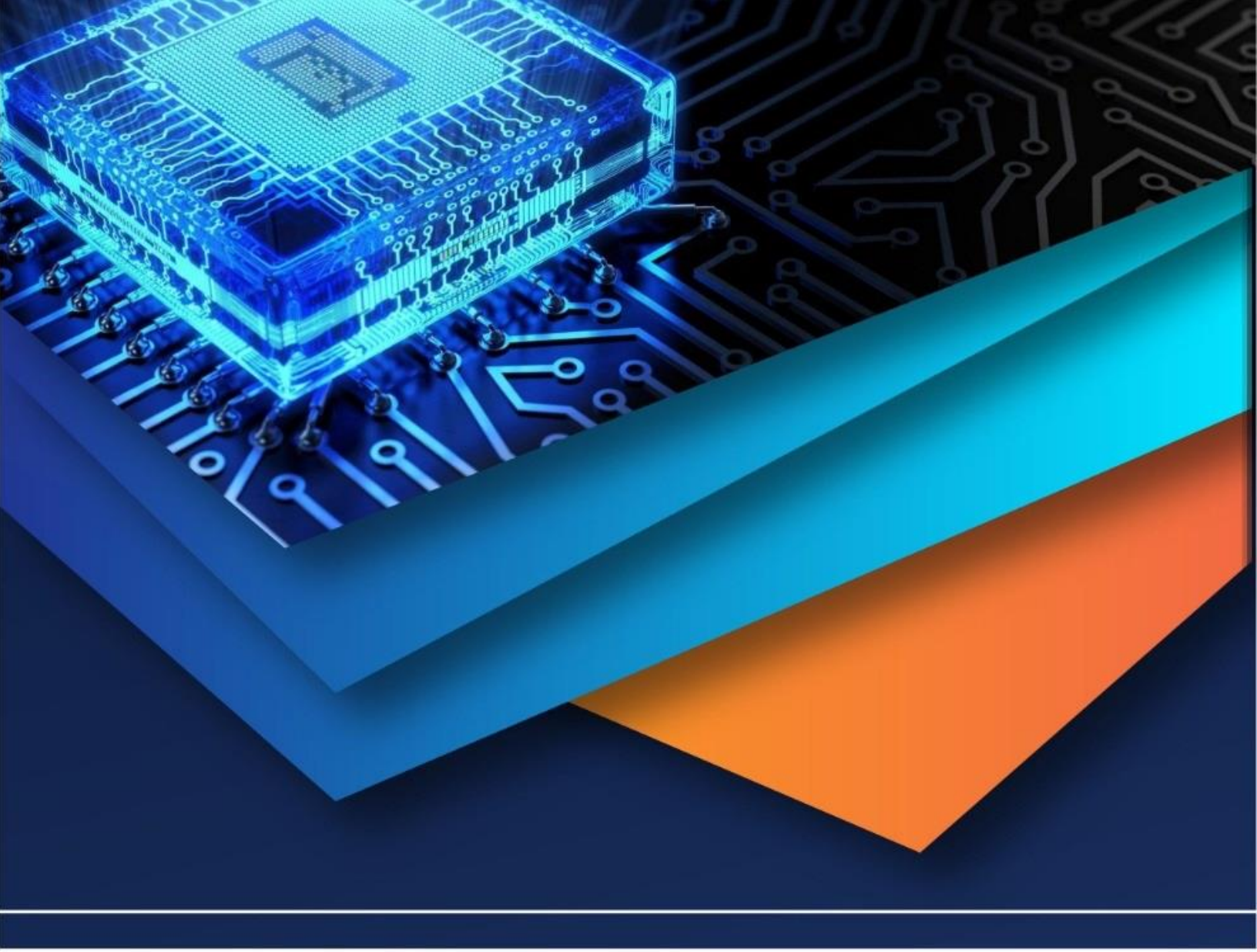
As the generation are blooming with rising developments the provision so we have novel face mask detector that could probably make contribution to public healthcare. In this pandemic situation, in which entire global is dreaming to return to regular routine, this gadget will play powerful position in tracking the use of face mask at work places. By the improvement of this gadget, we are able to detect the masks on one's face and permit his/her access with inside the workplace. In this work, Deep Learning set of rules is used to carry out masked face detection and it carry out nicely on figuring out it. In future, the powerful noise elimination strategies and illumination impact in face popularity the usage of Gabor and Non-Negative Matrix Factorization can be performed

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