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Developing An Application for Identification of Missing Children and Criminal Using Face Recognition.

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Abstract – One among the biometric based technology is the Face recognition. When both the input images are given to this technology it will undergo the mathematical calculation and it will predict the result and give the output to the user. The process involves applying Machine Learning (ML) process on the images. The purpose of the idea is to use the methodology for identification of criminals who has found in the previous record. Based on the recent data, that 90% of illegal activities are recurrently steadfast by similar offenders and even we can find out the missing children where the children are going missing in a large number every year using the face recognization technology the identification becomes very easy and faster way. where we can find out the missing children as well as a criminals by means of cameras and the video captures that are mounted in the various location .In certain areas has been overshadowed by the criminal activities with the negative societal application including increasing usage of internet as a source of particularly a marketing channel for child exploitation and this problem can be solved by utilizing convolutional neutral network a machine learning algorithm which will give the particular solution to this type of problems . This application as a more efficient approaches matched with other applications like: accuracy is more of atmost 90%. Accessibility where it is accessible to law enforcement authorities or the concern citizens. Scaleability where it can accommodate a large volume of data. Automation application automatically process the images where manual interventions is not needed .Speed, this application can quickly match the images as soon as both the input images are given where it saves the time and fast the work.

Keywords – machine learning, feature extraction, haar-casacade classifier, web scrapping.

I. INTRODUCTION

Use of multimedia, such as photographs and videos, has significantly increased during the last ten years, which has led to a growing interest in processing and analyzing this type of data. Face videos and images are particularly important, as they make up a large portion of multimedia data. Recognizing faces in different contexts remain castoff for numerous applications, such as surveillance monitoring, social networking, and human-computer interaction. For instance, during the imageries of the suspects captured by surveillance cameras helped the FBI to identify them, it still faces numerous problems. Chief challenges in face recognition is the variability in facial appearance due to fluctuations in lighting, pose, expression, and occlusion. These influences can meaningfully disturb the accuracy of face recognition algorithms. Another encounter is needed for great quantities of preparation data to develop accurate models. Additionally, face recognition algorithms may be susceptible to bias, particularly with respect to race and gender. Despite these difficulties, facial recognition technology has advanced significantly. Deep learning techniques, such as CNNs, have shown remarkable performance in face recognition tasks. Such methods can learn complex features from large amounts of data and are capable of handling variations in facial appearance. Overall, face recognition technology has the potential to revolutionize various applications, including security, surveillance, and human-computer interaction. Though, it remains significant to address the challenges and ethical thoughts related with this technology to ensure its responsible and ethical use. Illumination or expression may not be similar in another pose, illumination, or expression.

The proposed RFG framework consists of two main steps: reference face graph construction and recognition of face. In the first step, a group of referral faces is selected and represented as nodes in a graph. The edges among knobs are dogged founded on the similarity between the reference faces. In the second step, an unknown face is characterised as a set of feature vectors, and its similarity to each reference face is computed. The identity of the unknown face is then determined

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based on its similarity to the reference faces in the graph. The RFG structure has numerous benefits over traditional face recognition methods. First, it can handle unconstrained face recognition, where the faces may have variations in pose, illumination, and expression. Second, it does not require any pre-processing steps, such as alignment or normalization of the face images. Third, it can handle largescale face recognition problems, where the amount of reference faces can be very large. Finally, it remain be easily extended to handle other types of visual recognition problems, such as object recognition and scene recognition. It provides a good overview of computer vision and its applications. It correctly states that computer visualisation deals with how processers can understand digital images and extract highdimensional statistics from the real world. Correctly identifies face recognition as a technology used for identifying and verifying a person as of video frame or an image. It also mentions ANNs as a sequences of procedures that recognize underlying relationships in data through a process that mimics the operations of the human brain. The statement that ANNs work by adjusting "weights" during training and predicting output based on these adjusted weights is also accurate. It also mentions CNNs as a class of DNN most frequently castoff for analyzing visual imagery. It correctly identifies specific of the applications of CNNs, including video and image recognition and classification, analysis of medical image, natural language processing, and financial time series. Overall, provides a good summary of computer vision, face recognition, artificial neural networks, and convolutional neural networks. It accurately identifies particular of key applications of these technologies and their underlying principles.

Python's OpenCV library is capable of sensing substances and faces, but it cannot identify rotated images. Haar Cascade detector is castoff to find faces in photos that have been rotated and blurred. For face extraction and numerous functionality to compare the characteristics of two photos, utilise the Python Facepplib package. It is a programming interface that accepts two photos as input and methods with through many phases in order to recognise and compare faces. Facepplib's benefits include its ability to identify faces in unclear or distant photographs and the fact that it doesn't need to utilise the Haar classification for imageries of past offenders or missing children since such images just need little pre-processing. Because it employs web scraping, there is no need for a database or preexisting dataset in the web application, which is created using Python Flask and Jinja2 templates. Information on a criminal or a missing kid will remain animatedly updated in the event of any changes. The Haar cascade detector that can identify up to 55 faces from an image is used for face recognition. For face identification, the classifier transforms the RGB picture to grayscale.

The process consists of four steps: Selection of Haar Feature, Integral Images Creation, Training of Adaboost and Classifiers Cascading. These stages work together to detect faces in an image accurately. The Haar cascade detector is a prevalent technique for face discovery due to its high accuracy and speed.

Fig 1: Examples of how ageing affects the faces of people. Celebrity children are shown in the top picture, while their adult selves are shown in the ones below.

II. LITERATURE SURVEY

Dr. S. Matilda and S. Ayyappan have developed an method to identify missing children by means of web scraping and face recognition. This approach is capable to identify faces with an accuracy of 90%, which is quite impressive. Furthermore, this method necessitates less space to instrument and proceeds less time compared to other approaches.

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By means of face identification technology to identify missing children is a promising approach, as it can help law implementation activities and other organizations quickly locate missing children and reunite them with their families. Web scraping can likewise be a useful tool in this process, as it allows for the automated collection of statistics as of numerous foundations on the internet. It's important to note that although the method may be effective, there are likewise probable concerns around privacy and the ethical use of facial recognition technology. [1]

A paper presented by Nurul Azama Abdullah, for criminal identification using face recognition, the paper likely discusses their implementation of a face recognition system using principle component analysis (PCA) for identifying criminals. PCA is a technique used to reduce the dimensionality of data, this can remain used in face recognition tasks. The paper may describe the methodology and results of their implementation, in addition potential applications and limitations of the system. [2]

Lixiangli, Xiaohui Mu, Siying Li, and Haipeng Peng wrote a review paper on face recognition technology. The paper likely discusses the present state of the technology, including recent advancements and potential areas for improvement. They might have discussed the pros and cons of different face detection methods and how they remain be enhanced using various parameters such as camera quality, image processing, and image filtering. Additionally, they may have discussed the challenges of image reconstruction in addition in what way this can be addressed in recognition of face systems. Overall, the paper likely delivers a widespread impression of present state of face recognition technology and probable possibilities for upcoming research and development. [3]

Sakshi Malhotra, Amit Kumar, and Mukesh Kumar have likely developed an enhanced face acknowledgement system that customs age-invariant features. The system likely involves a process of face detection, followed by data collection and identification of the face. The authors may have castoff Python language for programming to code the program. The face detection process may involve by means of computer vision methods to locate and extract facial features from video stream or an image. The data collection process may involve capturing images of individuals and storing them in a database for later use in face recognition.The authors may have used age-invariant features, which are facial features that do not variation meaningfully with age, to progress accuracy of face recognition system. [4]

Abbasi has likely developed an exclusive face documentation scheme using ML in 2020. The system likely uses a technique called Haar Cascade for extracting the characters of human faces from frames of video or images. This is a machine learning-based approach that involves training a classifier to detect specific features of an object, such as a humanoid face. System likely involves a process of extracting faces through a series of data, which may involve capturing images or video frames of individuals. The extracted faces may then be castoff to train a ML model to recognize and identify faces in new images or video frames. The approach described by Abbasi may have potential applications in various fields, including security, surveillance, and biometrics. The use of ML can help to improve the accuracy and efficiency of face identification systems, making them more reliable and effective.Overall, the paper likely describes a novel approach to face identification using machine learning and Haar Cascade. [5]

Hyung-II Kim's work focuses on developing a method for objectively assessing the visual quality of face images in a dataset. The goal is to create a reliable and convenient way to train a dataset for facial recognition systems. The method involves using a set of objective metrics to appraise the eminence of face images. These metrics include measures of sharpness, contrast, noise, and distortion. The imageries are formerly graded founded on their quality scores, and the highest quality imageries are designated for custom in training the dataset. The approach is designed to be automated and efficient, allowing for large datasets to be evaluated quickly and accurately. By using objective metrics, the method avoids the subjective biases that can arise when human evaluators are used to assess image quality. Overall, Kim's work provides a valuable contribution to the field of facial recognition by offering a reliable and convenient way to train datasets with high-quality images. [6]

Liping Chang's work likely describes a method for pattern recognition and classification using a stacked convolutional autoencoder (SCAE) with deep learning. The SCAE is a kind of neural network that is normally castoff for image gratitude and feature extraction. The deep learning aspect of the method likely involves training the SCAE on a big database to acquire the underlying features and patterns of the images. The method likely involves using the SCAE to abstract topographies as of the images, which are further used for classification. The topographies mined by the SCAE may be more informative and discriminative than the raw image data, which can progress the accurateness of classification. In addition to the SCAE, the method likely incorporates sparse representation classification (SRC), which is a technique used for classification based on sparse representations of statistics. SRC involves representing the data as a linear grouping of a minor amount of basis vectors, those can be castoff for classification. [7]

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Piyush Kakkar's work focuses on developing a system that can automatically detect faces in video and advance the superiority of face images. The system achieves this by using a grouping of face detection procedures and image dispensation methods. The chief stage in scheme is for detecting expressions in video using a face detection algorithm. Once the faces are detected, the system applies image processing techniques to normalize the picture quality .[8]

Teddy Mantoro's work focuses on using eigenface approaches to generate a facial print. The facial print is a unique representation of a person's face that can be castoff for identification purposes. The system uses cascade classifiers and PCA for training. Cascade classifiers are a kind of ML algorithm that remain be castoff for object detection.

They work by breaking down the object detection problem into smaller sub-problems, making it at ease to detect the object. In the case of face detection, the cascade classifier would be trained to detect different facial features, such as the eyes, nose, and mouth. [9]

Lamiaa A. et. al. have proposed a client to server method for real-time tracking. This approach involves teaching computers to recognize visual elements by expending a large database and identifying emerging patterns. By doing so, the computers can make sense of imageries and track them in realtime. [10]

III. EXISTING SYSTEM

The existing applications that are castoff in our project is explained below and the flowchart of existing system is also illustrated in the figure 2. The existing scheme includes six chief steps they are:

1. Image Acquisition:

The image is captured, scanned and converted into a manageable entity. In this system face images are given as an input through the digital camera and stored in the hard disk.

We have to give two images as an input with the maximum difference of 30 years .

2. Face detection:

The input images are checked for faces. If faces are detected, then the faces are cropped and are further passed on to the next process. Else, the user is prompted to input a proper photograph.

3. Image pre-processing:

The chief aim of the image pre-processing is to set the provided image into proper format before the image undergoes the actual image processing. It will alter the size into preferred shape and it will upgrade the image and remove the unnecessary part of the image and perform some filtering operation for image enhancement.

4. Feature extraction:

Feature extraction performs a critical role in the machine learning task. It is considered as the procedure of dimensional reduction , where the pertinent topographies are careful for taining.it will train the particular feature extraction training to the corresponding model.

5. Predictions using multiple models:

The feature extraction can remain completed using vogg16 and LBP feature will extract the topographies as of the output of the vogg16 model. Cyclegan model will generate the features extraction individually which is unpaired dataset. Then for the final perdition both the vogg16 and LBP extracted images will extracted.

6. Final prediction:

Prediction are obtained from the vogg16 and LBP for each model then the images will have the binary classification from each model. Once all the predictions are collected, the maximum occurrence of a particular class of prediction , “Yes or “No” will obtained.

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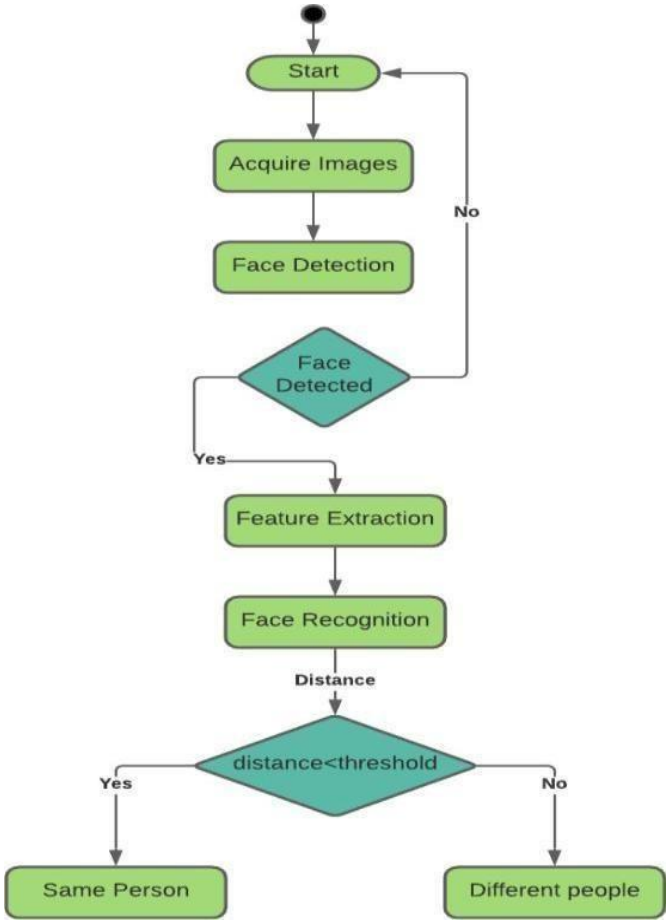

Fig 2: Flowchart for face recognition 1

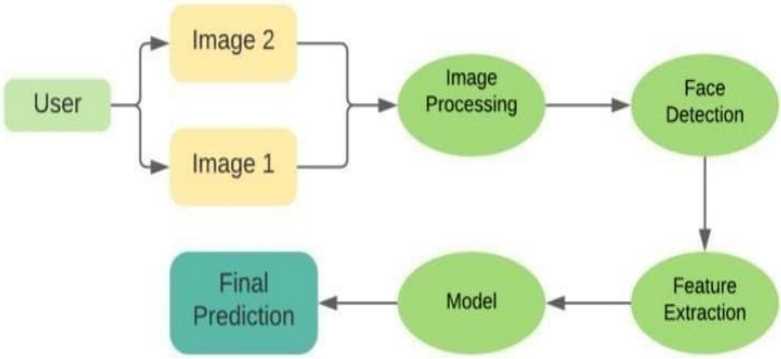

Fig 3: Flowchart for face recognition 2

IV. PROPOSED SYSTEM

The following modules make up the work carried out in our suggested system, and the structure is described below. The flow chart and block diagrams of projected system is also illustrated in the below figures. The six major steps involves are as below:

1. Image prepossessing:

The images were standardised into horizontally alignment of left and right eye using in plane rotation the facial coordinates are available from metad data which is provided with the FG -NET dataset. Any scope of the image is enlarge

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to the gauge of 224 X 224 size and it is stuffed into the convolutional neutral network using any one of the method that is original three colour medium or grey level medium duplicated 3 times.

2. Feature extraction :

VGG-Face CNN provided in the metaConvNet toolbox for feature abstraction has been used and there are four sections in the Deep architecture which will describe the VGG-Face network in consisting of 3 X 3 convolution layers 2 X 2 pooling layers and ReLu layer and three fully connected levels and this networks are originally trained to perform classification rather than the feature extraction.

3. Identification :

The design of the project is to recognise the images and test the data set first we have to give the old/young image of a person into the application and we have to test the dataset . then again secondly we have to give old/young image of a person where both first and second will individually undergo testing and identifying the images then they will be a classification on the means of vector where each mean of vector in the database is assign to have an identity in the gallery and it will show weather it is matching properly or it is unmatched.

4. Convolution layer :

Image processing uses multiple interconnected convolution layers to perform object recognition, image classification and segmentation. This layer uses mathematical concept called convolution to perform forensics on input image to determine feature of image. Convolution is performed by finding dot product between filter and pixel of image. input image's patterns and features are found and so called feature map. Using convolution layer allows automatic extraction of features from images.

5. Polling (sub sampling layer) :

Pooling is an operation , that is performed parallel with convolutional operation. Main objective of pooling is to make feature map smaller or in other words down sampling it , generated by convolutional layer by keeping the important information as it is. Based on presence of topographies in images, pooling is classified into :- Max pooling , which performs dividing feature map into non overlapping rectangular region and taking max value of each. Average pooling , each divided region is averaged. Sum pooling , values are summed from each region . Choice of pooling entirely depends on specific task and properties of input image.

6. Outer layer (fully connected layer) :

Outer layer is the final layer used for classifying images, finding presence of objects and segmentation. Every neuron in previous layer is mapped to neurons in this layer. Output from previous layer is converted to vector and delivered to fully connected layer. To learn non linear combination of characters obtained from convolution layer , which is utilised for other tasks.Output from this layer is passed to activation function, which generates probability distribution. This probability distribution is then used to make predictions of input image. It remains most significant layer for image processing and classification.

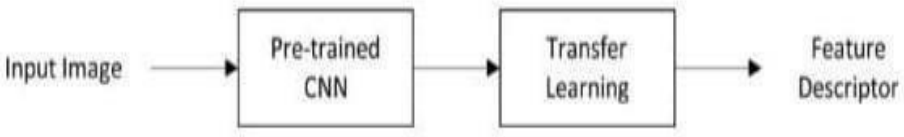

Fig 4: Flow diagram of robust feature extraction

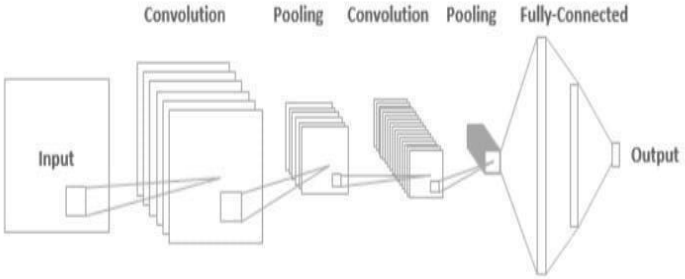

Fig 5: CNN composed of convolution, fully connected and pooling layers

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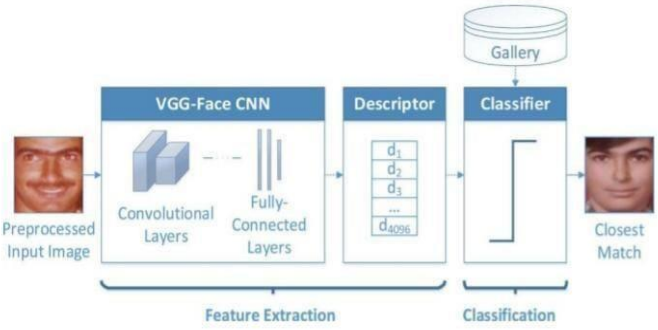

Fig 6 : Process of the face recognition

V. RESULT

For experimental purposes, the project is evaluated using a variety of age-invariant photos and image types. A small sample data set is used to evaluate the system's accuracy level and identify any weaknesses that need to be fixed in order for it to be improved. The tested imageries like childhood image and teen age image as a one set of data, older images in addition the Teenage image as a another set of data for a single person image and in instruction to test the images we have to take one set of data at a time and give both the imageries as an input which will compare both the imageries in addition show the outcome which will unable us to choose whether both the imageries of a one data set is matched or not .

Fig 7: Final output

Fig 8: Final output

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VI. CONCLUSION

In this article, we examined several picture types and the degree of accuracy of the supplied input photographs, and the results are quite encouraging. This application performs well at both the black and white images as well as a coloured images. In comparison to alternative methods, this application takes less time to develop and uses less memory space. This analysis process is approved out through all the age in-variant images and obtained a good results we consider that the application will increase the faster identification of criminal and missing children.

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