IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 4, April 2023

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

9940 572 462 | 6381 907 438 | ijircce@gmail.com | www.ijircce.com

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 4, April 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1104270 |

Automated Criminal Identification System using Face Detection and Recognition

Prajwal Gole, Nikhil Karale, Aditi Kardile, Prathmesh Patil, Madhura Shinde

Department of Computer Engineering, STES'S Smt. Kashibainavale College of Engineering, Vadgaon Bk, Off Sinhgad Road, Pune, Maharashtra, India

Department of Computer Engineering, STES'S Smt. Kashibainavale College of Engineering, Vadgaon Bk, Off Sinhgad Road, Pune, Maharashtra, India

Department of Computer Engineering, STES'S Smt. Kashibainavale College of Engineering, Vadgaon Bk, Off Sinhgad Road, Pune, Maharashtra, India

Department of Computer Engineering, STES'S Smt. Kashibainavale College of Engineering, Vadgaon Bk, Off Sinhgad Road, Pune, Maharashtra, India

ABSTRACT - Crime is a complex social issue impacting a considerable number of individuals within a society. Preventing and reducing Crime is a top priority in many countries. Given limited policing and crime reduction resources, it is often crucial to identify effective strategies to deploy the available resources. Towards this goal, crime hotspot prediction has previously been suggested. Crime hotspot prediction leverages past data in order to identify geographical areas susceptible of hosting crimes in the future. However, most of the existing techniques in crime hotspot prediction solely use historical crime recordsto identify crime hotspots, while ignoring the predictive power of other data such as urban or social mediadata. In this paper, we propose Crime, a platform that predicts and visualizes crime hotspots based on a fusion of different data types. Our platform continuously collects crime data as well as urban and social media data on the Web. It then extracts key features from the collected data based on both statistical and linguistic analysis. Finally, it identifies crime hotspots by leveraging the extracted features, and offers visualizations of the hotspots on an interactive map.

KEYWORDS*:* Crime, Crime Hotspot, Geographical areas, urban or social media

I. INTRODUCTION

Spatiotemporal data related to the public security have been growing at an exponential rate during the recent years. However, not all data have been effectively used to tackle real-world problems. In order to facilitate crime prevention, several scholars have developed models to predict crime. Most used historical crime data alone to calibrate the predictive models. The research on crime prediction currently focuses on two major aspects: crime risk area prediction, and crime hotspot prediction. The crime risk area prediction, based on the relevant influencing factors of criminal activities, refers to the correlation between criminal activities and physical environment, which both derived from the ‘‘routine activity theory’ ’Traditional crime risk estimation methods usually detect crime hotspots from the distribution of crime cases, and assume that the pattern will persist in the following time periods. For example, considering the proximity of crime places and the aggregation of crime elements, the terrain risk model tends to use crime-related environmental factors and crime history data, and is relatively effective for long-term, stable crime hotspot prediction. Many studies have carried out empirical research on crime prediction in different time periods, combining demographic and economic statistics data, land use data, mobile phone data and crime history data. Crime hotspot prediction aims to predict the likely location of future crime events and hotspots where the future events would concentrate. A commonly used method is kernel density estimation. A model that considers temporal or spatial autocorrelations of past events performs better than those that fail to account for the auto correlation. Recently machine learning algorithms have gained popularity. The most popular methods include K-Nearest Neighbor (KNN), random forest algorithm, support vector machine (SVM), neural network and Bayesian model etc. Some compared the linear methods of crime trend prediction, some compared Bayesian model and BP neural network and others compared the spatiotemporal kernel density method with the random forest method in different periods of crime prediction. Among these algorithms, KNN is an efficient supervised learning method algorithm. SVM is a popular machine learning model because it can not only implement classification and regression tasks, but also detect outliers. Random forest algorithm has been proven to

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 4, April 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1104270 |

have strong non-linear relational data processing ability and high prediction accuracy in multiple ends. Naive Bayes (NB) is a classical classification algorithm, which has only a few parameters and it is not sensitive to missing data. Convolutional neural networks (CNN) have strong expansibility and can enhance its expression ability with a very deep layer to deal with more complex classification problems. Long Short-Term Memory (LSTM) neural network extracts time-series features from features, and has a significant effect on processing data with strong time series trends. This paper will focus
on the comparison of the above six machine learning algorithms, and recommend the best performing one to demonstrate the predictive power with and without the use of covariates.

II. LITERATURE SURVEY

In [1], Piyush Chhoriya identifies and perceived countenances of the crooks in a video transfer got from a camera continuously. We have involved Haar highlight based course classifiers in Open CV approach for face identification. It is an AI based methodology where a course work is prepared from a great deal of positive and negative pictures. It is then used to identify objects in different pictures. Likewise, they utilized Local Binary Patterns Histograms (LBPH) for face acknowledgment. A few benefits of this calculation are: Efficient determination of highlights, Scale and area invariant finder, rather than scaling the actual picture, we scale the elements. LBPH recognizer can perceive faces in various lighting conditions with high exactness. Likewise, LBPH can perceive proficiently regardless of whether single preparing picture is utilized for every individual. The constant computerized face identification and acknowledgment framework proposed would be great for swarm reconnaissance applications.

Devendra Kumar Tayal et.al [2] , In the current paper, we propose a procedure for the arrangement and execution of bad behavior disclosure and criminal distinctive verification for Indian metropolitan regions using data mining techniques. Our philosophy is divided into six modules, to be explicit data extraction (DE), data preprocessing (DP), batching, Google map depiction, plan and WEKA execution. First module, DE focuses the unstructured bad behavior dataset from various bad behavior Web sources, during the hour of 2000-2012. Second module, DP cleans, fuses and reduces the isolated bad behavior data into coordinated 5,038 bad behavior events.

Practically speaking, ID of criminal in Malaysia is done through thumbprint ID. In any case, this sort of ID is compelled as the vast majority of criminal these days getting cleverer not to leave their thumbprint on the scene. With the coming of safety innovation, cameras particularly CCTV have been introduced in numerous public and private regions to give observation exercises. The recording of the CCTV can be utilized to recognize suspects on scene. In any case, as a result of restricted programming created to naturally distinguish the similitude between photograph in the recording and recorded photograph of crooks, the law authorize thumbprint recognizable proof. In [3], a computerized facial acknowledgment framework for criminal information base was proposed utilizing realized Principal Component Analysis approach. This framework will actually want to distinguish face and perceive face consequently. This will help the law authorizations to distinguish or perceive suspect of the case assuming that no thumbprint present on the scene. The outcomes show that around 80% of information photograph can be coordinated with the format information.

The motivation behind paper [4] is to propose another notice framework utilizing face discovery and acknowledgment to advise the house proprietor of guests by utilizing the SMTP to send an email containing the names and telephone quantities of those guests. In this framework, the camera identifies and perceives the people before the entryway and afterward sends their own data to the host. The hypothetical and viable parts of this framework are given as follows.

Ya Wang, Tianlong Bao [5] , Robust face acknowledgment in true observation recordings is a provoking yet significant issue because of the necessities of reasonable applications, for example, security checking. While current face acknowledgment frameworks perform well in moderately obliged scenes, they will generally experience the ill effects of varieties in posture, light or look in genuine observation recordings. In this paper, we propose a strategy for face acknowledgment in certifiable observation recordings by profound learning. Initial, a novel dataset from target genuine reconnaissance recordings is built consequently and steadily with the course of face identification, following, naming and purging. Then, at that point, a convolutional neural organization with the marked dataset is fine-tuned. On the testing dataset gathered from the grounds reconnaissance framework, the organization after tweaking accomplishes acknowledgment exactness of 92.1 %, which clearly beats the organization without adjusting, which returns an acknowledgment precision of 83.6%.

The Automatic Face Recognition framework is broadly applied in new advances. This framework works past the capacity of human vision. The restricted vision of natural eye in distinguishing huge number of human appearances is overwhelmed by the programmed face acknowledgment with a lot more benefits. The fundamental motivation behind face acknowledgment framework is to look at the picture video which is put away in a data set with the picture video continuously variety. Numerous strategies have

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 4, April 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1104270 |

been utilized in face acknowledgment framework. The paper [6] introduced an overview of a few procedures utilized in face acknowledgment framework, a way to deal with the location and ID of human face.

Bernd Heisele Thomas Serre and Tomaso Poggio [7] introduced a part based structure for face recognition and distinguishing proof. The face location and recognizable proof modules share a similar various leveled engineering. The two of them comprise of two layers of classifiers, a layer with a bunch of part classifiers and a layer with a solitary mix classifier. The part classifiers autonomously distinguish/recognize facial parts in the picture. Their results are passed the mix classifier which plays out the last discovery/ID of the face. We portray a calculation which consequently learns two separate arrangements of facial parts for the location and ID assignments. In tests we contrast the recognition and ID frameworks with standard worldwide methodologies. The exploratory outcomes obviously show that our part based methodology is better than worldwide methodologies.

Paper "Face Recognition in Video Streams and its Application in Freedom Fighters Discovery - A Machine Learning Approach" [8] , An AI approach is utilized to anticipate the essences of Indian political dissidents from any video transfer given as an info. To achieve this errand, the framework should be prepared before with a fitting and sufficient quantities of facial dataset. The preparation dataset is additionally made from a video transfer, which is named as preparing video. Given, that specific video transfer should contain just a single explicit political dissident's pictures of various stages and various styles. From the preparation video transfer, picture outlines comprise of their face were recognized, removed and put away for every individual. Then, at that point, these edges of countenances were utilized to prepare the machine. After appropriate preparing, a model was made and this model was utilized for expectation. In this work, Indian political dissidents' pictures were utilized for preparing and expectation. A similar methodology could be used for the forecast of any individual or rundown of people from a video transfer subsequent to obtaining appropriate preparing.

Face discovery is one of the most significant utilizations of picture handling and biometric frameworks. Counterfeit neural organizations (ANN) have been utilized in the field of picture handling and example acknowledgment. There is absence of writing reviews which give outline about the investigations and explores connected with the utilizing of ANN in face location. Along these lines, the exploration "Audit OF FACE DETECTION SYSTEMS BASED ARTIFICIAL NEURAL NETWORKS ALGORITHMS" [9] incorporates an overall survey of face discovery studies and frameworks which in light of various ANN approaches and calculations. The qualities and constraints of these writing studies and frameworks were incorporated too.

The accessibility of enormous clarified datasets and reasonable calculation power has prompted noteworthy enhancements in the exhibition of CNNs on different article discovery and acknowledgment benchmarks. These, alongside a superior comprehension of profound learning strategies, have likewise prompted further developed abilities of machine comprehension of countenances. CNNs can identify faces, find facial tourist spots, gauge present, and perceive faces in unconstrained pictures and recordings. In [10], creator depicted the subtleties of a profound learning pipeline for unconstrained face recognizable proof and check which accomplishes cutting edge execution on a few benchmark datasets. Rajeev Ranjan et al propose an original face finder, Deep Pyramid Single Shot Face Detector (DPSSD), which is quick and equipped for identifying faces with huge scope varieties (particularly minuscule appearances). We give configuration subtleties of the different modules engaged with programmed face acknowledgment: face recognition, milestone restriction and arrangement, and face recognizable proof/confirmation. We give assessment aftereffects of the proposed face identifier on testing unconstrained face location datasets. Then, at that point, we present test results for IARPA Janus Benchmarks A, B and C (IJB-A, IJB-B, IJB-C), and the Janus Challenge Set 5 (CS5).

III. PROPOSED SYSTEM

Face discovery is the initial phase in fostering a facial acknowledgment framework. This is the place where the framework recognize the face and decides if it is to be sure a human face or in any case. It additionally decides if the framework can recognize the subject and the foundation consequently permitting it to distinguish and perceive faces without any problem.

Input picture is picture from data set (for preparing) and ongoing picture (face location). Pre-handling is a typical name for activities with pictures at the least degree of reflection both information and result are force pictures. The point of pre-handling is an improvement of the picture information that smothers undesirable bends or upgrades some picture highlights significant for additional handling. Prior to talking about the extraction of component focuses it is important to have an action to analyze portions of pictures.

The extraction and matching of highlights depends on these actions. Other than the basic point highlight a further developed kind of element is additionally introduced. Highlight extraction method is utilized to remove the elements by

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 4, April 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1104270 |

keeping however much data as could be expected from huge arrangement of information of picture. Dataset is given to prepare Haar Cascade Algorithm. Grouping is performed utilizing Haar Cascade

Problem Analyses:

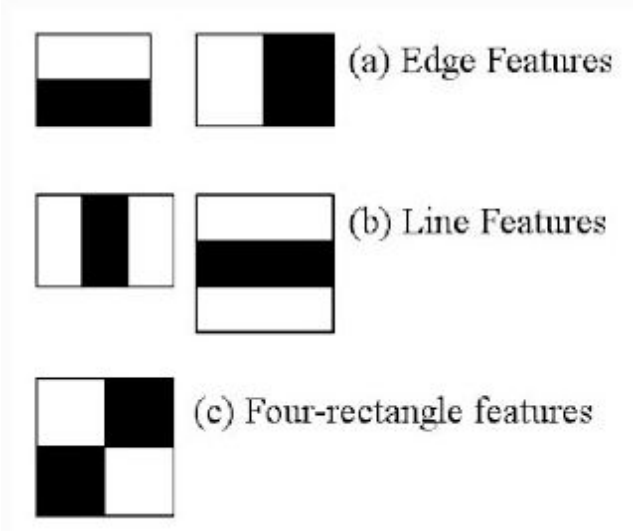


Figure 3.1: Problem Analyses

Object Detection utilizing Haar include based course classifiers is a compelling technique proposed by Paul Viola and Michael Jones in the 2001 paper, "Quick Object Detection utilizing a Boosted Cascade of Simple Features". It is an AI based methodology in which a course work is prepared from a ton of positive and negative pictures. It is then used to identify objects in different pictures.

Here we will work with face location. At first, the calculation needs a great deal of positive (pictures of countenances) and negative (pictures without faces) to prepare the classifier. Then, at that point, we want to separate highlights from it. For this, Haar highlights displayed in underneath picture are utilized. They are very much like our convolutional portion. Each element is a solitary worth got by deducting the amount of pixels under the white square shape from the amount of pixels under the dark square shape.

Presently all potential sizes and areas of every part are utilized to ascertain a lot of elements. For each element estimation, we want to track down the amount of the pixels under the white and dark square shapes. To tackle this, they presented the essential pictures. It works on computation of the amount of the pixels, how enormous might be the quantity of pixels, to an activity including only four pixels.

Yet, among this multitude of elements we determined, the vast majority of them are insignificant. For instance, consider the picture beneath. Top line shows two great elements. The main component chose appears to zero in on the property that the area of the eyes is frequently hazier than the district of the nose and cheeks. The subsequent element chose depends on the property that the eyes are hazier than the scaffold of the nose. Be that as it may, similar windows applying on cheeks or some other spot is superfluous. So how would we choose the best elements out of 160000+ elements? It is accomplished by Adaboost.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 4, April 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1104270 |

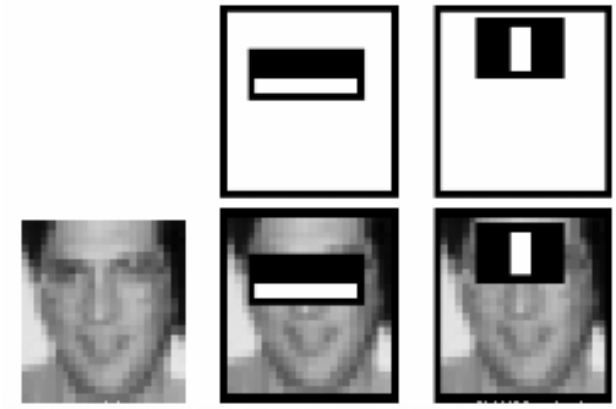


Figure 3.2: Image Processing

For this, we apply every single element on all the preparation pictures. For each element, it observes the best limit which will arrange the appearances to positive and negative. In any case, clearly, there will be blunders or misclassifications. We select the highlights with least blunder rate, which implies they are the elements that best orders the face and non-face pictures. (The

interaction isn't generally as straightforward as this. Each picture is given an equivalent load in the first place. After every characterization, loads of misclassified pictures are expanded. Of course same interaction is finished. New blunder rates are determined. Additionally new loads. The cycle is proceeded until required precision or mistake rate is accomplished or required number of elements are found).

Last classifier is a weighted amount of these feeble classifiers. It is called feeble in light of the fact that it alone can't arrange the picture, however along with others shapes a solid classifier. The paper says even 200 elements give identification 95% exactness.

In a picture, the greater part of the picture area is non-face district. So it is a superior plan to have a basic technique to check in the event that a window isn't a face locale. Assuming it isn't, dispose of it in a solitary shot. Try not to handle it once more. Rather center around area where there can be a face. Along these lines, we can carve out greater opportunity to really take a look at a potential face area. For this they presented the idea of Cascade of Classifiers. Rather than applying every one of the 6000 elements on a window, bunch the elements into various phases of classifiers and apply individually. (Ordinarily initial not many stages will contain exceptionally less number of elements). In the event that a window bombs the primary stage, dispose of it. We don't think about leftover elements on it. Assuming it passes, apply the second phase of elements and proceed with the cycle. The window which passes all stages is a face locale. How is the arrangement!!!

Creators' identifier had 6000+ highlights with 38 phases with 1, 10, 25, 25 and 50 elements in initial five phases. (Two highlights in the above picture is really gotten as the best two elements from Adaboost). As per creators, on a normal, 10 elements out of 6000+ are assessed per sub-window.

So this is a straightforward instinctive clarification of how Viola-Jones faces discovery functions. Peruse paper for additional subtleties.

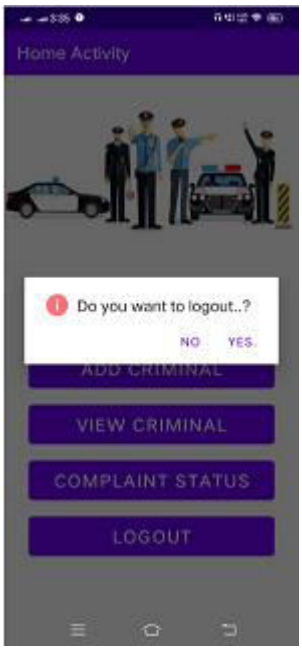
International Journal of Innovative Research in Computer and Communication Engineering

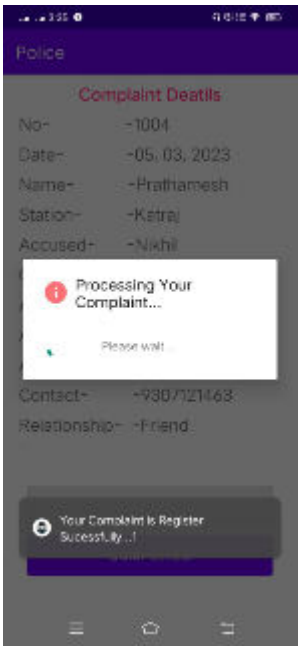
| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

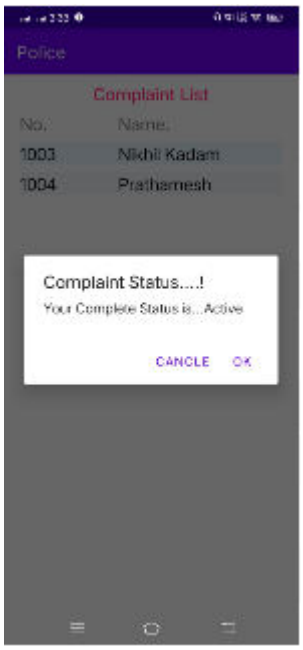
|| Volume 11, Issue 4, April 2023 ||

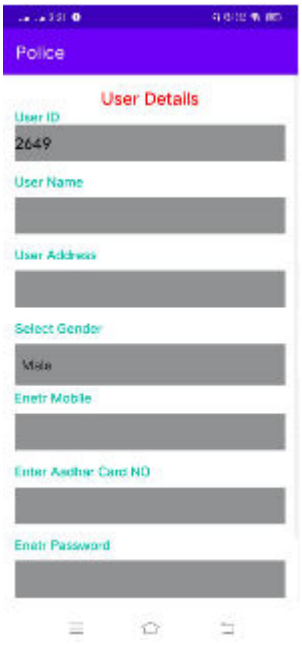
| DOI: 10.15680/IJIRCCE.2023.1104270 |

IV. RESULTS









V.CONCLUSION

AT THE POINT WHEN THE OBSERVER IS FREE, AT THE WRONGDOING EPISODE, IT IS NOT DIFFICULT TO RECOGNIZE THE CRIMINAL UTILIZING DRAWS AND OTHER PROOF. YET, WHEN A WRONGDOING OCCURS WITHOUT WITNESS THEN, AT THAT POINT, THE FACIAL ACKNOWLEDGMENT FRAMEWORK CAN BE UTILIZED TO RECOGNIZE THE HOODLUMS. THESE MODELS ARE EXTREMELY HELPFUL TO DISCOVER THE CRIMINAL AFTER THE WRONGDOING. THE FRAMEWORK PERCEIVES THE CROOK, VALUABLE TO FORESTALL THE WRONGDOING. LIMITS OF THE FRAMEWORK ARE

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 4, April 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1104270 |

THAT MOST FREQUENTLY LAWBREAKERS DON'T CONFRONT THE CAMERA/STAY AWAY FROM THE CAMERA. THE SPECIFIC FACE CAN BE INVESTIGATED BY EXTRICATING THE MORE MODEST ELEMENTS OF THE FACE LIKE PROFUNDITY OF THE EYE.

REFERENCES

[1] Piyush Chhoriya, "Automated Criminal Identification System using Face Detection and Recognition" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 06 Issue: 10 | Oct 2019 www.irjet.net p-ISSN: 2395-0072 © 2019, IRJET | Impact Factor value: 7.34 | ISO 9001:2008 Certified Journal | Page 910

[2] Tayal, D.K., Jain, A., Arora, S. et al. Crime detection and criminal identification in India using data mining techniques. AI & Soc 30, 117–127 (2015). https://doi.org/10.1007/s00146-014-0539-6

[3] Nurul Azma Abdullaha, Md. Jamri Saidi, Nurul Hidayah Ab Rahmanb, Chuah Chai Wenc and Isredza Rahmi A. Hamid, "Face Recognition for Criminal Identification: An implementation of principal component analysis for face recognition", The 2nd International Conference on Applied Science and Technology 2017 (ICAST'17) AIP Conf. Proc. 1891, 020002-1–020002-6;

[4] Ahmed AbdulQader Al-Bakeri Abdullah Ahmad Basuhail "Notification System Based on Face Detection and Recognition: A Novel Approach" International Journal of Computer Science and Information Security (IJCSIS), Vol. 14, No. 4, April 2016

[5] Ya Wang, Tianlong Bao, Chunhui Ding and Ming Zhu, "Face recognition in real-world surveillance videos with deep learning method," 2017 2nd International Conference on Image, Vision and Computing (ICIVC), 2017, pp. 239-243, doi: 10.1109/ICIVC.2017.7984553.

[6] Ningthoujam Sunita Devi Prof. K. Hemachandran, "Automatic Face Recognition System using Pattern Recognition Techniques: A Survey", International Journal of Computer Applications (0975 – 8887) Volume 83 – No 5, December 2013 10

[7] BERND HEISELE THOMAS SERRE AND TOMASO POGGIO "A Component-based Framework for Face Detection and Identification" International Journal of Computer Vision c 2006 Springer Science + Business Media, LLC. Manufactured in the United States. DOI: 10.1007/s11263-006-0006-z

[8] V. Perumal, "Face Recognition in Video Streams and its Application in Freedom Fighters Discovery - A Machine Learning Approach," 2020 IEEE International Conference on Machine Learning and Applied Network Technologies (ICMLANT), 2020, pp. 1-5, doi: 10.1109/ICMLANT50963.2020.9355979.

[9] Omaima N. A. AL-Allaf "REVIEW OF FACE DETECTION SYSTEMS BASED ARTIFICIAL NEURAL NETWORKS ALGORITHMS", The International Journal of Multimedia & Its Applications (IJMA) Vol.6, No.1, February 2014 DOI : 10.5121/ijma.2013.6101 1

[10] Rajeev Ranjan, Ankan Bansal, Jingxiao Zheng, Hongyu Xu, Joshua Gleason, Boyu Lu, Anirudh Nanduri, Jun-Cheng Chen, Carlos D. Castillo, Rama Chellappa "A Fast and Accurate System for Face Detection, Identification, and Verification", arXiv:1809.07586v1 [cs.CV] 20 Sep 2018.

INNO SPACE
SJIF Scientific Journal Impact Factor

Impact Factor: 8.379

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details