IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Face, Expression And Gesture Recognition & Compilation In Database

[1]Minal Tayde, [2]Dr. Rupesh C. Jaiswal, [3]Dr. Girish P. Potdar, [4]Prof. Manish R. Khodaskar
[1]Student, [2]Professor, [3]Professor, [4]Professor
[1,2]Department of E & Telecommunication Engineering,
[3,] Department of Computer Engineering,
[4,] Department of IT Engineering,
[1,2,3,4]SCTR's Pune Institute of Computer Technology, Pune, India.

ABSTRACT

A database that encompasses all potential combinations of suspects' external variables is only available to the government's upper echelons, putting more pressure on researchers to collect their own data or compile groups of datasets. To fix this flaw, we suggest a system for acquiring facial and behavioural data in unregulated and real-life scenarios. For the government and private organizations to maintain security, this project would be beneficial. We intend to observe and analyse a fully computerize process of crime registration, investigation, prosecution etc. and to build a central database along with time and location stamps that will serve as a national search engine as well as crime analytics for police and other government agencies. The database that has been created will be utilised to identify suspects from CCTV footage of crimes that has been recorded by a number of systems that are situated near crime scenes and on major thoroughfares. We also make some attempts to electronically share data/information among Police Stations & Police Higher Offices.

1.INTRODUCTION

Using a distributed CCTV system, this technique captures the face, gesture, and expression of the intended individuals (criminals) and records that data in a database along with a time and location stamp. The process of recognizing and interpreting symbolic gestures of the hands[6], arms, face[2][4], and sometimes head is known as face/gesture[3][4] recognition. It is critical to create a user-friendly human-computer interface to automate this operation. The technology has been under investigation in recent years due to its potential for use in user interfaces. One of the key areas of study for engineers and scientists is gesture recognition [6-9]. Today, the industry is developing various applications to make interactions more normal, simple, and convenient without the use of any additional devices. Many prominent figures in the field of gesture recognition systems have promoted their solutions to solve different problems. We present what gesture recognition technology entails, as well as a possible solution to gesture recognition.

Also, role of ML and ESPs [10-76] are becoming important in recent applications, recognition and control.

2.Activity Diagram

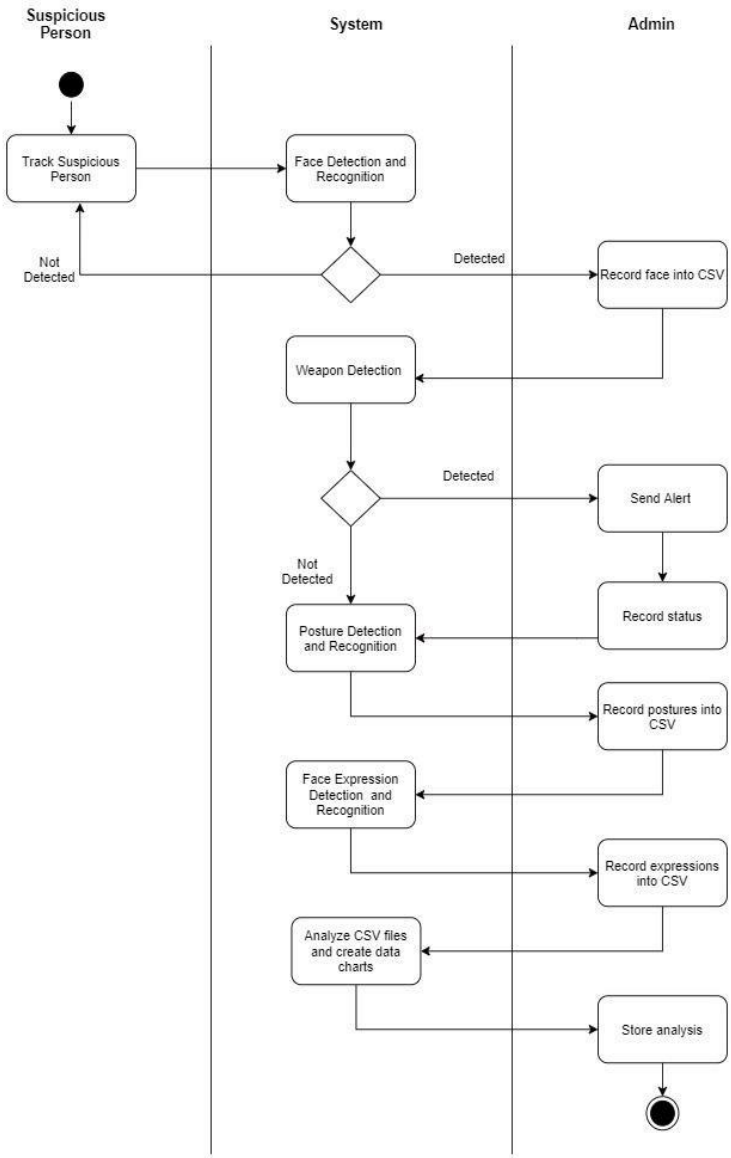


Figure 1. Activity diagram

The system shown in Figure 1 allows to record the targeted individuals' faces, expressions, and movements and save them in a database. Provide sample for matching and then extract features to recognize the below and to store data of criminal in CSV file.

1. Face detection and Recognition
2. Weapon detection
3. Posture detection and Recognition
4. Hand gesture recognition
5. Facial expression recognition

3.Algorithms

3.1. Face Detection & Recognition Module

MTCNN

A three-stage technique called MTCNN (Multi-task Cascaded Convolutional Neural Networks) recognises the bounding boxes and five-point face landmarks of faces in an image. By putting its inputs through a CNN, which produces candidate bounding boxes with their scores, each stage gradually improves the detection results.

The first step will be to give the software a picture to work with. We want to build a picture pyramid in this model in order to detect faces of various sizes. The image must be scaled into many copies, entered into the first neural network, P-Net, and its output must be accrued once the image has been entered. The weights and biases of P-Net have been tuned to provide a reasonably correct bounding box for each 12 x 12 kernel. In pictures, it's common for only a piece of a face to be visible peering in from the side of the frame. The network might then deliver a bounding box that is only partially visible in that situation. The new array for will contain many columns of 0s close to the right edge and pixel values distributed across the box's left side. The process of padding involves adding 0s to arrays. We can now feed these refined images into R-Net and collect the results. It provides the coordinates of the latest, more precise bounding boxes, as well as their trust levels. We must first pad any boxes from R-Net that are out-of-bounds before passing them to the O-Net. The bounding boxes can then be resized and moved into O-Net. Compared to P-Net and R-Net, O-Net results are significantly different. The three outputs provided by O-Net are the bounding box coordinates, the five facial landmark coordinates, and the confidence level of each box.

The data must next be compiled into a dictionary using the key terms "box, trust, and keypoints." This is the last phase. The terms "box" and "trust" refer to the bounding box coordinates, "keypoints" refers to the coordinates of each facial landmark (eyes, nose, and endpoints of the mouth).

3.2. Pose estimation module:

Steps:

- To extract function maps, the image is first passed through a baseline network.
- After that, the feature maps go through multiple stages of CNN processing to create: Firstly, a set of Part Confidence Maps, and secondly, a set of Part Affinity Fields (PAFs).
- The Confidence Map is a two-dimensional illustration of the idea that any given pixel can be used to find a certain body part.
- A collection of 2D confidence maps S for the locations of bodily parts. There is a map at each joint location.
- Part Affinity Fields (PAFs) are a collection of 2D vector fields L that express how closely related different parts are to one another.

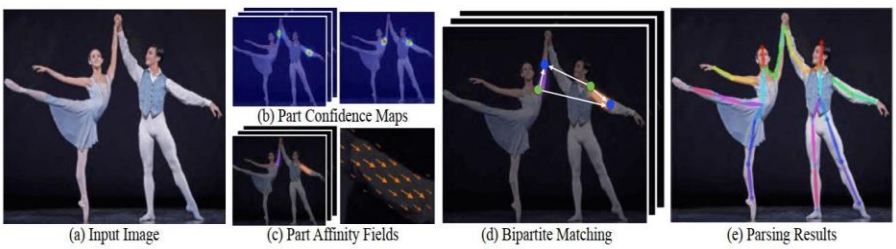


Figure 2: Overall Pipeline of the Open Pose architecture.

There are three steps that make up the parsing process:

Step 1: Using the confidence maps, locate every joint.

Step 2: Utilizing the part affinity fields and joints from step 1, determine which joints connect to create limbs (body parts).

Step 3: To gather the whole list of human positions, associate limbs that belong to the same person.

3.3. CNN-LSTM for

- Hand Gesture Recognition Module
- Weapon Detection Module
- Facial Expressions Recognition Module:

Long-short term memory networks (LSTMs) are a form of recurrent neural network that can account for sequential dependencies in a time series. Given the existence of associations between observations in a given time series (a phenomenon known as autocorrelation), a standard neural network will incorrectly treat all observations as independent, resulting in misleading results.

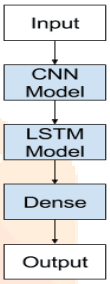


Figure 3: CNN-LSTM Architecture

Convolutional Neural Network (CNN) layers are used in the CNN LSTM architecture to extract features from input data, and LSTMs are used to assist sequence prediction. For the purpose of producing textual descriptions from sequences of images and visual time series prediction issues, CNN LSTMs were created.

In order to generate textual descriptions from sequences of images, CNN LSTMs were created for visual time series prediction issues (e.g. videos). In particular, the issues with:

- **Activity Recognition**: Producing a textual explanation of a task that is illustrated by a series of visuals.
- **Image Description**: Producing a written description for a single image.
- **Video Description**: Creating a text description of an image series.

4.GUI

4.1. Implementing GUI:

Implementation of GUI involves designing and writing design code for each user screen. Implementation of GUI is done using HTML, CSS, and JavaScript with Electron framework and Flask framework is used to expose CSV files to open ended API.

HTML is used to design the GUI Screen of the desktop app which will be used by Admin. HTML and CSS are used along with each other. CSS describes how HTML elements are to be displayed on screen. Electron is a framework for creating native applications with web technologies like JavaScript, HTML, and CSS. An app built with Electron behaves

like a web app, but it can read and write data in the computer's file system. The Electron app usually reuses the business logic, design and general structure of a web app. All HTML files are stored under template folder and media under static folder. It's a great way to save time and money on the business and development side.

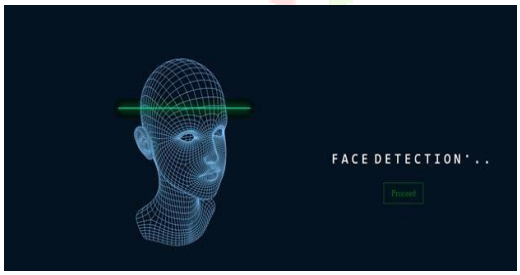
Also, Flask framework is used to run this application on the web. Flask is a web framework. It provides tools, libraries and technologies that allow you to build a web application. Flask enables secure transmission of data from local machines, which other LAN connected machines can also use. In this system all results are stored in CSV File which is popular among machine learning models as a means of training. This CSV can be exposed to an API easily with the flask framework. A summary of collected data will be displayed.

GUI Screenshots:

1. Login Screen

2. Upload Video/ Use camera screen:

3. Face Detection, Weapon Detection, Pose Estimation, Hand Gesture Estimation, Facial Estimation Screen:



4. Final Result Screen:

CONCLUSION

Through a distributed CCTV system, our system will record the faces, gestures, and facial expressions of the targeted individuals (criminals or suspects) and store them in a database. The database created will be used to identify suspects using CCTV footage of crimes that was recorded by a number of systems situated along roads and near to the crime scene. This system will fully automate the suspect identification procedure and offer better ways to lower the rising crime rate.

ACKNOWLEDGEMENT

I would like to thank all the members who have helped me in completing this research work and paper. I express my heartiest gratitude to Dr. Rupesh Jaiswal Sir for his guidance and constant supervision as well as for providing necessary information to complete our research work. I would also like to express my gratitude towards our parents and friends for their kind co-operation and encouragement which helped me in completion of this research work.

REFERENCES

[1] Liu Yihui, Bai Li. Salient Information of Mass Spectra of Prostate Cancer Dataset[C]. Proc. of IEEE GRC'08. Hangzhou, China:[s. n.], 2008.

[2] C.Sagonas,G.Tzimiropoulos,S.Zafeiriou,and M.Pantic, "A semiautomatic methodology for facial landmark annotation," in Proc. CVPR,Jun. 2013, pp. 896–903

[3] Mehrabian A.: Communication Without Words. Psychology Today, Issue 2, 53--56 (1968)

[4] Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emo-tion. Journal of Personality and Social Psychology, 17(2), 124-129.

[5] P. T. Yap, R. Paramesran and Seng-Huat Ong, "Image analysis by Krawtchouk moments," in IEEE Transactions on Image Processing, vol. 12, no. 11, pp. 1367-1377, Nov. 2003.

[6] A. El-Sawah, N. Georganas, and E. Petriu, "A prototype for 3-D hand tracking and gesture estimation," IEEE Trans. Instrum. Meas., vol. 57, no. 8, pp. 1627–1636, Aug. 2008.

[7] D. G. Lowe, "Distinctive image features from scale-invariant keypoints," Int. J. Comput. Vis., vol. 60, no. 2, pp. 91–110, Nov. 2004.

[8] Wei Liu et al., "SSD: Single Shot MultiBox Detector", European Conference on Conputer Vision, Volume 169, pp 20-31 Sep. 2017.

[9] D. Erhan et al., "Scalable Object Detection Using Deep Neural Networks," IEEE Conference on Computer Vision and Pattern Recognition (CVPR),2014.

[10] Jaiswal R.C. and Lokhande S.D., "Systematic Performance Analysis of Bit-Torrent Traffic", Helix SCI INDEXED E-ISSN: 2319-5592; P-ISSNs: 2277-3495, Helix Vol. 9 (2): pp. 4858- 4863, DOI 10.29042/2019-4858-4863, April 2019.

[11] Jaiswal R.C. and Aishwarya Gaikwad, "Experimental Analysis of Bit torrent Traffic based on Heavy-Tailed Probability Distributions", International Journal of Computer Applications, ISSN No. (0975 – 8887),Impact Factor .3.1579(2016),Volume 155 – No 2, December 2016.

[12] Jaiswal R.C. and Lokhande S.D., "Evaluation of Effect of Seeds and downloaders on the Performance of Bit Torrent Network using Markov Chain Modelling", Journal of Communication Engineering & Systems, Volume 6, Issue 1. (ISSN: 2321-5151 (print version), ISSN: 2249-8613 (electronic version) IF (2016): 0.709).

[13] Jaiswal R.C. and Lokhande S.D., A. Ahmed, P. Mahajan, "Performance Evaluation of Clustering Algorithms for IP Traffic Recognition", International Journal of Science and Research (IJSR), volume-4, Issue-5, May-2015, pp. 2786-2792. (ISSN (Online): 2319-7064, Index Copernicus Value (2013): 6.14|Impact Factor (2013):4.438

[14] Jaiswal R.C. and Lokhande S.D., Gulavani Aditya "Implementation and Analysis of DoS Attack Detection Algorithms", International Journal of Science and Research (IJSR), volume-4, Issue-5, May-2015, pp. 2085-2089. (ISSN (Online): 2319-7064, Index Copernicus Value (2013): 6.14 | Impact Factor (2013):4.438

[15] Jaiswal R.C. and Lokhande S.D., "Performance Analysis for IPv4 and IPv6 Internet Traffic", ICTACT Journal on Communication Technology, September 2015, volume: 06, issue: 04, pp. 1208-1217. (Print: ISSN: 0976-0091, Online ISSN:2229-6948 (Impact Factor: 0.789 in 2015).

[16] Jaiswal R.C. and Lokhande S.D, "Performance Evaluation of Wireless Networks", Coimbatore Institute of Information Technology International Journal, volume-7, Issue-8, July-2015, pp. 1237-1242. (Print: ISSN 0974 – 9616 |Impact Factor: 0.572)

[17] Jaiswal R.C. and Lokhande S.D, "A Novel Approach for Real Time Internet Traffic Classification", ICTACT Journal on Communication Technology, September 2015, volume: 06, issue: 03, pp. 1160-1166. (Print: ISSN: 0976-0091, Online ISSN:2229-6948 (Impact Factor: 0.789 in 2015).

[18] Jaiswal R.C. and Lokhande S.D, "Measurement, Modeling and Analysis of HTTP Web Traffic", IMCIET-International Multi Conference on Innovations in Engineering and Technology-ICCC-International Conference on Communication and Computing -2014, PP-242-258, ISBN:9789351072690, VVIT, Bangalore.

[19] Jaiswal R.C. and Lokhande S.D, "Comparative Analysis using Bagging, Logit Boost and Rotation Forest Machine Learning Algorithms for Real Time Internet Traffic Classification", IMCIP-International Multi Conference on Information Processing –ICDMW- International Conference on Data Mining and Warehousing-2014, PP113-124, ISBN: 9789351072539, University Visvesvaraya College of Engg. Department of Computer Science and Engineering Bangalore University, Bangalore.

[20] Jaiswal R.C. and Lokhande S.D, "Statistical Features Processing Based Real Time Internet Traffic Recognition and Comparative Study of Six Machine Learning Techniques", IMCIP- International Multi Conference on Information Processing-(ICCN- International Conference on Communication Networks-

2014, PP-120-129, ISBN: 9789351072515, University Visvesvaraya College of Engg. Department of Computer Science and Engineering Bangalore University, Bangalore.

[21] Jaiswal R.C. and Lokhande S.D, "Analysis of Early Traffic Processing and Comparison of Machine Learning Algorithms for Real Time Internet Traffic Identification Using Statistical Approach ", ICACNI-2014-International Conference on Advanced Computing, Networking, and Informatics), Kolkata, India, DOI: 10.1007/978-3-319-07350-7_64, Volume 28 of the book series Smart Innovation, Systems and Technologies (SIST),Page:577-587.

[22] Jaiswal R.C. and Lokhande S.D, "*Machine* Learning Based Internet Traffic Recognition with Statistical Approach*",* INDICON-2013-IIT Bombay IEEE Conference. Inspec Accession Number: 14062512, DOI: 10.1109/INDCON.2013.6726074.

[23] Jaiswal R.C. and Shahul Patil, "Small Businesses Need Project Management", International Journal for Research in Applied Science & Engineering Technology (IJRASET), Open Access, Peer Reviewed and refereed Journal, ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:7.538, Volume 10, Issue XII, pp. 1532-1536, December 2022.

[24] Jaiswal R.C. and Prasad Malwadkar, " Smart Wellness Program", International Journal of Creative Research Thoughts (IJCRT), Open Access, Peer Reviewed and refereed Journal, indexed in Google Scholar, Microsoft Academic, CiteSeerX, Publons Indexed, Mendeley : reference manager, ISSN: 2320-2882; SJ Impact Factor:7.97, Volume 10 Issue XII, pp. a22-a29, December 2022.

[25] Jaiswal R.C. and Nitin Dhevar, "Smart Home Surveillance System", International Journal of Creative Research Thoughts (IJCRT), Open Access, Peer Reviewed and refereed Journal, indexed in Google Scholar, Microsoft Academic, CiteSeerX, Publons Indexed, Mendeley : reference manager, ISSN: 2320-2882; SJ Impact Factor:7.97, Volume 10 Issue XI, pp. d461-d468, November 2022.

[26] Jaiswal R.C. and Zeel Patel, " A Survey Paper on Big Data Analytics in Sales and Marketing", International Journal of Creative Research Thoughts (IJCRT), Open Access, Peer Reviewed and refereed Journal, indexed in Google Scholar, Microsoft Academic, CiteSeerX, Publons Indexed, Mendeley : reference manager, ISSN: 2320-2882; SJ Impact Factor:7.97, Volume 10 Issue XI, pp. c420-c428, November 2022.

[27] Jaiswal R.C. and Niraj Sonje, " Deep Learning for Art Characterization ", International Journal of Creative Research Thoughts (IJCRT), Open Access, Peer Reviewed and refereed Journal, indexed in Google Scholar, Microsoft Academic, CiteSeerX, Publons Indexed, Mendeley : reference manager, ISSN: 2320-2882; SJ Impact Factor:7.97, Volume 10 Issue XI, pp. a687-a694, November 2022.

[28] Jaiswal R.C. and Shivani Pande, " Microservices in Cloud Native Development of Application", International Journal of Creative Research Thoughts (IJCRT), Open Access, Peer Reviewed and refereed Journal, Indexed in Google Scholar, Microsoft Academic, CiteSeerX, Thomson Reuters, Mendeley : reference manager, ISSN: 2320-2882; SJ Impact Factor:7.97, Volume 10 Issue X, pp. d170-d183, October 2022.

[29] Jaiswal R. C. and Chaitanya Srushti, " Helmet Detection Using Machine Learning", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, Indexed in Google Scholar, Microsoft Academic, CiteSeerX, Thomson Reuters, Mendeley : reference manager, ISSN-2349-5162, Impact Factor:7.95, Volume 9, Issue 10 pp. d10-d17, October 2022.

[30] Jaiswal R. C. and Manasi Satpute, "Machine Learning Based Car Damage Identification", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, Indexed in Google Scholar, Microsoft Academic, CiteSeerX, Thomson Reuters, Mendeley : reference manager, ISSN-2349-5162, Impact Factor:7.95, Volume 9, Issue 10 pp. b684-b690, October 2022.

[31] Jaiswal R.C. and Aryan Bagade, " Metaverse Simulation Based on VR, Blockchain, and Reinforcement Learning Model", International Journal for Research in Applied Science & Engineering Technology (IJRASET), Open Access, Peer Reviewed and refereed Journal, ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:7.538, Volume 10 Issue X, pp. 67-75, October 2022.

[32] Jaiswal R. C. and Atharva Agashe, " A Survey Paper on Cloud Computing and Migration to the Cloud", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, Indexed in Google Scholar, Microsoft Academic, CiteSeerX, Thomson Reuters, Mendeley : reference manager, ISSN-2349-5162, Impact Factor:7.95, Volume 9, Issue 10 pp. a258-a265, October 2022.

[33] Jaiswal R. C. and Taher Saraf, " Stock Price Prediction using Machine Learning", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal,

Indexed in Google Scholar, Microsoft Academic, CiteSeerX, Thomson Reuters, Mendeley : reference manager, ISSN-2349-5162, Impact Factor:7.95, Volume 9, Issue 9 pp. e33-e41, September 2022.

[34] Jaiswal R. C. and Ritik Manghani, "Pneumonia Detection using X-rays Image Preprocessing", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, Indexed in Google Scholar, Microsoft Academic, CiteSeerX, Thomson Reuters, Mendeley : reference manager, ISSN-2349-5162, Impact Factor:7.95, Volume 9, Issue 9 pp. c653-c662, September 2022.

[35] Jaiswal R. C. and Apoorva Ushire, " Real Time Water Monitoring System Using NodeMCU ESMP8266 ", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, Indexed in Google Scholar, Microsoft Academic, CiteSeerX, Thomson Reuters, Mendeley : reference manager, ISSN-2349-5162, Impact Factor:7.95, Volume 9, Issue 9 pp. c1-c8, September 2022.

[36] Jaiswal R. C. and Firoz Saherawala, " Smart Glasses ", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, Indexed in Google Scholar, Microsoft Academic, CiteSeerX, Thomson Reuters, Mendeley : reference manager, ISSN-2349-5162, Impact Factor:7.95, Volume 9, Issue 8 pp. f393-f401, August 2022.

[37] Jaiswal R. C. and Asawari Walkade, " Denial of Service Detection and Mitigation ", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, Indexed in Google Scholar, Microsoft Academic, CiteSeerX, Thomson Reuters, Mendeley : reference manager, ISSN-2349-5162, Impact Factor:7.95, Volume 9, Issue 5 pp. f108-f116, May 2022.

[38] Jaiswal R. C. and Fiza Shaikh, " Augmented Reality based Car Manual System ", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, Indexed in Google Scholar, Microsoft Academic, CiteSeerX, Thomson Reuters, Mendeley : reference manager, ISSN-2349-5162, Impact Factor:7.95, Volume 9, Issue 5 pp. c326-c332, May 2022.

[39] Jaiswal R. C. and Tejveer Pratap, " Multiparametric Monitoring of Vital Signs in Clinical and Home Settings for Patients ", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, Indexed in Google Scholar, Microsoft Academic, CiteSeerX, Thomson Reuters, Mendeley : reference manager, ISSN-2349-5162, Impact Factor:7.95, Volume 9, Issue 5 pp. a701-a705, May 2022.

[40] Jaiswal R. C. and Sahil Nahar, "Recognition and Selection of Learning Styles to Personalize Courses for Students", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, Indexed in Google Scholar, Microsoft Academic, CiteSeerX, Thomson Reuters, Mendeley : reference manager, ISSN-2349-5162, Impact Factor:7.95, Volume 9, Issue 2 pp. b235-b252, February 2022.

[41] Jaiswal R. C. and Rushikesh Karwankar, " Demand Forecasting for Inventory Optimization ", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, Indexed in Google Scholar, Microsoft Academic, CiteSeerX, Thomson Reuters, Mendeley : reference manager, ISSN-2349-5162, Impact Factor:7.95, Volume 8, Issue 12 pp. 121-131, January 2022.

[42] Jaiswal R. C. and P. Khore, " Exo-skeleton Arm ", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, Indexed In Google Scholar, Microsoft Academic, CiteSeerX, Thomson Reuters, Mendeley : reference manager, ISSN-2349-5162, Impact Factor:7.95, Volume 8, Issue 12 pp. 731-734, December 2021.

[43] Jaiswal R. C. and Shreyas Nazare, " IoT Based Home Automation System", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, ISSN-2349-5162, Impact Factor:7.95, Volume 8, Issue 11 pp. 151-153, November 2021.

[44] Jaiswal R. C. and Prajwal Pitlehra, "Credit Analysis Using K-Nearest Neighbours' Model", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, ISSN-2349-5162, Impact Factor:7.95, Volume 8, Issue 5, pp. 504-511, May 2021.

[45] Jaiswal R. C. and Rohit Barve, "Energy Harvesting System Using Dynamo", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, ISSN-2349-5162, Impact Factor:7.95, Volume 8, Issue 5, pp. 278-280, May 2021.

[46] Jaiswal R. C. and Sharvari Doifode, "Virtual Assistant", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, ISSN-2349-5162, Impact Factor:5.87, Volume 7, Issue 10, pp. 3527-3532, October 2020.

[47] Jaiswal R. C. and Akshat Kaushik, "Automated Attendance Monitoring system using discriminative Local Binary Histograms and PostgreSQL", Journal of Emerging Technologies and Innovative Research (JETIR),

Open Access, Peer Reviewed and refereed Journal, ISSN-2349-5162, Impact Factor:5.87, Volume 7, Issue 11, pp. 80-86, November 2020.

[48] Jaiswal R. C. and Danish khan, "Arduino based Weather Monitoring and Forecasting System using SARIMA Time-Series Forecasting", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, ISSN-2349-5162, Impact Factor:5.87, Volume 7, Issue 11, pp. 1149-1154, November 2020.

[49] Jaiswal R.C. and Param Jain, "Augmented Reality based Attendee Interaction at Events", International Journal for Research in Applied Science & Engineering Technology (IJRASET), Open Access, Peer Reviewed and refereed Journal, ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:7.429, Volume 8 Issue VI, pp. 1578-1582, June 2020.

[50] Jaiswal R.C. and Akash Pal, "Cosmetics Application Using Computer Vision", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, ISSN-2349-5162, Impact Factor:5.87, Volume 7, Issue 6, pp. 824-829, June 2020.

[51] Jaiswal R.C. and Jaydeep Bhoite, "Home Renovation Using Augmented Reality", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, ISSN-2349-5162, Impact Factor:5.87, Volume 7, Issue 6, pp. 682-686, June 2020.

[52] Jaiswal R.C. and Aashay Pawar, "Stock Market Study Using Supervised Machine Learning", International Journal of Innovative Science and Research Technology (IJISRT), Open Access, Peer Reviewed and refereed Journal , ISSN: 2456-2165; IC Value: 45.98; SJ Impact Factor:6.253, Volume 5 Issue I, pp. 190-193, Jan 2020.

[53] Jaiswal R.C. and Deepali Kasture, "Pillars of Object-Oriented System", International Journal for Research in Applied Science & Engineering Technology (IJRASET), Open Access, Peer Reviewed and refereed Journal , ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:7.177, Volume 7 Issue XI, pp. 589-591, Nov 2019.

[54] Jaiswal R.C. and Yash Govilkar, "A Gesture Based Home Automation System", International Journal for Research in Applied Science & Engineering Technology (IJRASET), Open Access, Peer Reviewed and refereed Journal, ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:7.177, Volume 7 Issue XI, pp. 501-503, Nov 2019.

[55] Jaiswal R.C. and Onkar Gagare, "Head Mounted Display", International Journal for Research in Applied Science & Engineering Technology (IJRASET), Open Access, Peer Reviewed and refereed Journal, ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:7.177, Volume 7 Issue XI, pp. 535-541, Nov 2019.

[56] Jaiswal R.C. and Nehal Borole, "Autonomous Vehicle Prototype Development and Navigation using ROS", International Journal for Research in Applied Science & Engineering Technology (IJRASET), Open Access, Peer Reviewed and refereed Journal, ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:7.177, Volume 7 Issue XI, pp. 510-514, Nov 2019.

[57] Jaiswal R.C. and Vaibhav Pawar, "Voice and Android Application Controlled Wheelchair", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, ISSN-2349-5162, Volume 6, Issue 6, pp. 635-637, June 2019.

[58] Jaiswal R.C. and Shreya Mondhe, " Waste Segregation & Tracking", International Journal for Research in Applied Science & Engineering Technology (IJRASET), Open Access, Peer Reviewed and refereed Journal , ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:7.429, Volume 8, Issue 5, pp. 2085-2087, May 2019.

[59] Jaiswal R.C. and Shreya Mondhe, "Stock Market Prediction Using Machine Learning & Robotic Process Automation", Journal of Emerging Technologies and Innovative Research (JETIR), Open Access, Peer Reviewed and refereed Journal, ISSN-2349-5162, Volume 6, Issue 6, pp. 926-929, February 2019.

[60] Jaiswal R.C. and Samruddhi Sonare, "Smart Supervision Security System Using Raspberry Pi ", Journal of Emerging Technologies and Innovative Research (JETIR), ISSN-2349-5162, Volume 6, Issue 4, pp. 574-579, April 2019.

[61] Jaiswal R.C. and Manasi Jagtap, "Automatic Car Fragrance Dispensing System", International Journal of Research and Analytical Reviews (IJRAR), ISSN-2349-5138, Volume 6, Issue 1, pp. 315-319, March 2019.

[62] Jaiswal R.C. and Sumukh Ballal, "Scalable Healthcare Sensor Network", Journal of Emerging Technologies and Innovative Research (JETIR), ISSN-2349-5162, Volume 6, Issue 2, pp. 350-354, February 2019.

[63] Jaiswal R.C. and Samruddhi Sonare, "Multiple Camera Based Surveillance System Using Raspberry Pi", International Journal of Research and Analytical Reviews (IJRAR), ISSN-2348-1269, Volume 6, Issue 1, pp. 1635-1637, February 2019.

[64] Jaiswal R.C. and Reha Musale, "Application of Digital Signature to Achieve Secure Transmission", International Journal for Research in Applied Science & Engineering Technology (IJRASET),ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:6.887, Volume 7 Issue II, pp. 150-153, February 2019.

[65] Jaiswal R.C. and Himanshu Mithawala, "Automatic Gate Monitoring System", Journal of Emerging Technologies and Innovative Research (JETIR), ISSN-2349-5162, Volume 6, Issue 1,pp. 88-94, January 2019.

[66] Jaiswal R.C. and Bernard Lewis, "Dynamic Runway and Gate Terminal Allocation for Flights", Journal of Emerging Technologies and Innovative Research (JETIR), UGC approved Journal, ISSN-2349-5162, Volume 5, Issue 12, December 2018.

[67] Jaiswal R.C. and Sakshi Jain, "Text Search Engine",', Journal of Emerging Technologies and Innovative Research (JETIR), UGC approved Journal ISSN-2349-5162, Volume 5, Issue 11, November 2018.

[68] Jaiswal R.C. and Arti Gurap, "Design of Different Configurations of Truncated Rectangular Microstrip Patch Antenna For 2.4 GHz And 1.6 GHz ', Journal of Emerging Technologies and Innovative Research (JETIR),UGC Approved Journal, ISSN-2349-5162, Volume 5, Issue 10, October 2018.

[69] Jaiswal R.C. and Atharva Mahindrakar, " Mine Warfare and Surveillance Rover", International Journal for Research in Applied Science & Engineering Technology (IJRASET), ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:6.887, Volume 6 Issue III, March 2018.

[70] Jaiswal R.C. and Saloni Takawale "Multi-Client Server Communication Enhancement through Intranet", International Journal for Research in Applied Science & Engineering Technology (IJRASET), ISSN: 2321-9653; UGC approved Journal, IC Value: 45.98; SJ Impact Factor :6.887, Volume 6 Issue 1, January 2018.

[71] Jaiswal R.C. and Nikita Kakade, "Skin disease detection and classification using Image Processing Techniques", Journal of Emerging Technologies and Innovative Research (JETIR), ISSN-2349-5162; UGC approved Journal:5.87, Volume 4, Issue 12, December 2017.

[72] Jaiswal R.C. and Nikita Kakade, "OMR Sheet Evaluation Using Image Processing", Journal of Emerging Technologies and Innovative Research (JETIR), ISSN-2349-5162; UGC approved Journal:5.87, Volume 4, Issue 12, December 2017.

[73] Jaiswal R.C. and Swapnil Shah, "Customer Decision Support System", International Research Journal of Engineering and Technology (IRJET), e-ISSN: 2395-0056; p-ISSN: 2395-0072; UGC approved Journal, SJ Impact Factor:5.181, Volume: 04 Issue: 10 | Oct -2017.

[74] Jaiswal R.C. and Ketan Deshpande, "IOT Based Smart City: Weather, Traffic and Pollution Monitoring System", International Research Journal of Engineering and Technology (IRJET), e-ISSN: 2395-0056; p-ISSN: 2395-0072; UGC approved Journal, SJ Impact Factor:5.181, Volume: 04 Issue: 10 | Oct -2017.

[75] Jaiswal R.C. and Vipul Phulphagar, "Arduino Controlled Weight Monitoring With Dashboard Analysis", International Journal for Research in Applied Science & Engineering Technology (IJRASET), ISSN: 2321-9653; UGC approved Journal, IC Value: 45.98; SJ Impact Factor:6.887, Volume 5 Issue XI November 2017.

[76] Jaiswal R.C. and Siddhant Sribhashyam, "Comparison of Routing Algorithms using Riverbed Modeler", International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE), ISSN: (Online) 2278-1021; online) 2278-1021 ISSN (Print) 2319 5940; UGC approved Journal, Impact Factor 5.947Vol. 6, Issue 6, June 2017.