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Suspicious Activity Detection Using Video Surveillance

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Abstract: *Suspicious Activity is predicting the part or joint locations of a person from an image or a video. This project will detect suspicious human Activity from real-time CCTV footage using neural networks. Human suspicious Activity is one of the key problems that has been studied for several years. It is important because of the complete number of applications that can benefit from Activity detection. For example, human pose estimation is used in applications including video surveillance, animal tracking, and behaviour understanding, sign language detection, advanced human-computer interaction, and marker less motion capturing. Low-cost depth sensors have limitations like limited to indoor use, and their low resolution and noisy depth information make it difficult to estimate human poses from depth images and videos. Hence, we plan to use neural networks to overcome these problems and find solution on it. Suspicious human activity recognition from surveillance video is an active research of image, video processing and computer vision. Through the visual surveillance, human activities can be monitored in sensitive areas and public areas such as bus stations, railway stations, airports, banks, shopping malls, schools and colleges, parking lots, roads, etc. to prevent terrorism, theft, accidents and illegal parking, vandalism, fighting, chain snatching, crime, and other suspicious activities. It is very difficult to watch public places continuously, therefore an intelligent video surveillance is required that can monitor human activities in real-time and categorize them as usual and unusual activities; and can generate an alert. The research being carried out is on images and videos. Also, none of the papers published tries to use CNNs to detect suspicious activities with such accuracy.*

Keywords: Suspicious, surveillance, vandalism, snatching

I. INTRODUCTION

With increasing crime rates, it becomes a problem if they are not identified in time and necessary precautionary actions taken. Most urban and metropolitan areas have surveillance systems installed which constantly accumulates data. With the vast accumulation of surveillance data there are higher chances of suspicious activities to occur. This problem can be solved by the automation of the video surveillance. The function of the automated system is to give indication in the form of alarm or any other form when the predefined abnormal activity is happened. The framework of the system consists of defining suspicious activity, background subtraction, object detection, tracking and classification of activities. The suspicious activities are defined using Semantic approach which applies the human understanding of the activity. The content of the paper are as follows- In section II the work done by various researchers in this field are discussed. Section III describes the system flow and the working of the system. In section IV, the results which are obtained after experiment are shown. Section V contains the conclusion which is drawn from the results obtained and the future work.

II. LITERATURE SURVEY

Since the past two decades due to the arrival of various information system and technology, there has been a great increase and development in Surveillance system. There have been drastic changes in surveillance system and the various ways in which they are implemented. There are various methods such as Motion Detection, Object Detection, Object Tracking, Concept of Fractal, and various clustering techniques used to achieve utmost accuracy. India Various businesses whether

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large scale or small scale has started increasingly using the managerial database to store the numerous accumulated large amounts of marketing data, so to keep the information sorted in order, yet still there are various losses and shoplifting, robbery, break-in in the store is a few to name. Various management related tools and policies such as supply chain management, customer relationship management, demand management, and customer demand management etc. Started being used to increase the potential of scale and have a proper track. This entire factor aggregated to purpose a better system to provide targeted surveillance. Keeping track of sales and customer relationships is one thing and keeping track of people's or customer's activity is another. The last decade witnessed the extensive use of surveillance system in various public spaces using CCTV and drones. After the events like Mumbai Terror Attack from 2011, there has been great increasing demand for a behaviour surveillance system that guarantees the peoples safety in the public areas. It should also include public spaces like football grounds, cricket stadiums, music concerts and places where people gather in large numbers such as malls. Such places lack to have proper surveillance that ensures the safety of the people. This paper proposes the utilization of the current surveillance system and upgrading it to a point where it can detect suspicious activity of the people. In this paper the goal is find a new approach to maximize the accuracy of detecting a suspicious activity rather than using the previously tested methods like SVM, genetic algorithm, continuous action detection of actions of interest among actions of non-interest, video visual analytics system and posture representation techniques all the result in predicting the movement of the customer and the network concepts, random forest algorithm, and deep learning-based fusion system. Human tracking and motion detection, as well as behaviour analysis are widely researched topics. Human tracking is also one of the aspects that help determine the behaviour of a person. It acts as a comprehensive framework for tracking a human motion. Using Machine Learning and deep learning algorithms makes it easy for the actual interaction between human and computers. This system thus proves to be trust worthy and worth putting time in. Robbery is a global problem. It's an open social problem. Although a growing number of CCTV cameras are being installed at public places (such as airports, banks, shopping malls, etc) yet the conventional surveillance systems that rely on human operators are inefficient in detecting rare anomalous events, such as robbery, in real-time. So, a robust and efficient automated surveillance system, able to accurately detect any robbery attempt from the CCTV footage, and can respond effectively (e.g., raise alarm, lock the vault, call police, release tear gas, etc.) to foil the plot is needed. But first a surveillance system to detect robbery in real time is must. Finally, it is noticed that the current CCTV system requires a security guard to constantly monitor all the activities. The efficiency of the guard deteriorates after some time due to which the robbery in the shop might go undetected. TheSome proposed system like Human Detection and Tracking on Surveillance Video, Human Motion Analyser, Suspicious Behaviour Recognition based on Face Features had a very limited scope and could not detect 'Shoplifting', 'Robbery' and 'Break-In'. Other systems such as Three Stream C3D+LSTM showed very less accuracy hence could not be practically implemented. Therefore, the main motivation of this paper is to give CCTV cameras the ability to detect suspicious activities such as 'Shoplifting', 'Robbery', and 'Break-In' in real-time and notifying the shop owners. S. Nagaprasad et al. [8], Ajay S. Ladkat et al. [9], S. L. Bangare et al. [10-15], K. Gulati et al. [16], P. S. Bangare et al. [17-18], Xu Wu et al. [19], V. Durga Prasad Jasti et al. [20], A. S. Zamani et al. [21], M. L. Bangare et al. [22] and S. Mall et al. [23] have proposed various research models which were referred here.

III. METHODOLOGY

Video capture, scene pre-processing, feature extraction, events classification, and prediction are all phases of the architecture. The idea of this paper is to use Computer Vision (CV) which is widely used to extract useful information from image or video. CV is a subset of Artificial Intelligence (AI) and Machine Learning (ML). Until recently, CV had very limited capabilities, but after the invention of deep learning and neural network, it has taken a leap further. It is seen that CV is able of surpass humans in certain areas related to labelling and detecting objects. This paper aims to propose a system using Convolution Neural Network, which detects suspicious activity of customer and notifies the shop owner. System can identify robbers as they tend to cover their face with cloth and point a gun at the shop owner. Break-in generally happens when the shop is closed i.e., at night. Thus, providing a system that determines suspicious activity for surveillance is must in today's world and hence this system delivers such services of tracking all such deception and forgery and thus making a huge revolution in today's surveillance system. Database Collection The database contains images and videos collected from Google and categorised into 3 classes Shoplifting, Robbing and Break-In. Images Pre-

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processing. The collected images and videos from Google were of different resolutions and formats. All the images were resized to 224x224 to standardize them. After that they were converted to RGB format. Then the process of data augmentation is done to avoid overfitting or underfitting. In data augmentation, rotation, zoom, shear range, width and height shift, and flip operations were performed on each image. It is then given as input to the Convolutional Neural Network (CNN). Model Training For training the model transfer learning is used by using pre-trained ImageNet weights, instead of training the CNN model from scratch. The full architecture is depicted. A model is generated by training the CNN with epoch. This paper evaluates the performance of the model intwo phases. The first phase consists of evaluating the performance on the test set of images and videos collected from Google. Considering the accuracy, precision and recall of the system as the evaluation metric. To show the trade-off between true Operating Characteristics curve. Finally, the plotted precision-recall and area under curve is used positive and false positive rate plotting.

IV. SYSTEM ARCHITECTURE

The Receiver to analyse the performance of the model. The second phase consists of providing real time videos as input to the system. The frames are extracted from a live video stream source. The extracted frame is then pre-processed by first resizing it (the frame is resized to the size of the image provided during the training phase of the model), followed by RGB channel ordering. Each frame extracted and pre-processed from the real-time video is given to the model, which then predicts its class label. The label of the class with the highest probability is returned by the model. The same process is repeated for all the frames from the real-time video. For every input frame, its predicted class along with its probability is displayed on the output frame. The videos for the input are drawn from both existing and newly developed datasets. Frames are retrieved from collected videos as part of the pre-processing process. The labelled folders are formed based on the videos, and the frames are placed in them. The entire video is changed to frames, which are saved as files. Every frame is then scaled to (224 x 224) pixels to fit inside the 2DCNN architecture and saved. The test video is also saved in a folder after being converted to frames and scaled to 224 x 224. For video pre-processing, the Python package Open CV is used. Layers of Convolution, a layer of ReLU (Rectified Linear Unit) activation function, Layers of max pooling, Layers of fully connected dense, and Layers of normalizing are all represented. The model can be fine-tuned to our specifications, and the model's last layer is deleted. The model is then trained using LSTM (Long Short-Term Memory) architecture. In sequence prediction problems, the networks of LSTM are a type of RNN that can learn order dependency. Now there is a ReLU activation function, a layer of dropout, and layers of dense that are fully coupled. The system categorizes the videos as either unusual (fainting or fighting) or regular (running, walking). An SMS (Short Message Service) will be sent to the appropriate officials in the event of suspicious conduct.

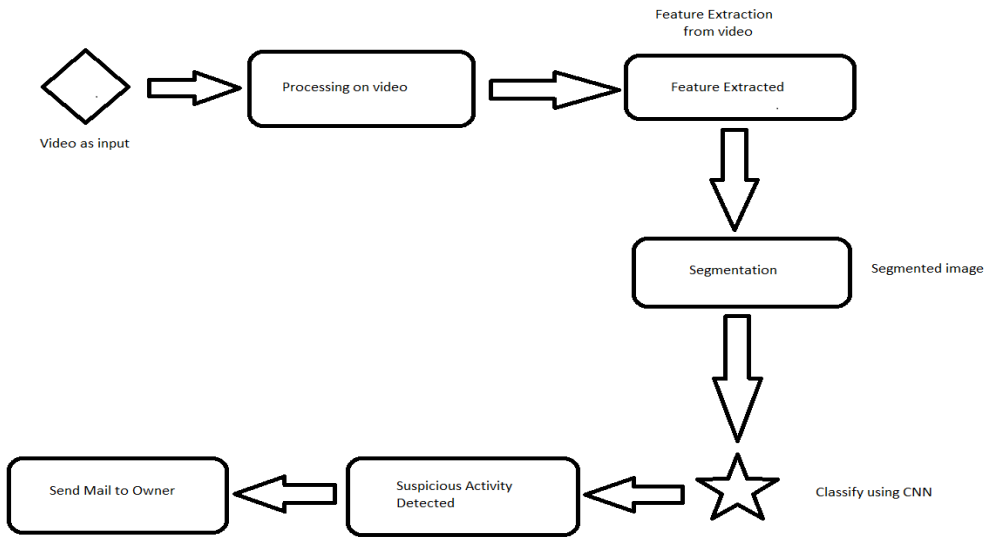

Fig.6:Architecture Diagram

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V. SCOPE

In our model we take number of images form video if video is large then it will take more time to create frames. In future we try to improve accuracy and make sure that it takesless time to capture human suspicious activity. In future we will add more images data set to detect suspicious activity and fight.

VI. RESULT

After clear understanding and execution of the project. It has classified normal and suspicious activities. These were the Suspicious Activities detected from the uploaded CCTV video Surveillance.

Registration Page

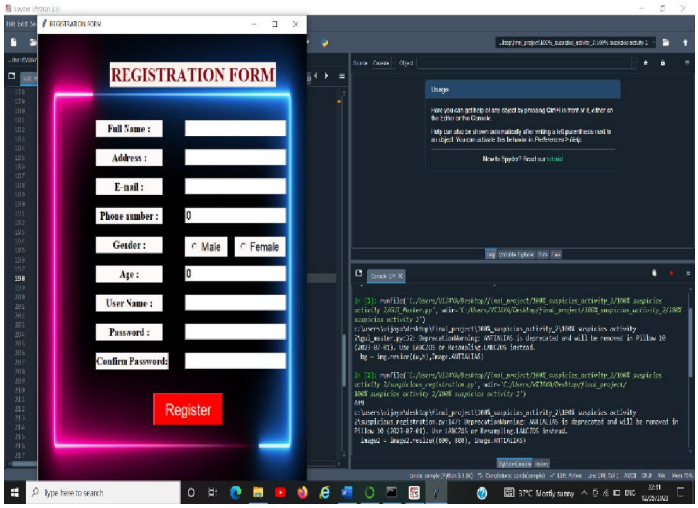

Fig.7: Result of Working Module

Login Page

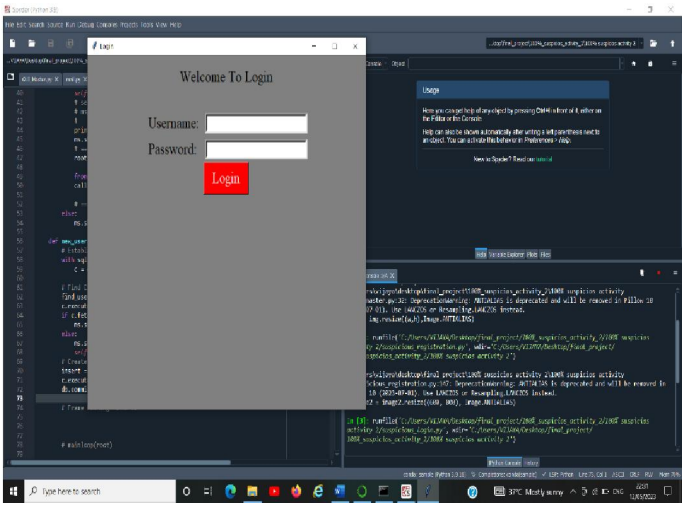

Fig.8: Result of Working Module

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Selecting Video

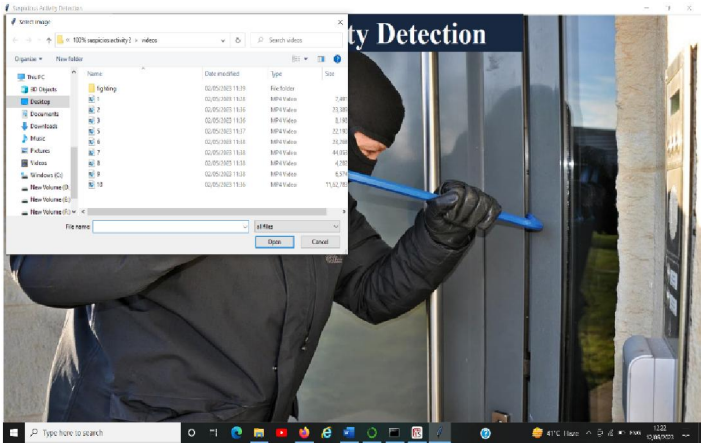

Fig.9: Result of Working Module

Detecting Activity

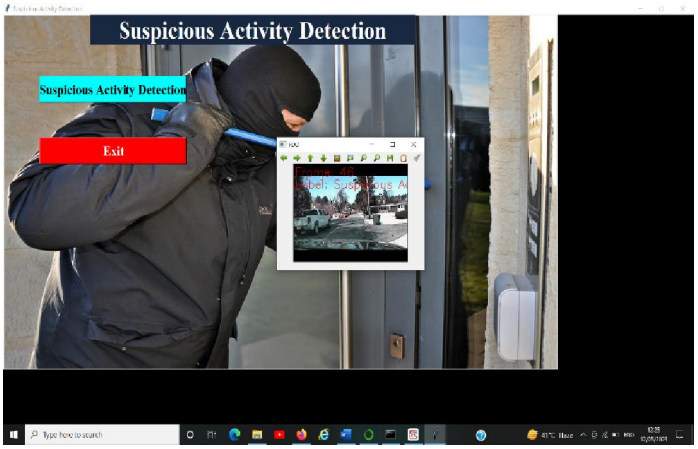

Fig.10: Activity Detection

VII. CONCLUSION

Nowadays, practically everyone understands the importance of CCTV footage, yet in most circumstances, this footage is only utilized for purposes of investigation after an incident or crime has occurred. The proposed system offers the advantage of sending alerts when an accident occurred. CCTV footage is being outcome is a directive to appropriate officials to decide if the result shows that an undesirable event is likely to occur. As a result, this can be prevented. Although the proposed approach is dedicated to the academic's realm, it can be utilized to forecast more unusual actions in private or public settings. The system can be utilized in any location where training should be delivered in conjunction with the unusual activity that is appropriate for that location.

REFERENCES

[1]. S. Zaidi, B. Jagadeesh, K. V. Sudheesh and A. A. Audre, "Video Anomaly Detection and Classification for Human Activity Recognition," 2017 International Conference on Current Trends in Computer, Electrical, Electronics and Communication (CTCEEC), Mysore, 2017, pp. 544-548.

[2]. S. Dodge and L. Karam, "A Study and Comparison of Human and Deep Learning Recognition Performance under Visual Distortions," 2017 26th International Conference on Computer Communication and Networks (ICCCN), Vancouver, BC, 2017, pp. 1-7.

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[3]. K. S. Kushwaha, C. M. Sharma, M. Khare, R. K. Srivastava and A. Khare, "Automatic multiple human detection and tracking for visual surveillance system," 2012 International Conference on Informatics, Electronics & Vision (ICIEV), Dhaka, 2012, pp. 326- 331.

[4]. W. Sultani, C. Chen and M. Shah," Real-World Anomaly Detection in Surveillance Videos," 2018 IEEE/CVF Conference on Computer Vision and Pattern Recognition, Salt Lake City, UT, 2018, pp. 6479- 6488.

[5]. A. Nurhopipah, A. Harjoko: "Motion Detection and Face Recognition for CCTV Surveillance System", IJCCS (Indonesian Journal of Computing and Cybernetics Systems) Vol.12, No.2, July 2018, pp. 107 118, 2018.

[6]. A. Eamthanakul, M. Ketcham and N. Chumuang, "The Traffic Congestion Investigating System by Image Processing from CCTV Camera," 2017 International Conference on Digital Arts, Media and Technology (ICDAMT), Chiang Mai, 2017, pp. 240-245.

[7]. B. A., P. P. and V. S., "Detection of Suspicious Human Activity based on CNN-DBNN Algorithm for Video Surveillance Applications," 2019 Innovations in Power and Advanced Computing Technologies (i-PACT), Vellore, India, 2019, pp. 1-7

[8]. S. Nagaprasad, D. L. Padmaja, YaserQuereshi, S.L. Bangare, Manmohan Mishra, Mazumdar B. D., "Investigating the Impact of Machine Learning in Pharmaceutical Industry", Journal of Pharmaceutical Research International (Past name: British Journal of Pharmaceutical Research, Past ISSN: 2231-2919, NLM ID: 101631759), Volume 33, Issue 46A, Pages 6-14, Publisher: JPRI https://www.journaljpri.com/index.php/JPRI/article/view/32834

[9]. Ajay S. Ladkat, Sunil L. Bangare, Vishal Jagota, Sumaya Sanober, Shehab Mohamed Beram, Kantilal Rane, Bhupesh Kumar Singh, "Deep Neural Network-Based Novel Mathematical Model for 3D Brain Tumor Segmentation", Computational Intelligence and Neuroscience, vol. 2022, Article ID 4271711, 8 pages, 2022. https://doi.org/10.1155/2022/4271711

[10]. S. L. Bangare, "Brain Tumor Detection Using Machine Learning Approach", Design Engineering ISSN: 0011-9342,Scopus Index- Q4, EiCompendex, Volume 2021, Issue 7, Pages 7557-7566, Publisher Design Engineering.

[11]. S. L. Bangare, and P. S. Bangare. "Automated testing in development phase." International Journal of Engineering Science and Technology 4.2 (2012): 677-680.

[12]. S. L. Bangare, N. B. Dhawas, V. S. Taware, S. K. Dighe, & P. S. Bagmare, (2017). "Implementation of fabric fault detection system using image processing", International Journal of Research in Advent Technology, Vol.5, No.6, June 2017, E-ISSN: 2321-9637.

[13]. S. L. Bangare, N. B. Dhawas, V. S. Taware, S. K. Dighe, & P. S. Bagmare (2017). "Fabric fault detection using image processing method", International Journal of Advanced Research in Computer and Communication Engineering, 6(4), 405-409.

[14]. S. L. Bangare, S., H. Rajankar, P. Patil, K. Nakum, G. Paraskar, (2022). "Pneumonia detection and classification using CNN and VGG16". International Journal of Advanced Research in Science, Communication and Technology, 12, 771-779.

[15]. Sunil L. Bangare, Deepali Virmani, Girija Rani Karetla, Pankaj Chaudhary, Harveen Kaur, Syed Nisar Hussain Bukhari, Shahajan Miah, "Forecasting the Applied Deep Learning Tools in Enhancing Food Quality for Heart Related Diseases Effectively: A Study Using Structural Equation Model Analysis", Journal of Food Quality, vol. 2022, Article ID 6987569, 8 pages, 2022. https://doi.org/10.1155/2022/6987569

[16]. K. Gulati, M. Sharma, S. Eliyas, & Sunil L. Bangare (2021), "Use for graphical user tools in data analytics and machine learning application", Turkish Journal of Physiotherapy and Rehabilitation, 32(3), 2651-4451.

[17]. P. S. Bangare, Ashwini Pote, Sunil L. Bangare, Pooja Kurhekar, and Dhanraj Patil, "The online home security system: ways to protect home from intruders & thefts." International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN (2013): 2278-3075.

[18]. P. S. Bangare, S. L. Bangare, R. U. Yawle and S. T. Patil, "Detection of human feature in abandoned object with modern security alert system using Android Application," 2017 International Conference on Emerging Trends & Innovation in ICT (ICEI), Pune, India, 2017, pp. 139-144, doi: 10.1109/ETIICT.2017.7977025.

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[19]. Xu Wu, Dezhi Wei, Bharati P. Vasgi, Ahmed Kareem Oleiwi, Sunil L. Bangare, Evans Asenso, "Research on Network Security Situational Awareness Based on Crawler Algorithm", Security and Communication Networks, vol. 2022, Article ID 3639174, 9 pages, 2022. https://doi.org/10.1155/2022/3639174.

[20]. V. Durga Prasad Jasti, Enagandula Prasad, Manish Sawale, ShivlalMewada, Manoj L. Bangare, Pushpa M. Bangare, Sunil L. Bangare, F. Sammy, "Image Processing and Machine Learning-Based Classification and Detection of Liver Tumor", BioMed Research International, vol. 2022, Article ID 3398156, 7 pages, 2022. https://doi.org/10.1155/2022/3398156

[21]. Zamani, A. S., Dr. Seema H. Rajput, Dr. Harjeet Kaur, Dr.Meenakshi, Dr. Sunil L. Bangare, & Samrat Ray. (2022). Towards Applicability of Information Communication Technologies in Automated Disease Detection. International Journal of Next-Generation Computing, 13(3). https://doi.org/10.47164/ijngc.v13i3.705.

[22]. M. L. Bangare, P. M. Bangare, R. S. Apare, & S. L. Bangare, (2021). "Fog computing-based security of IoT application", Design Engineering, 7, 7542-7549.

[23]. S. Mall, A. Srivastava, B. D. Mazumdar, M. Mishra, S. L. Bangare, & A. Deepak, (2022). "Implementation of machine learning techniques for disease diagnosis", Materials Today: Proceedings, 51, 2198-2201.https://www.sciencedirect.com/science/article/abs/pii/S2214785321072679#!