

Computer Vision Project Proposal

“Video analysis of suspicious activities”

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1 Introduction

Real-time Object Detection in video streams has been one of the most important computer vision tasks. The most popular algorithms to detect objects in video data include Mask R-CNN, YOLOv3, YOLOR, and YOLOv7. A computer vision system uses image processing algorithms in multi-step computer vision pipelines to analyze images in order to extract information from video data. Computer vision systems can solve complex and business-specific tasks that involve person or object detection, facial recognition, activity recognition, quality inspection, and so on. Computer vision systems can acquire video input from cameras or VMS.



2 Project Idea

The proposed project aims to develop a computer vision system for **security surveillance** outside the homes of people in Karachi, Pakistan. The vision system will be designed to detect suspicious or out of ordinary activities which will help in determining how robbers or thieves carry out their activities. The project will focus on developing a system that can operate in real-time eventually and provide actionable insights to the security. The primary goal right now is train a system that provides a reliable and efficient report to the security regarding the activity carried out that was struck as not ordinary by the system. This solution that can help prevent criminal activities happening in the city at the moment and enhance the overall security of the city and the country.

3 Background

It is important to understand the need for this project. The team believes this project idea is the need of the hour especially considering how prevalent street crime has been in the city. The traditional security measures are no longer sufficient to tackle the growing security concerns of the city. Therefore, there is a need for an advanced security system that can monitor the city's streets and detect suspicious activities. This is where our proposed idea comes in to help the pre-existing system making it better.

4 Objective

The objective of this project is to develop a computer vision system for security surveillance in Karachi. The system will use deep learning algorithms to detect unusual activities, such as unauthorized entry, loitering, and suspicious behavior. The system will eventually work in real-time and provide alerts to the security personnel so that they can take appropriate action. For now the system will determine

the activities not happening usually in the area as suspicious and flag them to the security for them to determine if it is a threat to consider. For example, something happening at 4 AM in the morning will be flagged and the security will go over the footage in the morning to determine the next steps if it is deemed as a threat.

5 Methodology

The deep learning algorithm will be trained on videos of surveillance outside of homes in Karachi. We will gather potential data from atleast two different houses with the surveillance footage of atleast a week each. We will first focus on the time **12 AM to 5 AM** to flag activities for suspicious behaviour. This is because this time of the night has the least amount of activity on the streets and most crime happens during this time. Since we will be using videos to train our model on, we will be using a deep learning algorithm that is proficient with analysing videos. **YOLOv5** is a deep learning algorithm which is used for real time object detection and has solved the problem of vehicle classification on video. We will use the algorithm for object detection on the street outside of homes to detect any suspicious activity.



5.1 Design/Methodology Phase

First Our Aim is to conduct a detailed literature review of the existing system and its performance on open-source available data sets. After that, we will select the most optimized algorithm for the video analysis system. Then design a system and model that takes video as input and gives the results on the basis of activity.

5.2 Implementation Phase

In order to implement the above-defined system we have to do research about the activity that we want to recognize and track in the system through the surveillance cameras. We know that deep learning models require a large amount of data so we have to collect the data set in order to train the model correctly.

5.3 Testing and Evaluation Phase

Testing will be done through test data set in the form of a video. The system should be able to identify suspicious activity and recognize it in the system and give it the time stamps of such activities.

6 Project Planning

1. Week 10 = Data Gathering and Research about existing systems algorithm
2. Week 11 = Data Gathering and Research about existing systems algorithm

3. Week 12 = Data Gathering and Research about existing systems algorithm
4. Week 13 = Training and optimizing the model
5. Week 14 = Training and optimizing the model
6. Week 15 = Testing and improving the accuracy result of model
7. Week 16 = Final Report and results demonstration

7 Probable Outcomes

The possible positive outcomes of our computer vision project include;

1. **Enhanced security:** The system will be able to monitor the city streets and detect suspicious activities in real-time, thus providing enhanced security to the people of Karachi.
2. **Crime prevention:** The system will help prevent criminal activities, such as burglary and theft, by detecting suspicious behavior and alerting the security personnel.
3. **Data Collection and Analysis:** The system will provide necessary data to the security to analyse and prevent any such future incidence.

8 Conclusion

The citizens of Karachi and hopefully everyone in the future, will receive a cutting-edge security solution from the proposed computer vision system. Modern deep-learning techniques will be used by the system to identify suspicious activity and send security staff immediate alerts. The technology will aid in the prevention of criminal activity and give the security staff useful information to study crime trends and make wise judgments.

References

- [1] Morales, Cristyan Rufino Gil. "Video Analysis to Detect Suspicious Activity Based on Deep Learning." dzone.com, 22 Dec. 2020, dzone.com/articles/video-analysis-to-detect-suspicious-activity-based.
- [2] Klingler, Nico. "Video Analytics in Practical AI Applications [2023 Guide]." viso.ai, 1 Jan. 2023, viso.ai/computer-vision/video-analytics-ultimate-overview/: :text=Object
- [3] M. Brand, N. Oliver, and A. Pentland. Coupled hidden markov models for complex action recognition. In IEEE Conf. on Computer Vision and Pattern Recognition, 1997
- [4] J. W. Davis and A. F. Bobick. The representation and recognition of action using temporal templates. In IEEE Conference on Computer Vision and Pattern Recognition, pages 928–934, 1997
- [5] Amrutha, C.V Chandran, Jyotsna Joseph, Amudha. (2020). Deep Learning Approach for Suspicious Activity Detection from Surveillance Video. 335-339. 10.1109/ICIMIA48430.2020.9074920.