Suspicious Activity Detection Using Deep Learning

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ABSTRACT

The system aims to give CCTV cameras the ability to detect suspicious activity, without human intervention. This paper aims to identify suspicious activity for surveillance and alert shop owners when suspicious activity is detected. Electronic article surveillance (eas) systems are widely used in today's retail stores, but this system is not capable enough as the shoplifters can easily remove the tag or label from the product. Hence, this system aims to take real-time videos from CCTV as input and pass it to the cnn model created with the help of transfer learning and detect 'shoplifting', 'robbery' or 'break-in' in the store and notify the owners as soon as it occurs. Finally, the main motive is to provide a system that detects suspicious activities without human intervention and generates an alert, thus making a huge revolution in today's surveillance system.

Keyword: - *Alert Generation, Suspicious Activity, Shoplifting, Robbery, Break-In*

1. INTRODUCTION

The proposed system, Activity Detector and Alert Generator (ADAG) is aimed to use Closed Circuit Television (CCTV) which is readily available in most of the shops. It aims to give CCTV cameras the ability to detect suspicious activity, without human intervention. The goal of this paper is to help shop owners detect shoplifting, when it happens, in real time and get an alert about it. Electronic Article Surveillance (EAS) alarm systems are widely used in today's retail stores, that warns the security person when a shoplifter tries to leave a store with a product having an active tag or label attached to it. But this system is not capable enough as the shoplifters can easily remove the tag or label from the product. Therefore there is a compelling need for a system that can detect shoplifters based on their suspicious behavior in the store. The developed system can take real-time videos from CCTV as an input, it then takes frames from the video and gives it to the CNN model. This CNN model takes a single frame as input, passes it through some operation to detect the occurrence of 'Shoplifting', 'Robbery' or 'breakin' in the store and produces a video with labelled frames as output. Each output frame is either annotated with 'Normal', 'Shoplifting', 'Robbery' or 'Break-In' tags along with the probability. An alert message is sent to the shop owner when there is a change in the label from 'Normal' to 'Shoplifting', 'Robbery' or 'Break-In'. For frames with 'Normal' tag, message is not sent. For training the model this paper uses transfer learning using pre-trained imagenet weights, instead of training the CNN model from scratch. The first step is to extract frames from real time video. (i.e. Video taken from CCTV). Second step is to pass the frame to trained CNN model. Third step is to push the predicted label for each frame to Queue. The fourth step is to repeat step 3 for 'k' frames. The fifth and final step is to select the label with the highest probability corresponding to the mean of the last 'k' predictions. If the difference between sum of probabilities of other classes label and probability of predicted class is greater than 80%, display the frame with predicted class label and send an alert message, else display 'Normal' message. Thus, providing a system that determines suspicious activity is a must in today's world and hence this system delivers such services of tackling all such deception and forgery and thus making a huge revolution in today's surveillance system.

2. LITERATURE REVIEW

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 [2]. There have been drastic changes in surveillance system and also the various ways in which they are implemented. There are various methods such as Motion Detection [3] [4], Object Detection [3] [5], Object Tracking [3], Concept of Fractal [6], and also various clustering techniques [7] used to achieve utmost accuracy Various businesses whether large scale or small scale has started increasingly using the managerial database to store the numerous accumulated large amount 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 are a few to name. Various management related tools and policies such as supply chain management, customer relationship management [8], demand management, and customer demand management etc. started being used so as 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 by the use of CCTV and drones [3]. After the events like Mumbai Terror Attack from 2011, there has been great increasing demand for a behavior 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.

3. SYSTEM REQUIRMENT

3..1 Database Requirements SQLite is one of the most popular and easy-to-use relational database systems. It possesses many features over other relational databases. Many big MNCs such as Adobe, use SQLite as the application file format for their Photoshop Lightroom product.SQLite is an embedded, server-less relational database management system. It is an in-memory open-source library with zero configuration and does not require any installation. Also, it is very convenient as it's less than 500kb in size, which is significantly lesser than other database management systems.

3..2 Anaconda Navigator Anaconda is an open-source distribution of the Python and R programming languages for data science that aims to simplify package manage ment and deployment. Package versions in Anaconda are managed by the package management system, conda, which analyzes the current environment before executing an installation to avoid disrupting other frameworks and packages.The Anaconda distribution comes with over 250 packages automatically installed. Over 7500 additional open-source packages can be installed from PyPI as well as the conda package and virtual environment manager. It also includes a GUI (graphical user interface), Anaconda Navigator, as a graphical alternative to the command line interface. Anaconda Navigator is included in the Anaconda distribution, and allows users to launch applications and manage conda packages, environments and channels without using command-line commands. Navigator can search for packages, install them in an environment, run the packages and update them.

3..3 Hardware Requirements RAM : 8 GB As we are using Machine Learning Algorithm and Various High Level Libraries Laptop RAM minimum required is 8 GB. Hard Disk : 500 GB Data Set of CT Scan images is to be used hence minimum 40 GB Hard Disk memoryis required. Processor : Intel i5 Processor IDE : Spyder

3.4 Spyder Spyder is an open source cross-platform integrated development environment (IDE) for scientific programming in the Python language. Spyder integrates with a number of prominent packages in the scientific Python stack, including NumPy, SciPy, Matplotlib, pandas, IPython, SymPy and Cython, as well as other open source software. It is released under the MIT license. Spyder is extensible with first- and third-party plugins, includes support for interactive tools for data inspection and embeds Python-specific code quality assurance and introspection instruments, such as Pyflakes, Pylint and Rope. It is available cross-platform through Anaconda, on Windows, on macOS through MacPorts, and on major Linux distributions such as Arch Linux, Debian, Fedora, Gentoo Linux, openSUSE and Ubuntu. Spyder uses Qt for its GUI, and is designed to use either of the PyQt or PySide Python bindings. QtPy, a thin

abstraction layer developed by the Spyder project and later adopted by multiple other packages, provides the flexibility to use either backend

4.SYSTEM ARCHITECTURE

The Application Based On Suspicious Activity Detection. This Is Software Based Application
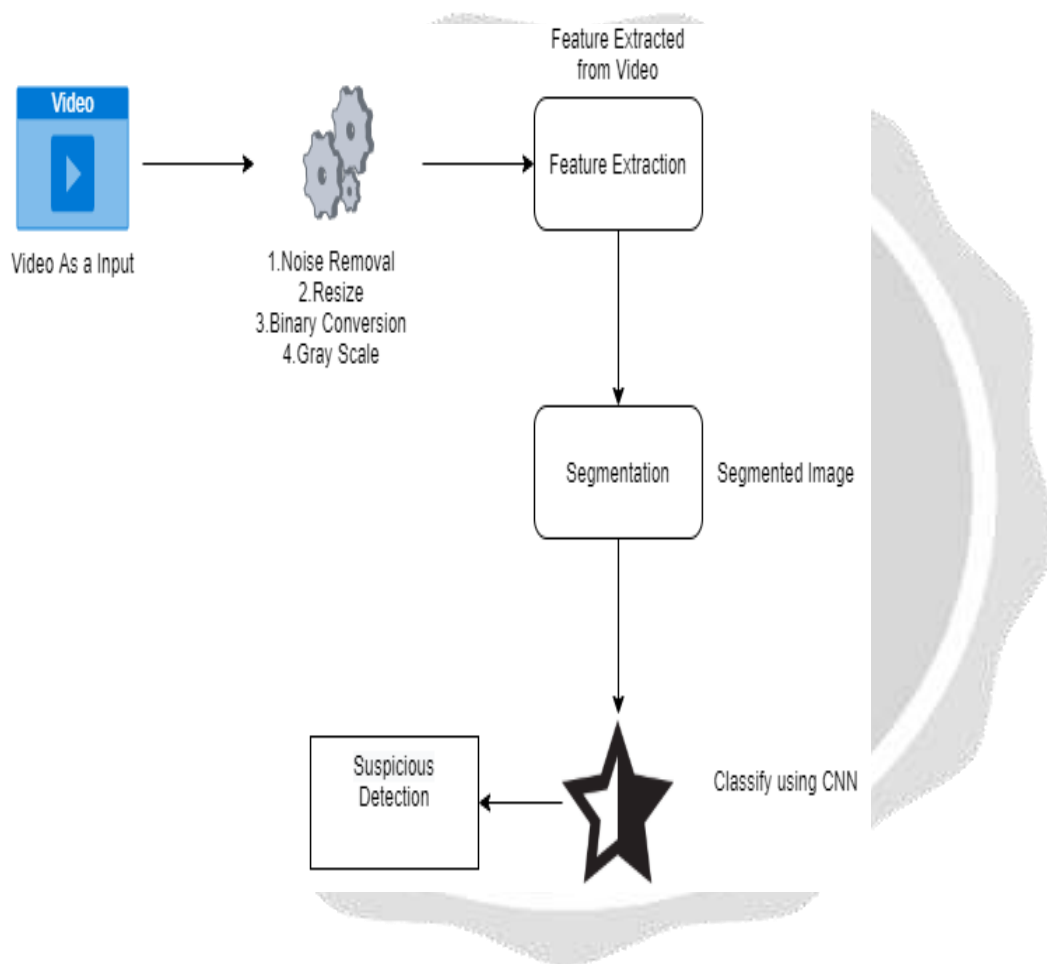

Fig 1 System Architecture

• Extracting frames from real time video. (i.e. video taken from CCTV)
• Pass the frame to trained CNN model.
• Push the predicted label for each frame to Q.
• Repeat step 3 for 'k' frames.
• Select the label with the highest probability corresponding to the mean of the last 'k' predictions

 If the   difference between the sum of probabilities of other classes label and probability of predicted class is greater than 80%, display the frame with prediction

5. IMPLEMENTATION

In this section , the detailed designed and implementation of the system are presented. A. Software Login and Register interface : This part of the system gives the to convenient way to register and login himself.

Fig 2 Home Page

Software Login interface In this login interface we can see omkar can login. If the username are correct then it will login and show the pop up of login successfully. It takes username and password for login

Fig 3 Login Page

Software Registration Interface In this interface we can see that omkar can register themselves by using the name, address, email, phone number, user name, password .The email and passwordis the important credential to login the user again. After the registration successfully completed the registration process

Fig 4 Registration Page

6. CONCLUSION

The developed system can take real-time videos from CCTV or pre-recorded videos as an input, it then takes frames from the video and gives it to the CNN model. This CNN model takes a single frame as input, passes it through some operation to detect the occurrence of 'Shoplifting', 'Robbery' or 'Break-In' in the store and produces a video with labelled frames as output. Each output frame is either annotated with 'Normal', 'Shoplifting', 'Robbery' or 'BreakIn' along with the probability. An alert message is sent to the shop owner when there is a change in the label from 'Normal' to 'Shoplifting', 'Robbery' or 'Break-In'. For frames with 'Normal' tag message is not sent. For sending the message to the shop owner.Finally, it is concluded that providing a system that determines customer behavior and detect suspicious activities without human intervention is a huge revolution in today's surveillance system

7. REFRENCES

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