



IJIRCCCE

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



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 5, May 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.379

9940 572 462

6381 907 438

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www.ijircce.com

Anomaly Detection in Banking Using A Video Surveillance System

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ABSTRACT: Abnormal event detection is one of the important objectives in research and practical applications of video surveillance. Surveillance cameras are increasingly being used in public places e.g. streets, intersections, banks, shopping malls etc to increase public safety. One critical task in video surveillance is detecting anomalous events such as traffic accidents, crimes or illegal activities. Generally, anomalous events rarely occur as compared to normal activities. The goal of a practical anomaly detection system is to timely signal an activity that deviate normal patterns and identifies the time window of the occurring anomaly. Therefore, anomaly detection can be considered as coarse level video understanding, which filters out anomalies from normal patterns. Once an anomaly is detected, it can further be categorized into one of the specific activities using classification techniques. This project presents an overview of anomaly detection, focusing on the context of banking operations applications. Banking operations include many daily, periodic, and a periodic activities and transactions performed by or affecting numerous stakeholders such as employees, customers, debtors, and external entities. Events may unfold over time, and early detection can significantly ameliorate potential ill-effects, and in some cases actively prevent the same. Time series based anomaly detection used to detect persons in unwanted time. In this work machine learning based anomaly detection technique implement to detect the normal and abnormal events.

KEYWORDS: Python, Antivirus and antimalware software, Behavioral analytics, Email,security,Firewalls,Network segmentation, Security information and event management, Web security, Wireless security.etc...

I. INTRODUCTION

1. ANOMALY DETECTION

Anomaly detection refers to the problem of finding patterns in data that do not conform to expected behavior. These non-conforming patterns are often referred to as anomalies, outliers, discordant observations, exceptions, aberrations, surprises, peculiarities or contaminants in different application domains. Of these, anomalies and outliers are two terms used most commonly in the context of anomaly detection; sometimes interchangeably. Anomaly detection finds extensive use in a wide variety of applications such as fraud detection for credit cards, insurance or health care, intrusion detection for cyber-security, fault detection in safety critical systems, and military surveillance for enemy activities. Security and crime control concerns are the motivating factors for the deployment of video surveillance cameras. Video surveillance cameras are used in shopping centres, public places, banking institutions, companies, and home security and ATM machines. Nowadays, researches experience continuous growth in network surveillance. The reason being is the instability incidents that are happening all around the world. Therefore, there is a need of a smart surveillance system for intelligent monitoring that captures data in real time, transmits, processes and understands the information related to those monitored. The video data can be used as a forensic tool for after- crime inspection. Hence, these systems ensure high level of security at public places which is usually an extremely complex challenge. As video cameras are available at good price in the market, hence video surveillance systems have become more popular. Video surveillance systems have wide range of applications like traffic monitoring and human activity understanding. In video surveillance system we demonstrate a system which analyses activity in the monitored space in real time, and makes the events available for generating real time alerts and content based searching in real time.

1.2 PROBLEM STATEMENT

A great deal of research has been performed for automatic abnormal activity detection and curbing the situations such as bank robberies. The proposed methodology/system uses computer vision techniques for recognition of normal and

abnormal behavior of a person. The system consists of a structure where objects are moving with respect to a fixed background and each frame of video is processed as follows. First, foreground extraction technique is used to obtain clear view of people. Background subtraction is used to extract the foreground objects from video sequence. Generally, banks are installed in a closed enclosure where background does not change over the time. We make use of the frame without any moving object as a background frame. After obtaining the foreground objects, then compute the motion detection process. Motion templates are an efficient way to record motion and gesture recognition The pixel intensity is linearly ramping value as a function of time, where brighter (more whiter) values represent the more recent motion locations. As an object moves it leaves behind a motion history of its movements.

1.3ALGORITHM

HAAR CASCADE ALGORITHM

In this project propose a new method for super resolution by first learning the high-frequency components in the facial data that can be added to a low-resolution input image to create a super-resolved image. Our method is different from conventional methods as we estimate the high-frequency components that are not used in other methods, to reconstruct a higher-resolution image, rather than studying the direct relationship between the high- and low resolution images. The HR and LR images are denoted as X and Y, respectively. The term “cascade” means that the classifier thus produced consists of a set of simpler classifiers which are applied to the region of interest until the selected object is discarded or passed.

- Step 1: Assign the weights for the features.
- Step 2: Normalize the weights.
- Step 3: Based on the output of Step 2, select the next best classifier.
- Step 4: Update weights and evaluate the features for the selected criteria.
- Step 5: If it passes, apply the second stage of features and continue the process. Else normalize the weights and repeat the steps.

1.4THE PLATFORM

1.3.1 PYTHON

Python is an interpreted high-level programming language for general-purpose programming. Created by Guido van Rossum and first released in 1991, Python has a design philosophy that emphasizes code readability, notably using significant whitespace. It provides constructs that enable clear programming on both small and large scales. In July 2018, Van Rossum stepped down as the leader in the language community. Python features a dynamic type system and automatic memory management. It supports multiple programming paradigms, including object-oriented, imperative, functional and procedural, and has a large and comprehensive standard library. Python interpreters are available for many operating systems. CPython, the reference implementation of Python, is open source software and has a community-based development model, as do nearly all of Python's other implementations. Python and CPython are managed by the non-profit Python Software Foundation. Rather than having all of its functionality built into its core, Python was designed to be highly extensible.

There are two attributes that make development time in Python faster than in other programming languages:

1. Python is an interpreted language, which precludes the need to compile code before executing a program because Python does the compilation in the background. Because Python is a high-level programming language, it abstracts many sophisticated details from the programming code. Python focuses so much on this abstraction that its code can be understood by most novice programmers.
2. Python code tends to be shorter than comparable codes. Although Python offers fast development times, it lags slightly in terms of execution time. Compared to fully compiling languages like C and C++, Python programs execute slower.
3. Of course, with the processing speeds of computers these days, the speed differences are usually only observed in benchmarking tests, not in real-world operations. In most cases, Python is already included in Linux distributions and Mac OS X machines.

II. MYSQL

MySQL is the world's most used open source relational database management system (RDBMS) as of 2008 that run as a server providing multi-user access to a number of databases. The MySQL development project has made

its [source code](#) available under the terms of the [GNU General Public License](#), as well as under a variety of [proprietary](#) agreements. MySQL was owned and sponsored by a single [for-profit](#) firm, the [Swedish](#) company [MySQL AB](#), now owned by [Oracle Corporation](#). MySQL is a popular choice of database for use in web applications, and is a central component of the widely used LAMP open source web application software stack—LAMP is an acronym for "[Linux](#), [Apache](#), [MySQL](#), [Perl/PHP/Python](#)." [Free-software](#)-open source projects that require a full-featured database management system often use MySQL. For commercial use, several paid editions are available, and offer additional functionality.

Inter images

MySQL is primarily an RDBMS and ships with no GUI tools to administer MySQL databases or manage data contained within the databases. Users may use the included command line tools, or use MySQL "front-ends", desktop software and web applications that create and manage MySQL databases, build database structures, back up data, inspect status, and work with data records. The official set of MySQL front-end tools, MySQL Workbench is actively developed by Oracle, and is freely available for use.

III. LITERATURE SURVEY

TITLE: A semi-supervised deep learning based video anomaly detection framework using RGB-D for surveillance of real-world critical environments

AUTHOR NAME: Pushpajit Khaire, Praveen Kumar

Video anomaly detection is defined as the process of automatic detection of abnormal events in videos through video processing and computer vision techniques. The term 'anomaly', 'abnormal', 'unusual', 'outliers' etc. are often used to refer the irregular pattern in videos that is different from the regular one. The anomalous or unusual events are often subjective, contextual in nature, and environment-dependent. Unwanted incidents such as fire explosions, stampede, accidents in public places, and irregular human activities like fighting, robbery, and violations of traffic rules are some of the challenging tasks in video anomaly detection. Detecting such anomalous events at public places can prevent infrastructural damages and save lives of people.

Hence, automatic and accurate detection of such events in real-time is the main objective of video-based surveillance systems to address the problem of anomaly detection in critical environments such as Bank-ATMs, we propose to use multimodal RGB and depth data captured by advanced RGB þ D sensor. By observing the human behaviour in ATM and the activities that frequently occur, we replicated and captured various normal and anomalous activities in ATM like environment to create a dataset.

TITLE: Elegant and Efficient Algorithms-Real Time Implementation of Object Detection, Classification, Tracking and Counting using FPGA Zynq XC7Z020 for Automated Video Surveillance and its Applications

AUTHOR NAME: Dr. H. V. Ravish Aradhya

Video processing applications usually involve processing of large amount of data and if done serially it becomes extremely difficult to achieve real time implementation as it produces delay in carrying out all the operations. And the complexity also shoots up drastically. Moreover the general purpose processors or the DSP boards are designed to address a broad user group and has a fixed hardware structure. It means that the transistor memory, connections and peripherals are constant. All the operations are predefined and user just uses them in a sequential way.

TITLE: Unsupervised Anomaly Video Detection via a Double-Flow ConvLSTM Variation Auto encoder

AUTHOR NAME: LIN WANG

The reconstruction probability is a probabilistic measure that takes into account the variability of the distribution of variables. Experimental results of this paper show that this method outperforms auto encoder-based methods on MNIST dataset [33]. Compared with the reconstruction error used by the auto encoder and the principal component-based anomaly detection method, the reconstruction probability with a theoretical background is more principled and objective. However, VAE limits its applicability to time series, especially to video, for it does not take the temporal characters of video into account. In this work, in order to solve above problems, our two models choose ConvLSTM units instead of LSTM units to learn the internal spatio-temporal relations of video. These two asymmetric models blend ConvLSTM with VAE architecture to reconstruct videos without anomaly objects for anomaly detection. One is called ConvLSTM-VAE (Asymmetric); we use reconstruction error probability which is different from reconstruction probability to detect anomalies. Experiments verify the effectiveness and competitiveness of our DF- ConvLSTM-VAE on multiple public benchmark datasets. In particular, our model achieves the state-of-the-art performance on anomalous event count.

IV. SYSTEM ANALYSIS

1. EXISTING SYSTEM

The extraction of abnormal information from format-compliant encrypted bitstreams was used for detection abnormal activity. In this scheme, we use three types of estimated values obtained from the bitstream structure and codeword structure, i.e., the data size of the macroblock (in bits), the macroblock (MB) partition mode, and the magnitude of motion vector difference (MVD).

DISADVANTAGES

- Fail to simultaneously utilize the rich information and relationship between still images
- Only implement image to image matching
- Performance is less at the time of face recognition.

V. PROPOSED SYSTEM

Proposed system focuses on implementing a Smart Camera which monitors the activity in the banks, it can detect any sort of suspicious behavior, and the thieves would be tracked on the basis of motion and the time based face detection. If any such suspicious face is detected in unwanted time, the Smart Camera will automatically send an alert message to the security department.

The message mentions what type of alert is generated; it also contains the image sharing when the face was detected with a web link where the live image is stored, so that the security can come with appropriate preparation.

ADVANTAGES

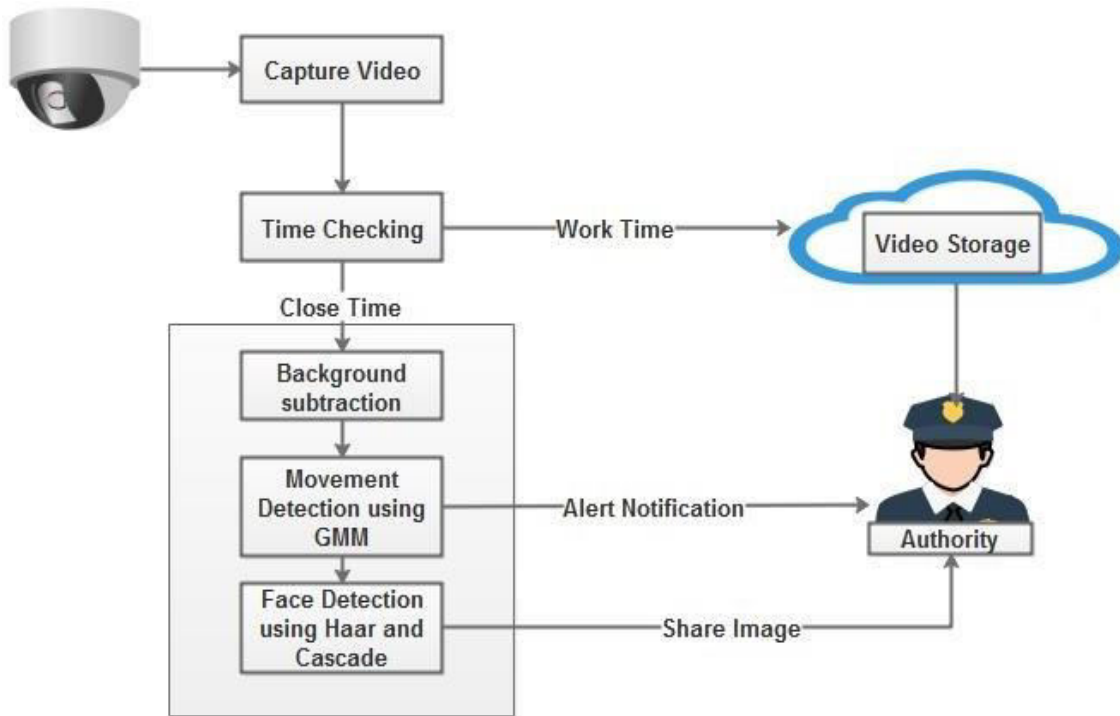
- Build the relationship between the unbalanced distributions of still images and video clips of different quality
- Complexity is low and performance is high.
- Low time consuming for detection and provide alerts.

VI. NETWORK ARCHITECTURE

A system architecture or systems architecture is the conceptual model that defines the structure, behavior, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviours of the system. System architecture can comprise system components, the externally visible properties of those components, the relationships (e.g. the behavior) between them. It can provide a plan from which products can be procured, and systems developed, that will work together to implement the overall system. There have been efforts to formalize languages to describe system architecture; collectively these are called architecture description languages (ADLs).

Various organizations define systems architecture in different ways, including:

- An allocated arrangement of physical elements which provides the design solution for a consumer product or life-cycle process intended to satisfy the requirements of the functional architecture and the requirements baseline.
- Architecture comprises the most important, pervasive, top-level, strategic inventions, decisions, and their associated rationales about the overall structure (i.e., essential elements and their relationships) and associated characteristics and behavior.
- If documented, it may include information such as a detailed inventory of current hardware, software and networking capabilities; a description of long-range plans and priorities for future purchases, and a plan for upgrading and/or replacing dated equipment and software
- The composite of the design architectures for products and their life-cycle processes.



VII. SYSTEM SPECIFICATION

7.1 HARDWARE REQUIREMENTS

- Processor : Dual core processor 2.6.0 GHZ
- RAM : 4GB
- Hard disk : 320 GB
- Compact Disk : 650 Mb
- Keyboard : Standard keyboard
- Monitor : 15 inch color monitor

7.2 SOFTWARE REQUIREMENTS

- Operating system : Windows OS
- Front End : Python
- Back End : MYSQL Server
- Application : Windows Application
- Tool : Pycharm


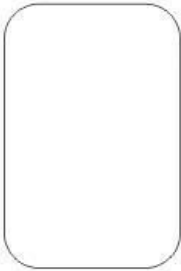

7.3 SYSTEM DESIGN

DATAFLOW DIAGRAM

A two-dimensional diagram explains how data is processed and transferred in a system. The graphical depiction identifies each source of data and how it interacts with other data sources to reach a common output. Individuals seeking to draft a data flow diagram must identify external inputs and outputs, determine how the inputs and outputs relate to each other, and explain with graphics how these connections relate and what they result in. This type of

diagram helps business development and design teams visualize how data is processed and identify or improve certain aspects.

Data flow Symbols:

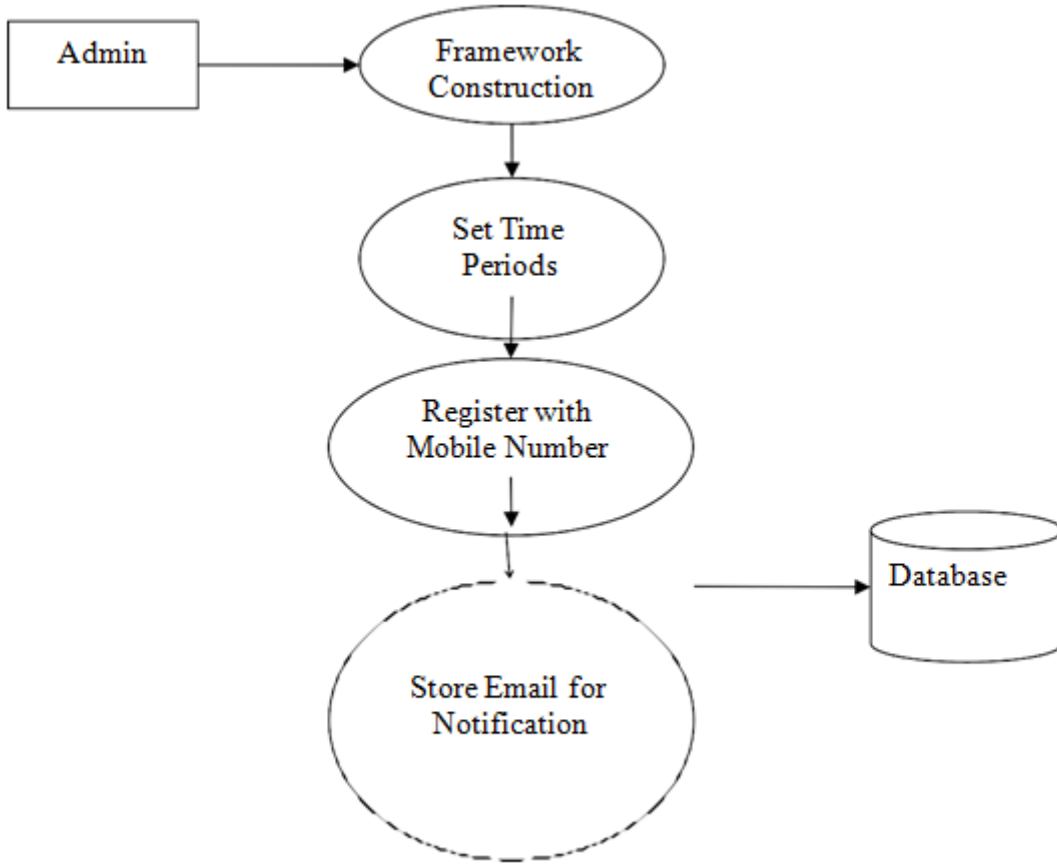
Symbol	Description
	An entity . A source of data or a destination for data.
	A process or task that is performed by the system.
	A data store , a place where data is held between processes.

LEVEL 0

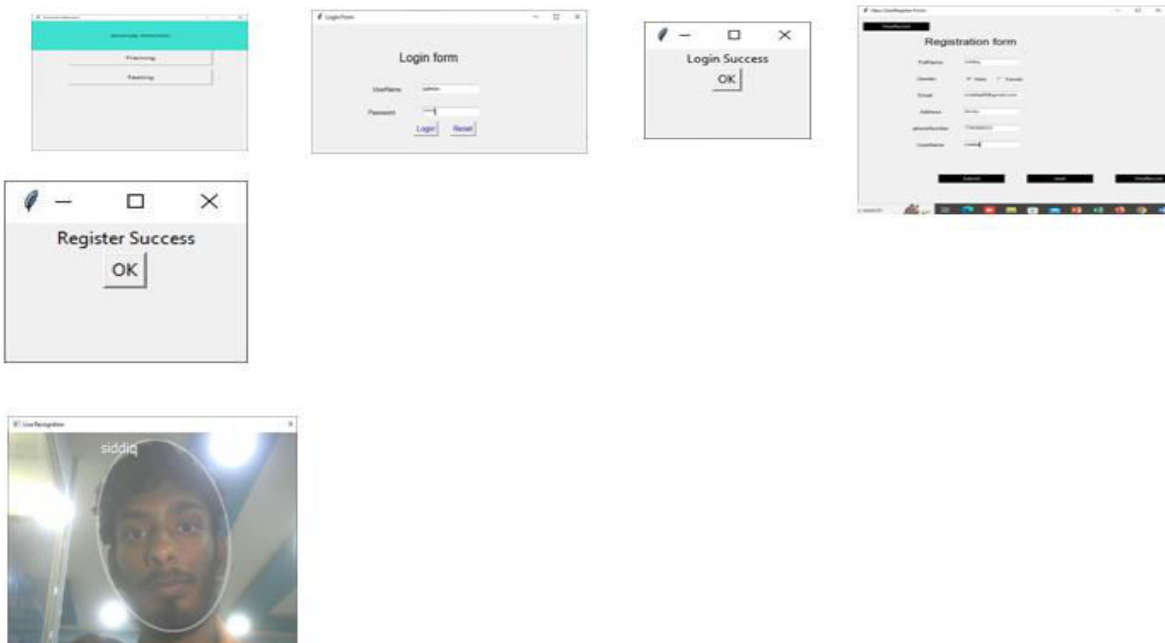
The Level 0 DFD shows how the system is divided into 'sub-systems' (processes), each of which deals with one or more of the data flows to or from an external agent, and which together provide all of the functionality of the system as a whole. It also identifies internal data stores that must be present in order for the system to do its job, and shows the flow of data between the various parts of the system.

LEVEL 1

The next stage is to create the Level 1 Data Flow Diagram. This highlights the main functions carried out by the system. As a rule, to describe the system was using between two and seven functions - two being a simple system and seven being a complicated system. This enables us to keep the model manageable on screen or paper.



VIII. RESULT



IX. CONCLUSION AND FUTURE WORK

9.1 CONCLUSION

Proposed system focuses on implementing a Smart Camera based anomaly detection which monitors the activity in the banks, it can detect any sort of suspicious behavior, and the thieves would be tracked on the basis of motion and the face detection approach based on unwanted time period. If any such suspicious action is detected at unwanted time, the Smart Camera will automatically send an alert message to the security department. The message mentions what type of alert is generated; it also contains the face image of the thief and time detected with a web link where the live image is stored, so that the security can come with appropriate preparation.

9.2 FUTURE WORK

The future scope of this paper is wide open in research aspect for all applications. Various other feature extraction methods can be applied to test the accuracy of the system. Also provide activity recognition approach to automatically predict abnormal activities. In the further analysis, efficient artificial intelligence techniques can be used to enhance the performance of proposed anomaly detection from surveillances video. Feature extraction algorithms can also be used to classify the abnormality of events with more accurately so that the efficiency of anomaly detection system can be improved. In addition, the framework can be extended with the objective of anomaly identification, traffic information analysis, traffic prediction, route suggestion, smart park management, etc.

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