A PRELIMENERY REPORT ON

SUSPICIOUS ACTIVITY DETECTION IN HOSPITAL

SUBMITTED TO THE SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE
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FOR THE AWARD OF THE DEGREE

OF

BACHELOR OF ENGINEERING (COMPUTER ENGINEERING)

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CERTIFICATE

This is to certify that the project report entitles

"SUSPICIOUS ACTIVITY DETECTION IN HOSPITAL"

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With immense pleasure, we are presenting this Project Report (stage 1) as a part of the curriculum of B.E Computer. WE wish to thank all the people who gave us endless support right from the stage the idea was conceived.

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This project would not be possible without the help of the library department who helped us gather the information from various sources. Lastly, we offer our regards to all those who supported us in any respect during the completion of the stage-1 of our project.

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ABSTRACT

Suspicious activities are of a problem when it comes to the potential risk it brings to humans. With the increase in criminal activities in urban and suburban areas, it is necessary to detect them to be able to minimize such events. Early days surveillance was done manually by humans and where a tiring task as suspicious activities were uncommon compared to the usual activities. With the arrival of intelligent surveillance systems, various approaches were introduced in surveillance.

A significant field of research and development focuses on sophisticated machine learning methods for the detection of suspicious human behaviour to lower monitoring costs while increasing safety. We require a real-time intelligent human activity detection system that can recognize suspicious actions in hospitals because it is challenging for personnel to continuously watch in hospitals. The complicated low-accuracy algorithms and approaches used by current systems make them less dependable. By integrating a Convolutional Neural Network and using the 2D posture estimation approach to the system, this study suggests a real-time suspicious human activity recognition method with high accuracy. This system is suitable for usage in hospitals, homes, and other surveillance areas. Here, we use 2D pose estimation to extract skeleton pictures of people from the input video frames in order to determine their pose.

KEYWORDS: Suspicious, Hospital, Deep Learning, Computer, Security, Machine Learning.

INDEX

LIST OF ABBREVATIONS

ABBREVIATION	ILLUSTRATION
IDS	Intrusion Detection System
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
RAM	Random Access Memory
GB	Gigabytes
HTML	Hyper Text Markup Language
CSS	Cascading Style Sheet
RDBMS	Relational Database Management System
LAMP	Linux, Apache, MySQL, and PHP.
IDE	Integrated Development Environment
VGA	Video Graphics Array
SDLC	Software Development Life Cycle
UML	Unified Modeling Language

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1 INTRODUCTION

The hospital of image processing and computer vision known as Suspicious Human Activity Recognition from Video Surveillance recognizes human activity and classifies it into normal and abnormal activities. Abnormal behaviors are the uncommon or suspicious actions that people rarely take when in a hospital, including slipping and falling. Normal activities are the regular tasks carried out by people, such as slipping, when they are in a hospital. Video surveillance is increasingly used today to keep an eye on people's movements and stop suspicious behavior among patients in hospitals.

It is also necessary to have intelligent video surveillance to automatically detect falls among elderly hospital patients. For fall detection, the market mostly offers worn-sensor based systems (Willems et al. 2009; Nguyen et al. 2009). These devices are primarily electronic devices that force elderly people to either put them in their pockets or wear them on their wrists. These wearable fall detectors often contain an accelerometer or manual help button to detect a fall. These wearable fall detectors do have certain limitations, though. One of the drawbacks of fall detectors is that older individuals sometimes forget to wear them, and the help buttons are ineffective for those who pass out after falling. Modern developments in computer vision have produced fresh approaches to get beyond these limitations. One of the key benefits of a visual-based fall detection system is that it doesn't require the user to wear anything, making it less obtrusive than a wearable sensor. In addition, computer vision systems offer greater insight into a person's behavior than typical wearable sensors do. This enables a visual-based home monitoring system to collect data on falls as well as other aspects of daily life that are important for health care monitoring, like mealtimes and sleep length. An image of a Human Fall detection that was taken by a sophisticated vision surveillance system.

There are two different kinds of surveillance systems: the first is semi-autonomous, which records video and sends it for human expert analysis. In order to stop suspicious human activity in hospitals, non-intelligent video surveillance requires constant human monitoring, which is very expensive, problematic, and also very tough and challenging to do. In order to conduct low level tasks like motion detection, tracking, categorization, and abnormal event identification, a second fully autonomous surveillance system is needed.

The objective of video surveillance is to create intelligent video surveillance to replace the conventional passive video surveillance in order to record abnormal human activity. After analysis, a warning can be produced by alarms, massages, or other approaches to stop odd activity.

There are a number of anomalous activities that demand for an intelligent surveillance system that may automatically create an alarm or alert, including the identification of abandoned objects, theft, patient health monitoring, or elder care in hospitals (i.e. fall detection). Snatch stealing, as is depicted in Fig. 1b, is a common anomalous activity carried out by chain snatchers in the present and is difficult to identify in public spaces. Snatch theft is an abnormal conduct that draws attention from the public, and the victim requires assistance right away. Real-time intelligent video monitoring is needed at the hospital to find the victim.

1.1 MOTIVATION

1 We believe that this Project will be very helpful in hospital system.
2 It is useful for patients care.
3 Behaviour analysis of patients is a significant issue, where good supervision can reduce the risk of injury to hospital personal, property, and patients themselves.

1.2 PROBLEM DEFINATION

Hospitals In addition, video surveillance can be utilised in hospitals to keep an eye on elderly or young patients. It is even used in ambulances to remotely monitor patients. In hospitals, video surveillance can keep an eye on patient activity and spot any questionable behaviour, such as vomiting, dizziness, or other strange behaviour. The hospital of image processing and computer vision known as Suspicious Human Activity Recognition from Video Surveillance recognises human activity and classifies it into normal and abnormal activities. The Falling patient is engaging in abnormal behaviour. The human at the hospital is slipping while performing normal duties.

2 LITERATURE SURVEY

When it comes to the potential risk it poses to people, suspicious activity is a problem. It is essential to detect criminal activity given the rise in it in urban and suburban areas in order to reduce such occurrences. In the early days, surveillance was carried out manually by humans, which was a taxing task because suspicious activity was rare compared to everyday activity. Different methods of surveillance were introduced with the introduction of intelligent surveillance systems. We concentrate on examining two situations where, if ignored, there is a high risk to human lives: identifying potential crimes involving firearms and identifying abandoned luggage on surveillance footage.[1]

Automated teller machines (ATMs) are frequently used to conduct financial transactions and are quickly evolving into a necessity of daily life. Money can be withdrawn, deposited, and transferred between accounts whenever needed with the use of ATMs. However, this convenience is tainted by criminal activity, which is rapidly compromising bank clients' security, such as money theft and assaults on consumers. In this research, we provide a video-based framework that can quickly spot suspicious activity at ATM installations and sound an alarm in the event of any suspicious occurrence. The suggested method uses Hu moments and motion history images (MHI) to extract pertinent features from video .[2]

This publication takes into account original works that expand the field of knowledge. Even if no novel information or ideas are given, original reviews and surveys are accepted. The article's results shouldn't have been submitted to or published elsewhere. It is possible to submit expanded versions of conference publications. The language used to write articles must be standard English and be understandable.[3]

The computer analysis of visual data is the main topic of this publication. The journal Computer Vision and Image Understanding publishes papers on all facets of image analysis, from early vision's low-level, iconic processes to recognition and interpretation's high-level, symbolic

processes. The domain of image understanding is addressed over a wide range of topics, with papers providing perspectives that diverge from prevailing viewpoints.[4]

The most recent technological advancements have resulted in automation and digitization in practically every field, which has had an impact on a wide range of applications. This has led to a massive flow of data from all industries, with the information included in that data serving as a crucial component for the advancement of each individual, group, state, nation, and so on. Depending on who handles it, these data with vital information might be seen in a constructive or negative way. Therefore, taking precautions becomes absolutely necessary to secure the data from unauthorized access. This opens the door for the creation of a system to detect suspicious activity in sensitive locations like hospitals, financial institutions, and military regimes. [5]

Sensor-based human activity recognition has received a lot of attention in artificial intelligence and ubiquitous computing due to the accessibility of inexpensive sensors and sensor networks. In this study, using wireless sensors linked to a person's body, we describe a novel two-phase method for identifying aberrant actions. Among many other applications of sensor networks, detecting anomalous behaviors is a particularly crucial duty in security monitoring and healthcare. Traditional solutions to this issue have a significant false positive rate, especially when sensor data collection is biased toward normal data and aberrant events are few. As a result, it is difficult to apply many traditional data mining techniques because there is a lack of training data.[6]

Due to an increase in immoral or anti-social behaviors that have been occurring often, security has become a crucial aspect of the modern society. Many organizations have installed CCTV to continuously watch over people, their interactions, and movements. Continuously produced video data is substantial. Humans cannot continuously analyses data to determine whether occurrences are anomalous because doing so would need a large workforce and continual attention. This makes automating the same process necessary. In order to quickly determine whether an unusual activity is abnormal, it is also necessary to notice which frames and portions of them include the strange activity. [7]

The detection of suspicious human activity in surveillance footage is a current field of study for image processing and computer vision. In order to stop terrorism, theft, accidents and illegal parking, vandalism, fighting, chain snatching, crime and other suspicious activities, human activities can be observed through visual surveillance in sensitive and public areas like bus, train, airport, banks, shopping malls, schools, and colleges. Since it is very challenging to constantly monitor public spaces, it is necessary to install intelligent video surveillance that can track people's movements in real-time, classify them as routine or unusual, and issue alerts. There have been a lot of publications in the last ten years about using visual surveillance to spot unusual activity. [8]

Everyone desires to be in good health. To prevent any future dramatic changes, it is equally crucial to regularly check on a person's health. Long hospital lines and ambulatory monitoring are both well known in this fast-paced, modern world. Simple health status monitoring for older people is also essential. These problems necessitate the creation of a fundamental health monitoring system that can be used in homes or other settings with basic health parameters. We are aware that the internet of things and numerous wireless devices are products of advanced technology. [9]

In the past ten years, automated patient monitoring has drawn more attention in hospital settings. Behavior analysis of psychiatric patients is a significant issue, where good oversight can reduce the risk of injury to hospital personnel, property, and patients themselves. We do a preliminary analysis on visual patient monitoring utilizing security cameras for this assignment. The suggested method identifies potentially harmful behavior using statistics of optical flow vectors that were collected from patient motions. To extract the shape and temporal features of blobs, the approach additionally carries out foreground segmentation followed by blob tracking.[10]

In several nations, the population of seniors is always growing. The majority of these folks like living on their own. Falls can result in critical injuries or even fatalities. It is crucial to create a fall detection system in order to address this issue. This project's goal is to recognize and spot any strange conduct in an elderly person. People spend the majority of their time at home or at work, and many consider these areas to be their spiritual havens. The individual's details are kept

in a database. Therefore, the neighbor can review the affected person's details in an emergency and refer to all of the information about the affected person. [11]

The field's key subfield is computer vision. a branch of computer science that enables machines to simply observing and studying digital images and movies, one can become smart and intelligent. Activity recognition, which automatically categorizes the actions being carried out by an agent, is an important use of this. The goal of human activity recognition is to understand a person's actions through a series of observations while taking into account different difficult contextual conditions. This paper examines the many methodologies used, the problems found, and the uses for this field of study. [12]

Research on sleeping habits and the prevention of bedsores, among other biomedical topics, can benefit greatly from monitoring human sleeping postures throughout time. In this article, we present a vision-based tracking system for widespread yet undetectable long-term monitoring of in-bed postures in various contexts. Once trained, our system uses a hierarchical inference model on the top view movies gathered from any common off-the-shelf camera to produce an in-bed posture tracking history (iPoTH) report. Our model can be learned offline, applied to new users without further training, and is person-independent despite being based on a supervised learning structure. [13]

The effectiveness of conventional pattern recognition systems has significantly increased recently. Utilizing deep learning algorithms to comprehend human behavior in mobile and wearable computing contexts has garnered a lot of interest due to its rising popularity and success. This study suggests a deep neural network that combines long short term memory (LSTM) and convolutional layers. This model could automatically extract activity features and classify them with just a few model parameters. Recurrent neural networks (RNNs) come in a variety, and one that is better suited to handling temporal sequences is the LSTM. The proposed architecture used a two-layer LSTM followed by convolutional layers to process the raw data collected by the sensors. [14]

A growing need for cheap wellness monitoring is giving patient monitoring systems (PMS) more significance. Due to their low cost and passive sensing capabilities, CMOS cameras are being used more and more for vision-based PMS applications. This thesis proposes integrated architecture for a vision-based PMS as well as computationally effective methods for extracting facial features including the eyes, lips, and brow furrows. Given that the eyebrow is a stable facial characteristic, an effective method for detecting the eyebrow has been proposed to aid in the localization of other face features. Iterative thresholding was suggested as a method for effectively extracting the edges of the eyebrows. [15]

3 SOFTWARE REQUIREMENT SPECIFICATION

3.1 INRODUCTION

It is also necessary to have intelligent video surveillance to automatically detect falls among elderly hospital patients. For fall detection, the market mostly offers worn-sensor based systems (Willems et al. 2009; Nguyen et al. 2009). These devices are primarily electronic devices that force elderly people to either put them in their pockets or wear them on their wrists. These wearable fall detectors often contain an accelerometer or manual help button to detect a fall. These wearable fall detectors do have certain limitations, though. One of the drawbacks of fall detectors is that older individuals sometimes forget to wear them, and the help buttons are ineffective for those who pass out after falling. Modern developments in computer vision have produced fresh approaches to get beyond these limitations. One of the key benefits of a visual-based fall detection system is that it doesn't require the user to wear anything, making it less obtrusive than a wearable sensor. In addition, computer vision systems offer greater insight into a person's behavior than typical wearable sensors do. This enables a visual-based home monitoring system to collect data on falls as well as other aspects of daily life that are important for health care monitoring, like mealtimes and sleep length. An image of a Human Fall detection that was taken by a sophisticated vision surveillance system.

3.1.1 Scope of Project

- The suggested technique will assist those who want to post certain photographs and detect activity.
- On the basis of the dataset's photos, the recommendation was made.
- Only informational purposes are served by the information displayed on the application.
- The system has the power to frequently maintain the application.

3.1.2 User classes and Characteristics

Our System Divided into Two classes / Modules

1) User
2) System

3.1.3 Assumptions and Dependencies

- User must be fluent in English and have some familiarity with web-based applications.
- In order to use the application, the user must have all necessary software.

3.2 FUNCTIONAL REQUIREMENTS

- It ought to be able to recognize activity.
- Each module's operation and function must be flawless. The users will be able to operate effectively thanks to the software's general performance.
- The application is made up of modules that make it simple to find and solve issues. As a result, installing and updating new functionality is made simpler.
- Only the user themselves can view user information.

3.3 EXTERNAL INTERFACE REQUIREMENTS

3.3.1 User Interfaces

Minimum requirements for hardware include a 180 GB hard drive and 4 GB of RAM running at 2 GHz or faster. The main prerequisites include MySQL and 4GB of RAM for developing Android applications.

3.3.2 Hardware Interfaces

Since this is an online tool for managing products, no hardware components for the user interface are being enabled or installed.
There is no embedded system in it.

Pentium IV 2.4 GHz processor; 1.5 GHz and faster speed; and 4 GB of RAM (min) a 220 GB hard drive, a standard Windows keyboard, a two- or three-button mouse, and a keyboard.

3.3.3 Software Interfaces

This is the software setup that the project was created in. Here is a description of the programming language, tools, etc. used.

- Window's operating system
- Front end: HTML, CSS, bootstrap, and JavaScript • Tool: PyCharm
- MySQL is the database

3.3.4 Communication Interface

• The web application can be accessed by the user from a remote place.
• A regular internet connection is necessary.
• A TCP/UDP connection is necessary.

3.4 NON FUNCTIONAL REQUIREMENTS

3.4.1 Performance Requirements

• High Speed: Our system processes the requested task simultaneously with other actions to provide a prompt answer. The system then has to wait for the process to finish.
• Accuracy: our System conducts processes correctly and report results precisely. The system output follows the user-specified format.

3.4.2 Safety Requirements

Establishing a safe and dependable transmission medium is necessary to protect the security of the data. To prevent abuse or malfunction, the source and destination information must be input

accurately. User-generated passwords are made up of characters, special characters, and numbers, making them hard to crack. Therefore, that user account is secure.

3.4.3 Security Requirements

Secure access to private information (user information).
Information security is the process of preventing unauthorized users from accessing, using, disclosing, disrupting, altering, or destroying data and information systems.
•It's common practice to wrongly use the terms information assurance, computer security, and information security interchangeably. Although these disciplines frequently interact with one another and strive to ensure the privacy, accuracy, and accessibility of information, there are some minor distinctions between them.
• For security purposes, user passwords must be stored in encrypted form.
• Only people in positions of high authority shall have access to all user information.
Usernames and passwords will be used to limit access.

3.4.4 Software Quality Attributes

• Accessibility [associated with Reliability]
• Modifiability (which encompasses portability, reuse, and scalability)
• Performance\s• Security \s• Testability
• Usability [including user and self-adaptability]

3.5 SYSTEM REQUIREMENTS

3.5.1 Database Requirements

An open-source relational database management system is MySQL (RDBMS). The word "My" is a combination of "SQL," the acronym for structured query language, and "My," the name of co-founder Michael Widenius's daughter.

Under the rules of the GNU General Public License, MySQL is free and open-source software. It is also accessible under a number of proprietary licences. Sun Microsystems acquired the Swedish company MySQL AB, which owned and sponsored MySQL (now Oracle Corporation). Widenius forked the open-source MySQL project to develop MariaDB in 2010, the year Oracle acquired Sun.

Linux, Apache, MySQL, Perl/PHP/Python is an acronym for the LAMP web application software stack, which also includes other components. Numerous database-driven web programmes, such as Drupal, Joomla, phpBB, and WordPress, use MySQL. Numerous well-known websites, such as Facebook, Flickr, MediaWiki, Twitter, and YouTube, also use MySQL.

3.5.2 Software Requirements

Operating System : Windows 11 (22H2)
Technology : KNN algorithm
Tool : PyCharm Community
Database : MySQL
Programming : Python

3.5.3 Hardware Requirements

In our Model we have used Intel i7 10^{th} gen, 2.4 GHz processor.
Hard disc capacity of 220 GB.
Network Interface: Standard Ethernet
RAM: 16 GB

3.6 ANALYSIS MODELS: SDLC MODEL SHOULD BE APPLIED

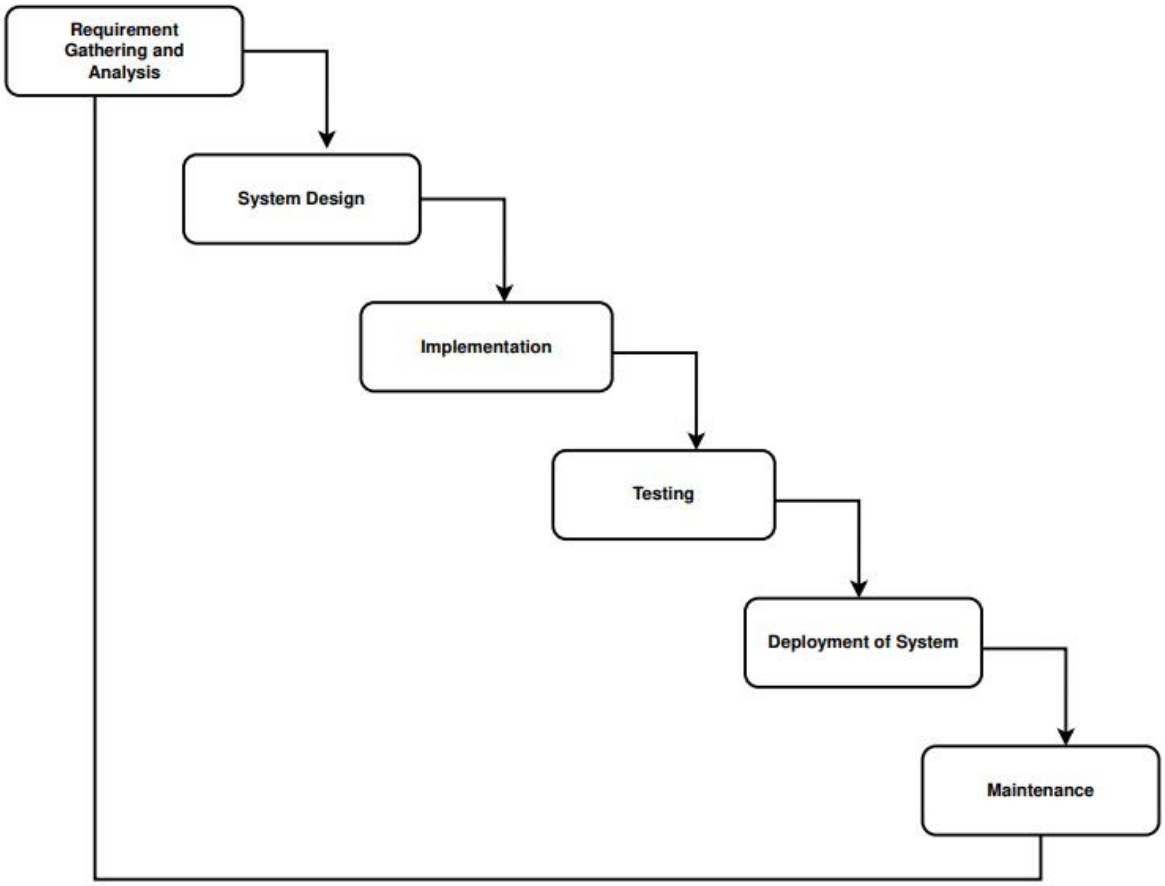


Fig 3.1 SDLC Model

3.7 SYSTEM IMPLEMENTATION PLAN

3.7.1. Gathering and analysing needs:

Analyzing to comprehend how web modules and functions are separated. Which modules on the web carry out which tasks. We identify the needs for our project in this waterfall step, including those for software and hardware, databases, and interfaces.

3.7.2. System Design:

System design is crucial for project implementation since it indicates how the project will proceed. Which modules carry out which tasks and how they relate to one another. We develop a system that is user-friendly and easy to comprehend for end users throughout this stage of system design.

3.7.3. Implementation:

There are two modules in our Project: first, user, and then system. User registers using a name, email, mobile number, and password, and logs in using this information. User inputs the system, and the system returns output. The system will allow users the ability to input data, and then its machine learning algorithm will produce the desired results.

During the project's implementation phase, we successfully implemented the various modules needed to achieve the desired results at the various module levels.

The system is initially built as small programmes known as units with input from the system design and is then combined in the following phase. Unit testing is the process of developing and evaluating each unit for functionality.

3.7.4. Testing:

Various test cases are run to see if the project module is producing the desired results within the anticipated time frame.

Following the testing of each unit created during the implementation phase, the entire system is merged. The entire system is tested for errors and failures after integration.

In order to comprehend the system flow, system modules, and order of execution, we construct several UML diagrams and data flow diagrams.

3.7.5. System Deployment:

Front end and back end of a website are deployed in the same file.

The front end deploys the dedication file.

The product is either released to customers or deployed in their environments following functional and non-functional testing.

3.7.6. Maintenance:

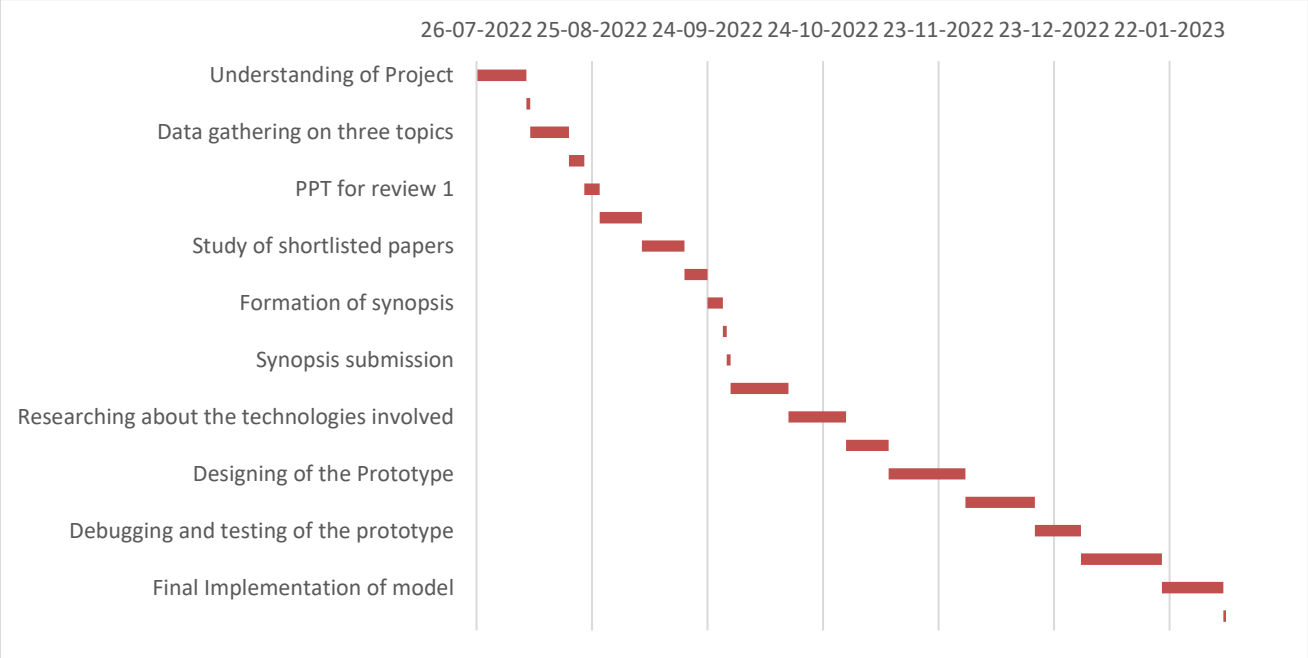
The client environment encounters a few problems. Patches are published to address certain problems. Additionally, improved versions of the product are issued. To bring about these changes in the surroundings of the consumer, maintenance is performed. The progression is viewed as falling smoothly through the phases like a waterfall as they are all connected to one another.

Task	Start Date	Days to complete
Understanding of Project	26-07-2022	13
Submission of topics	08-08-2022	1
Data gathering on three topics	09-08-2022	10
Searching for reference papers	19-08-2022	4
PPT for review 1	23-08-2022	4
Review 1 and shortlisting of a topic	27-08-2022	11
Study of shortlisted papers	07-09-2022c	11
PPT for review 2	18-09-2022	6
Formation of synopsis	24-09-2022	4
Review 2	28-09-2022	1
Synopsis submission	29-09-2022	1
Planning the prototype of project	30-09-2022	15
Researching about the technologies involved	15-10-2022	15
Creation of SRS	30-10-2022	11

Designing of the Prototype	10-11-2022	20
Implementation of the prototype	30-11-2022	18
Debugging and testing of the prototype	18-12-2022	12
Fixing of all Defects in the prototype	30-12-2022	21
Final Implementation of model	20-01-2023	16
Deployment of model	05-02-2023	6

Table 3.1 Project Plan

Gantt Chart :



4 SYSTEM DESIGN

4.1 SYSTEM ARCHITECTURE

In the following system architecture, we have shown briefly that how the detection of suspicious activity will be done. First the use will give the Input in form of video file while will be then saved in the database. Then the preprocessing will be done on the input data to get processed input which will be clean in nature without any noise. Then on this processed data the activity detection will be done using feature extraction and KNN algorithm and the suspicious activity detection will be done according to Activity Class.

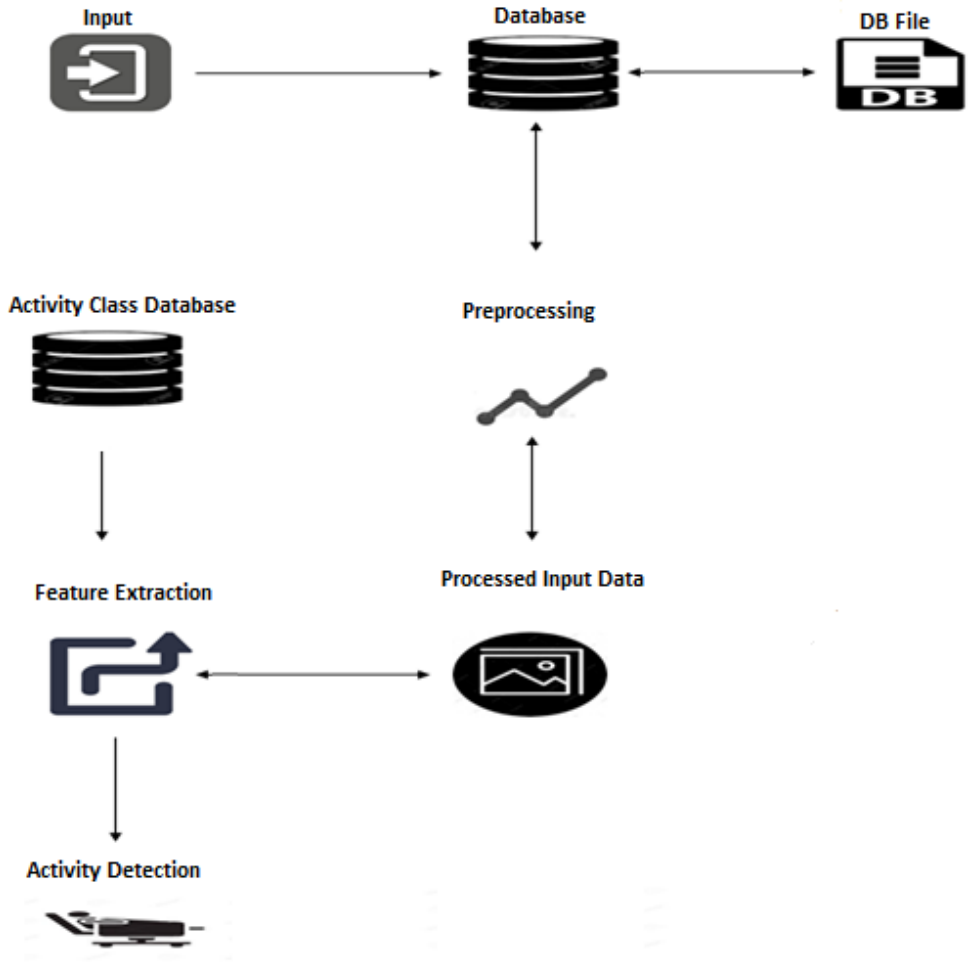
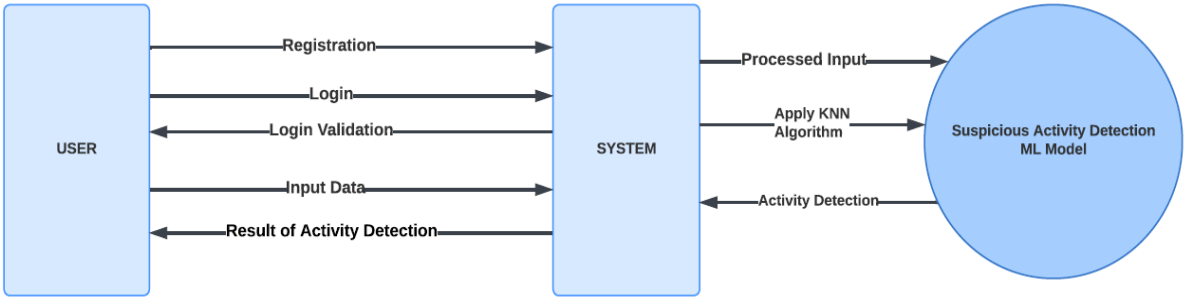


Fig 4.1 System Architecture

4.2 DATA FLOW DIAGRAM

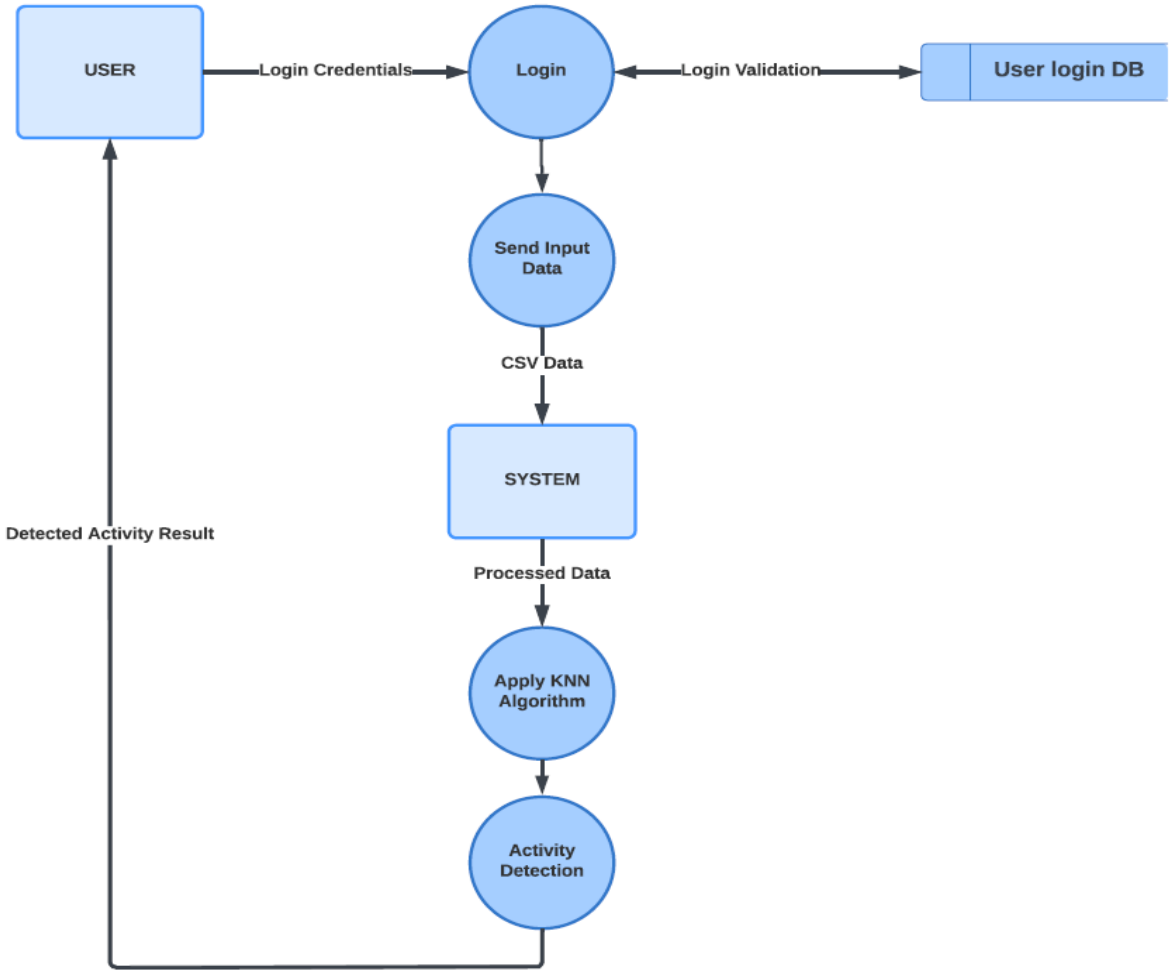
DFD Level 0

In the DFD level 0 diagram we have shown Our project as a single process which are login , sending input , applying KNN algorithm to getting the Result of Activity Detection with its Interaction with external entity here which is User.



DFD Level 1

In the DFD level 1 diagram we have highlighted main functions of our project in descriptive manner and also shown how high-level process like login , sending input , etc. of DFD level 0 are broken down into subprocesses such as validation of login using the database , Sending CSV data etc.



DFD Level 2

DFD level 2 goes one step deeper into parts of 1-level DFD. It shows the details about the model's functioning about the preprocessing of Input Data , detecting the class of activity along with how the flow of activity detection will we done in the project.

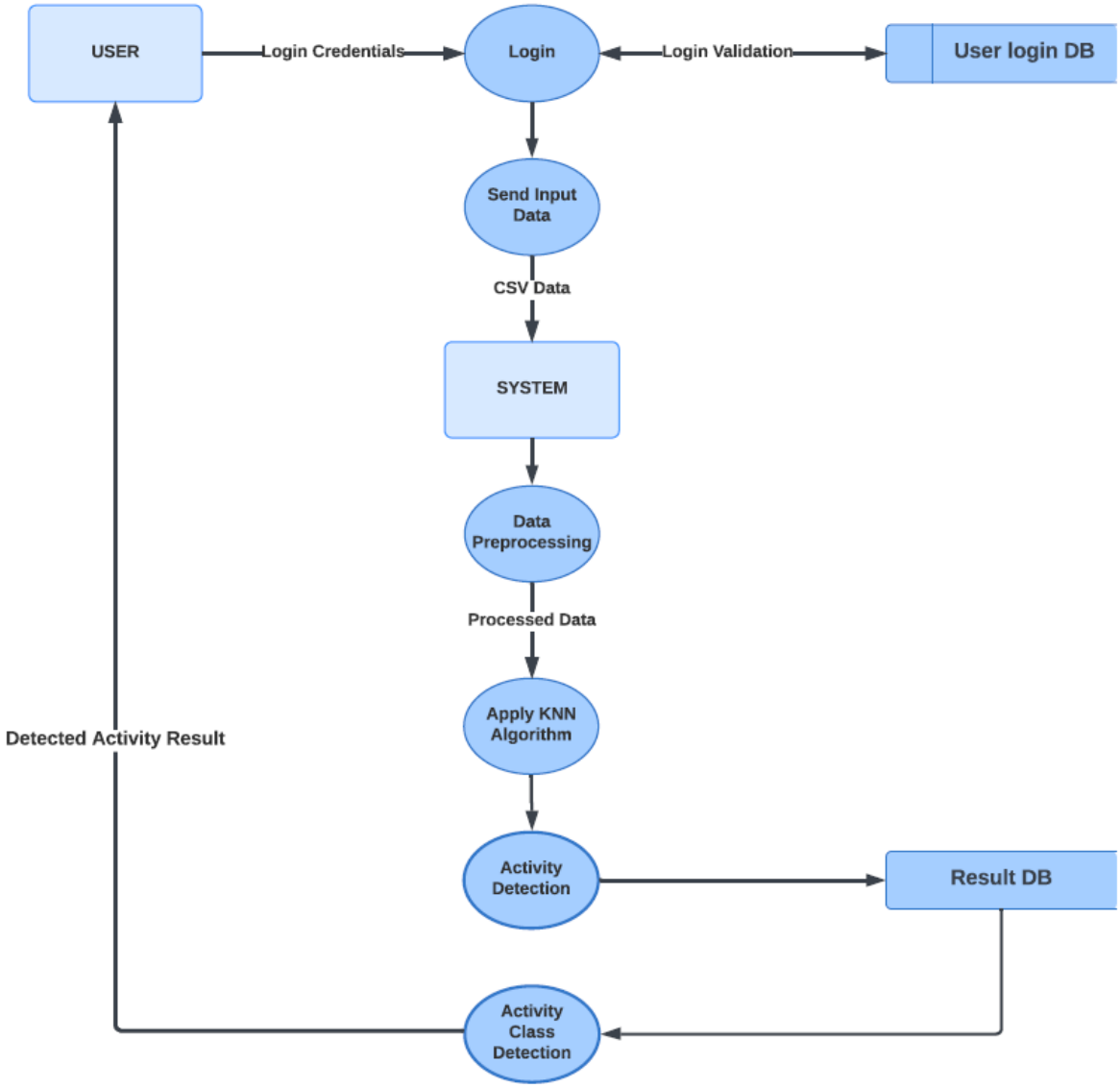


Fig 4.2 Data Flow Diagram

4.3 ENTITY RELATIONSHIP DIAGRAM

This Suspicious Activity Detection System maps out in detail all the critical entities, their attributes and relationships. It gives the rough details of all the entities involved, from User. Creating an ERD for a Surveillance system can be beneficial to ensure that all the important aspects are a part of your system. It is basically a graphical representation of Surveillance system and relation between user, system, input image, activity detection, feature extraction. This ER diagram for Suspicious Activity Detection System also describes the data objects and their relationships.

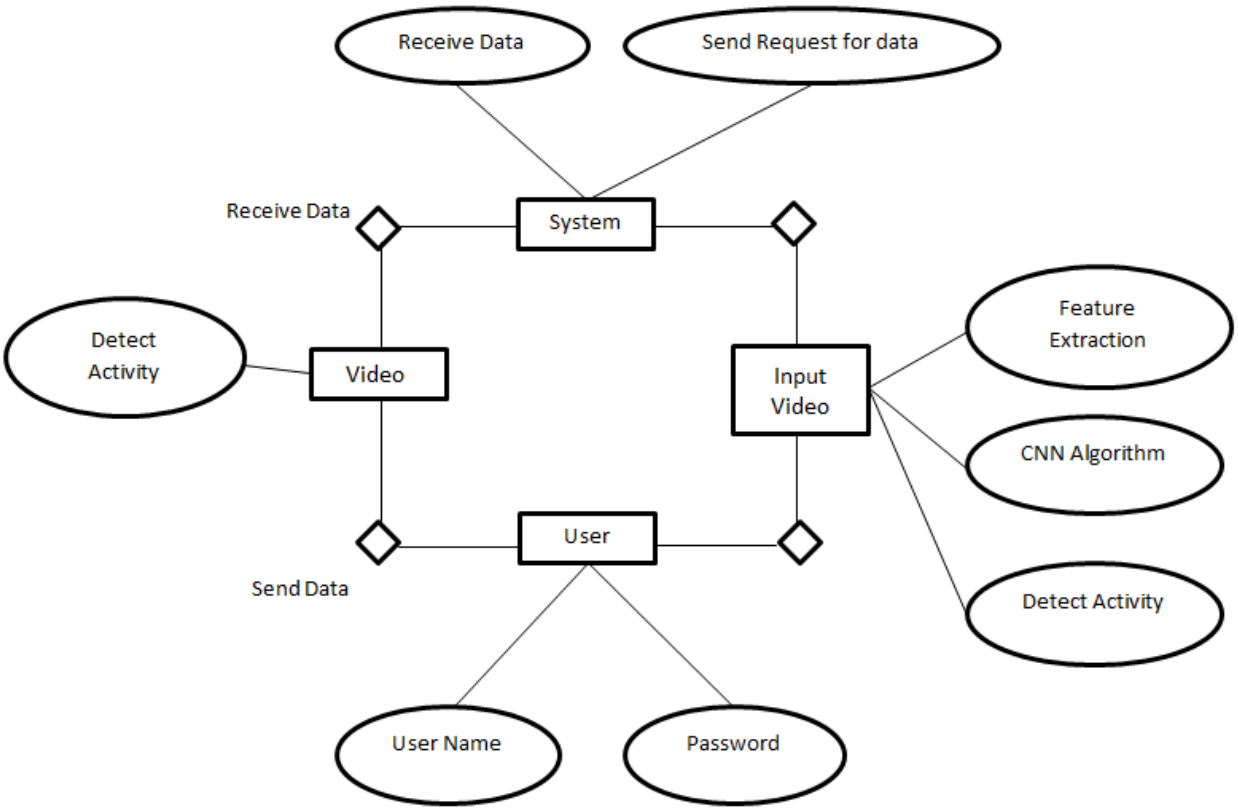


Fig 4.3 ER Diagram

4.4 UML DIAGRAMS

4.4.1 Use Case Diagram

After running this model, users must register with their name, username, mobile number, email, and password. Once registration is complete, users must login using their email address and password. If the user's email address and password are correct, they are then redirected to the login page. User logs in, provides input for a prediction, which is processed, and then displays the outcome.

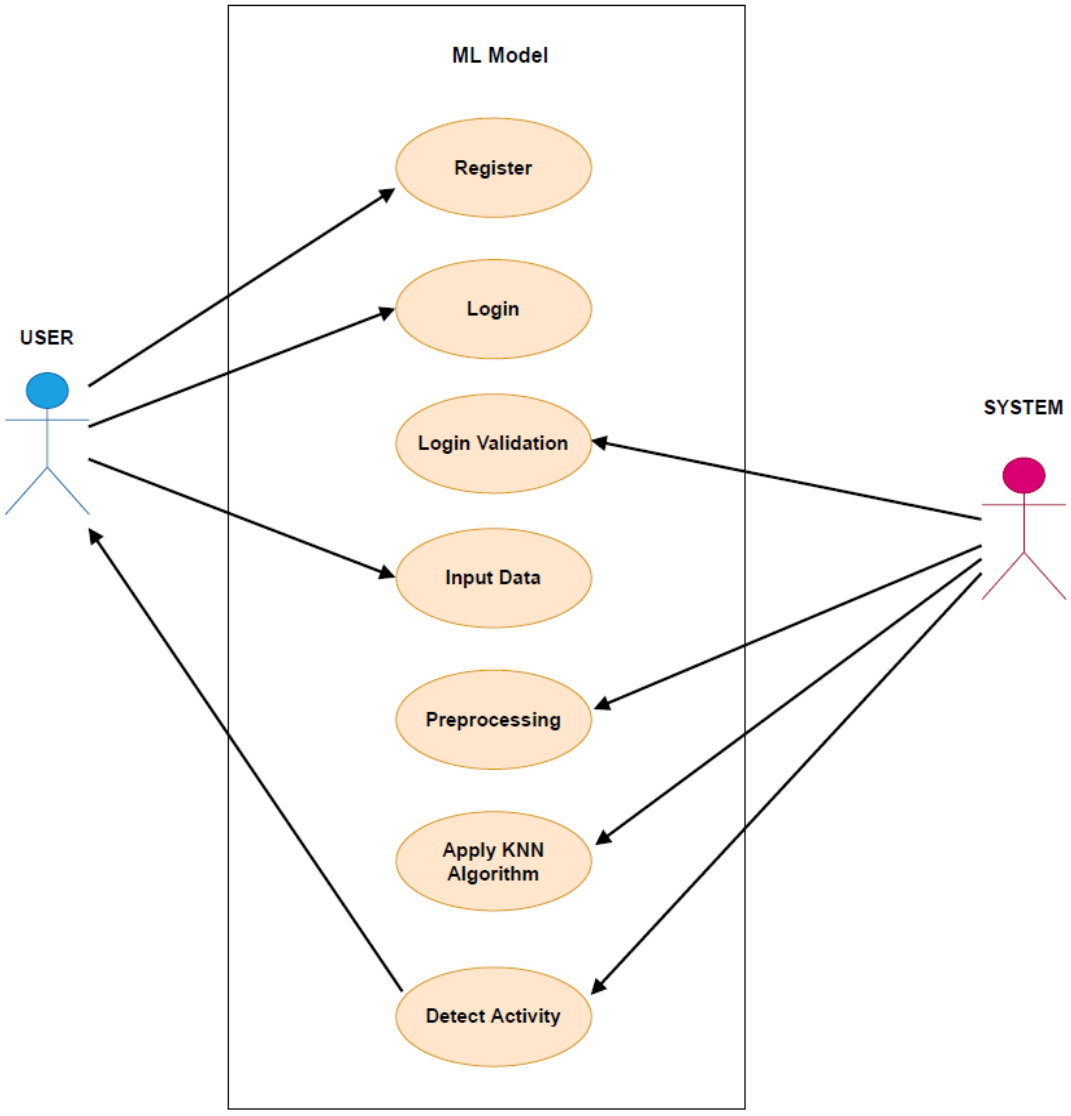


Fig 4.4 Use Case Diagram

4.4.2 Sequence Diagram

In our project, there are two modules: the first is the user, and the second is the system. During registration, users must provide their name, mobile number, email address, password, and confirmation email. Upon logging in with their email address and password, the system then receives user input and applies a machine learning algorithm to assign a class label.

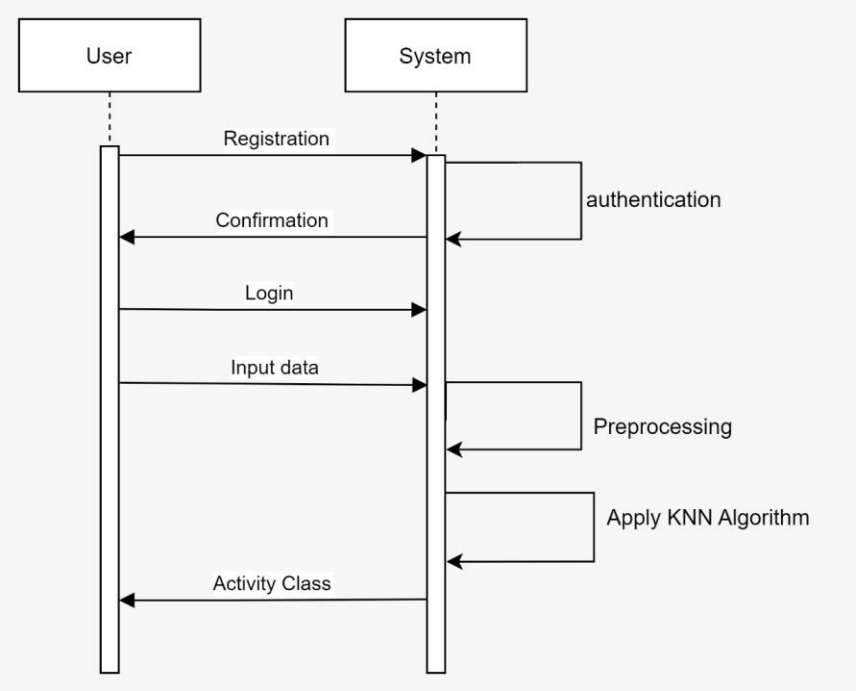


Fig 4.5 Sequence Diagram

4.4.3 Activity Diagram

First-time users must log in after which they provide an input for processing before beginning the train-test split. Predict the result by using the ML algorithm, storing the data in a pickle file.

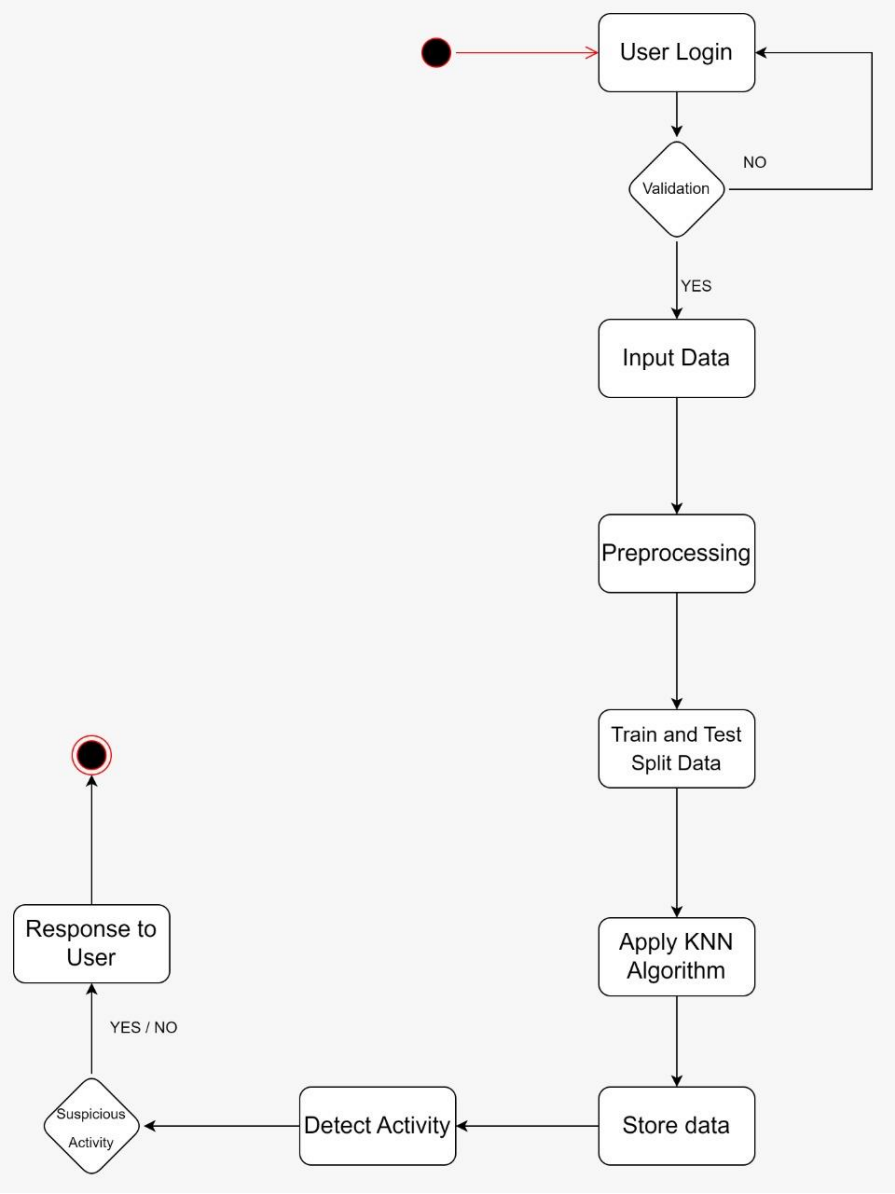


Fig 4.6 Activity Diagram

4.4.4 Class Diagram

When a user registers and logs in using their user name, email, and password, and when their email address and password are both legitimate, the system responds and recognises the activity. Prediction involves gathering input, reading csv files, processing data, using machine learning algorithms, saving files, and spotting activity.

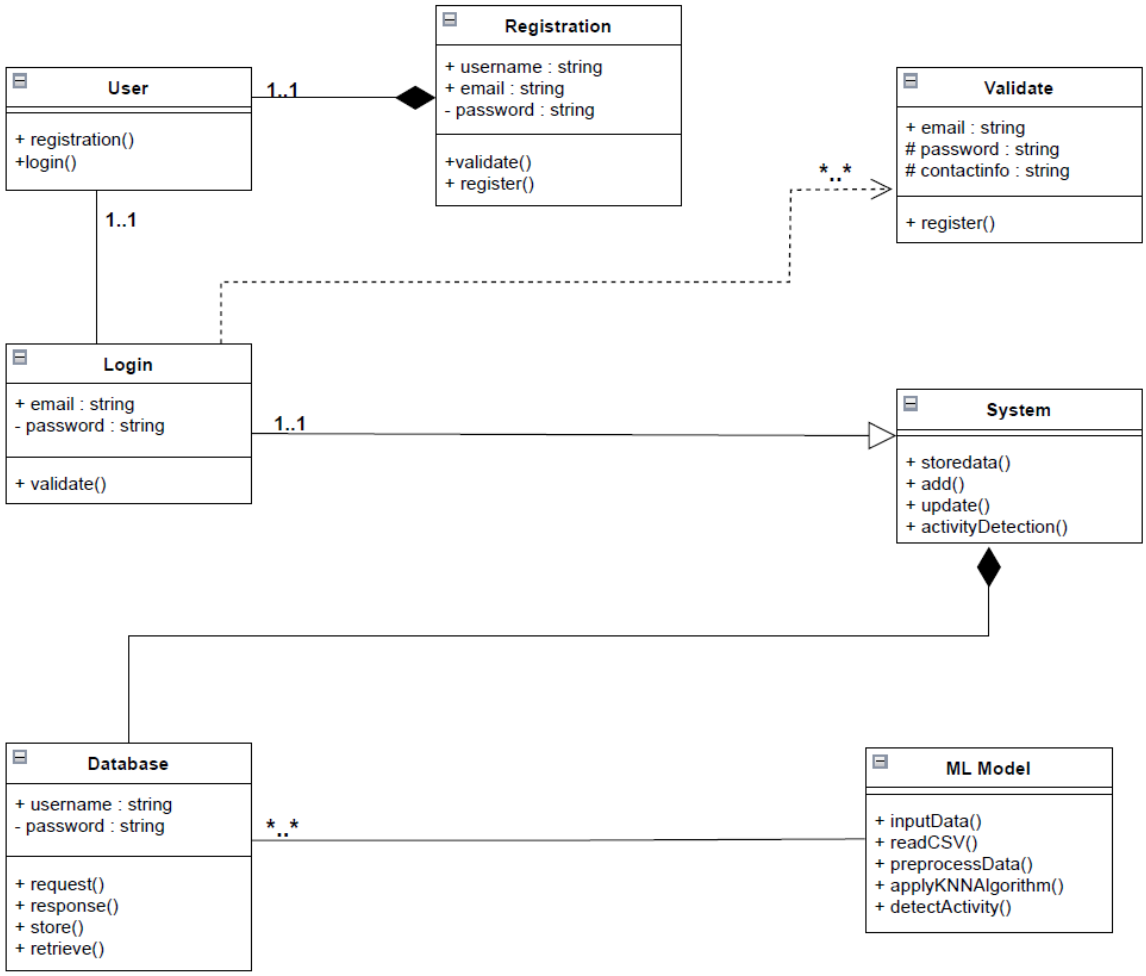


Fig 4.7 Class Diagram

5 OTHER SPECIFICATION

5.1 ADVANTAGES

1. Less human intervention needed: because of the suspicious Activity Detection all the tedious task such as constantly watching videos for the detection of the suspicious activities can be automated which in turn reduces the man power required for same, which reduced the human interaction needed for constant surveillance.
2. Continuous Improvement due to continues generation of training data: As the model is detecting the suspicious activity for all continues input the user provides, so because of this the system is being trained continuously which increases the accuracy of the system by manyfold.
3. Wide range of applications: This system cannot only be used for the care of patients but can also be used in various areas of the hospital for better security and the heightened surveillance.

5.2 FUTURE SCOPE

1. Future work may be automatic surveillance system for moving videos. Improvements are required in accuracy, false alarm reduction, and frame rate to develop an intelligent surveillance system for the Hospital monitoring.
2. In future if an algorithm who can process live data in negligible amount of time is found then patient can be protected in real time which will lead to prevention of suspicious activities.
3. Fire detection Future work can include more improvement in accuracy, frame rate, false alarms reduction and it can be improved to detect far distant small fire covered by dense smoke.

5.3 LIMITATIONS AND CHALLENGES

- **Illumination changes:** The moving object detection is difficult to process reliably due to dynamic variation in natural scenes such as gradual illumination changes caused by day–night change and sudden illumination variation caused by weather changes.
- **Shadow:** Shadow changes the appearance of an object, which creates problem to track and detect the particular object from the video. Some of the features such as shape, motion, and background are more sensitive for a shadow.
- **Occlusion:** Occlusion is situation when an object hides a part of another object or person that we want to focus on. Occlusion often occurs when two or more objects come too close and seemingly merge or combine with each other.

6 CONCLUSION

- In the mentioned project, we have put forward a video analysis model for suspicious activity detection.
- This tool is designed to reduce the demanding task of manually sorting through hours of surveillance video sequentially to work out if suspicious activity has occurred.
- This project could help the authorities of hospital surveillances to detect suspicious activities like smoking cigarette or unauthorized entry in patient's room.
- Automation of such a task could be a huge savior of your time and may speed up the work of the authorities manyfold. Thus, increasing the Security of the Hospital

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