

A Major Project Final Report on
Online Depository: Virtual Warehouse with Security

Submitted in Partial Fulfillment of the Requirements for
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Submitted by:
Abiral Sangroula, 14301
Ashmin Dhungel, 14306
Santosh Devkota, 14338

Under the supervision of
Er. Birendra Bista

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Department of Computer Engineering
**NEPAL COLLEGE OF INFORMATION
TECHNOLOGY**

Balkumari, Lalitpur, Nepal.

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Abstract

Technology has been improving at a tremendous pace in today's world. Every single thing is being digitized which somehow has made human life easier. 'Online Depository: Virtual Warehouse with Security' is a PHP platform based web application that connects employees of different branch of a shopping store to manage good items, analyze mostly sold and recently added items and hence generate invoice and statement on daily/weekly/monthly basis of net profit or loss for the store. It is an innovative approach towards securing and managing the stock items in the store. Here, for *face recognition* purpose we have used "OpenCV" library which will be used for attendance purpose within the Employees inside the Store. "Tensor Flow" framework in our project has been used for human detection; it has been used to target in parts where unauthorized personnel try to reach out to our store without any permission by the admin. Manifesting the records in the Warehouse will be done with the help of "Pie Chart" and "Bar Graph", which has been maintained with the help of Calendar to keep the records up to date with each day sales.

Keywords: Warehouse, PHP, tensor flow, record, OpenCV

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CHAPTER 1:

INTRODUCTION

1.1 BACKGROUND

The ‘Online Depository: Virtual Warehouse with Security’ is the innovative approach of helping the peoples in the business sectors to manage the stock items. The web application specially targets the employees working in the warehouse or shopping complex. It helps the users to add the items on the basis of category with respective buying price, selling price and quantity. It allows the required items to be updated on the basis of available number of good and items. With this the particular person can generate the report of corresponding items sold in the given day with corresponding profit. Also using face recognition tool to provide automatic attendance for the employees. The real time webcam security using tensor flow helps to prevent the shop from thief and robbery.

1.2 PROJECT MOTIVATION

When in we keep record of good items and financial calculation in the given business like in stock items there may be problem in manual operation just like in paper works. There may be human fault and other error in calculation which may lead to huge loss of money in the required business of stock products. Though human are willing to do best there might be little mistake which may lead to huge loss. Hence to overcome this problem our project is mostly needed for proper management of stock items. Also there may be problem in doing the manual attendance of the customers in the shop. Our system aims to do automatic attendance using face recognition technology. Also, tensorflow library helps to provide on time security.

By researching about different stock items in the market and collecting information about them, we have drawn following objectives:

- To provide user to perform inventory activities.
- To message the vendor/supplier when a product stock is finished.
- To generate the statement report of given items sold with net profit or loss with search by calendar.
- To perform automatic attendance of staff members using face recognition with the help of OpenCV.

- To provide the security to the store from unauthorized access of people using relative tensor flow object detection when shop is closed.
- To show the graph and bar chart report of history of items sold and the stock items.

1.4 SIGNIFICANCE OF STUDY

Our research has shown that there are a lot of stock items the market of respective shop or complex which are in large number. Though the record of the items has been added manually and calculation is done in a daily basis, there may exists problem in the manual operation dealing with net profit and loss of the required number of items remaining and modification of the given items. Also unauthorized access by the employee or people may lead to huge loss in the business.

Our main approach of the study is to provide proper care and service to the people in the required sectors such that there might not be any types of problems resulting in the stock goods and helps to maintain better accounting experience in the required sector. Our project also aims to protect the system from unauthorized access and helps to provide attendance of the staff in the organization.

1.5 SCOPE AND LIMITATION OF PROJECT

Some of the scopes are listed below:

- The entire user will be facilitated to perform required works according to their access and authentication.
- This application is useful in generating the business report in a feasible manner.
- The categorization of items helps to access and search the stock items more in a flexible way.
- Automated system saves time than manual work.

Some of the limitations are:

- There is complexity in how to use the application for end users
- No bar code reader added in our project
- Our system does not have access to customer and vendor
- Although the management system helps the business in eliminating many kinds of risk, but even after using the system, the business is open to many other risks.

CHAPTER 2:

PROBLEM STATEMENT

While working in a warehouse or shopping center, there may consist of varieties of good items in stock in random condition. In such situation there might be difficult to make proper arrangement of items in the documents or lists. Hence, our project aims to categorize the stock items according to their type and order with proper price and number. This helps the employees to properly manage their good items in the warehouse. Also there might be the problem to analyze which stock items to be maintained in higher number in warehouse on demand such that there might be maximum profit gained from the given popular items.

The recently added items can also be analyzed and displayed in our website such that it provides flexibility to the employees to seek and manage the items. Management of website according to the access level also provides the website to run in more flexible manner. There might be problem and more time consuming situation in doing attendance in the organization. Also many shops are being robbed and confidential data being violated even though webcam and cc-tv footage types of system are being installed in the shop for security purposes. Hence, our system aims to provide little more security as well as digital attendance for the smooth run of an organization.

CHAPTER 3:

REQUIREMENTS

3.1 REQUIREMENT ANALYSIS:

Requirement analysis, in software engineering encompasses those tasks that go into determining the need and conditions to meet for a new or altered product, taking account of possibly conflicting requirements of the various stakeholders, such as beneficiaries and users. It is the early stage activity of requirement engineering which encompasses all activities concerned with eliciting, analyzing, documenting, validating and managing system requirements.

3.2.1 FUNCTIONAL REQUIREMENTS:

- Manage products information
- Perform Sale
- Attendance of Employees
- View Reports
- Webcam Security

3.2.2 NON FUNCTIONAL REQUIREMENTS:

- Attendance should be recorded in the website when face is recognized.
- Point information should be updated when sale is performed by salesman.
- Alarm and Pop-up message should be performed on detecting human in camera.

CHAPTER 4: LITERATURE REVIEW/STUDY

4.1 REVIEW

Various Works are performed in the management of stock items in the warehouse. Nowadays shopping malls and complexes like Bhatbhateni and E-commerce websites like Daraz, E-Sewa, Khalti etc. are implementing such for keeping and securing their business. It is also one of the most essential components for their business. “SalesBinder” is one of the web application providing such services.. So for helping to keep and manage the record of stock items, this is our small approach to deal with the problems.

4.2 EXISTING SYSTEM

There are different types of web applications in Nepal which can be used to provide this types of services like in Online Shopping Stores, Bhatbhateni etc. ‘SalesBinder’ is also one of the type of web application which is used to provide services like Inventory Management, Locations and zones, customer accounts, financial reports etc. ‘The Canvas’ and ‘Zoho’ are also other web applications providing such services in Bank, Saloon, Coffee, Pharmacy, Market etc. In Nepal such types of web application is becoming more popular to sustain their business and make better profit and management. However, such types of systems are limited to bind in certain level in providing certain features and webcam security as mentioned in our project.

Bhatbhateni Store^[3] is one of the leading supermarket stores in Nepal. The system for the organization is built by “IMS Himalayan Sangrila Pvt. Ltd”. The record generally is categorized according to the supplier and then by the product information. Each item in the store has to be labeled and recorded for it to be distributed to branches and to stores. The Inventory Control System uses the data received from all the branches and determines the demanding products. It also monitors the amount of stock and provides information accordingly. The billing system is another sensitive part of the Departmental IS. It has a centralized server in each branch and several Points of sales (POS) throughout the entire building. The customers pay through the POS, and the information is directly stored to the server. The reports generated from these transactions are however transferred to the head office for further analysis. It also has a membership scheme in which any customer can be the member of the company and benefit from it. The benefits include discounts in certain products. All these separate IS run under a common platform as bundled. Single software handles entire database. There is biometric fingerprint system for attendance of the staff members. Each branch has its own server and software, there is no any synchronization between branches or head office. There are cc-cameras for security of the superstore.

In [7] the authors have proposed a finger print based attendance system. A portable fingerprint device has been developed which can be passed among the students to place their finger on the sensor during the lecture time without the instructor's intervention. This system guarantees a fool-proof method for marking the attendance. The problem with this approach is that passing of the device during the lecture time may distract the attention of the students. A number of works related to Radio Frequency Identification (RFID) based Attendance Systems exist in the literature. In [8] the authors have proposed RFID based system in which students carry a RFID tag type ID card and they need to place that on the card reader to record their attendance. RS232 is used to connect the system to the computer and save the recorded attendance from the database. This system may give rise to the problem of fraudulent access. An unauthorized person may make use of authorized ID card and enter into the organization. Iris is the another bio-metric that can be used for Attendance Systems. In [9] the authors have proposed Daugman's algorithm based Iris recognition system. This system uses iris recognition management system that does capturing the image of iris recognition, extraction, storing and matching. But the difficulty occurs to lay the transmission lines in the places where the topography is bad. In [4] authors have proposed a system based on real time face recognition which is reliable, secure and fast which needs improvement in different lighting conditions. In the test performed in the paper [4] LBPH algorithm is found to be more efficient than many other published algorithms such as Bayesian MAP, PCA, Math Cosine and EBGM CSU optimal.

4.3. Modern methods in object detection

Object detection is a common term for computer vision techniques classifying and locating objects in an image. Modern object detection is largely based on use of convolutional neural networks^[2]. Some of the most relevant system types today are Faster R-CNN, R-FCN, Multi box Single Shot Detector (SSD) and YOLO (You Only Look Once)^[2]. Original R-CNN method worked by running a neural net classifier on samples cropped from images using externally computed box proposals (=samples cropped with externally computed box proposals; feature extraction done on all the cropped samples). This approach was computationally expensive due to many crops; Fast RCNN reduced the computation by doing the feature extraction only once to the whole image and using cropping on the lower layer (=feature extraction only once on the whole image; samples cropped with externally computed box proposals). Faster RCNN goes a step further and used the extracted features to create class-agnostic box proposals (=feature extraction only once on the whole image; no externally computed box proposals). R-FCN is like Faster R-CNN but the feature cropping is done in a different layer for increased efficiency^[2].

4.4. Object detection in sports

Computer vision techniques are widely used in sports today. Applications include use during training (trainers and coaches can e.g. analyze movement of individual players), during

matches (e.g. helping referees in tracking players and balls, visualization in broadcasting) and for audiences ^[5]. Commercial player detection systems can be completely manual (a person is marking the locations of e.g. players in images) or automated ^[5]. However, there are no commercial, fully-automated systems capable of reliably finding and labeling players who often obstruct view to each other or look similar ^[5]. Ball tracking systems are used e.g. tennis, baseball and football with good accuracy ^[5].

Use of trained classifiers has been widely used in pedestrian detection, with good results. In sports this technique has been suffering from problems such as high false positive rates (due to factors such as highly varying poses of the athletes) and high computational intensity ^[5,6], and it has been shown that the classifier should be taught using scene specific data^[5]. Detection of the ball has been considered difficult as the ball is small and tends to move fast ^[5]. In sports such as football where there is a relatively uniformly colored field and possibility for static camera usage, image differencing and background subtraction (comparing image to pre-build background model of the location) or a color-based elimination of the ground can be used ^[5]. However, these methods are prone both to false positives and missed detections, especially when only one camera viewpoint is available ^[5,6]. The object detection systems applied to moving image are often combinations of techniques. For instance, ball detection can combine finding possible candidates for a ball and knowledge of physics of ball movement to predict the most likely trajectory of the ball ^[5]. One suggested method to overcome some of the aforementioned problems of using background-subtracted foreground masks or trained classifiers is combining the two approaches ^[6]. Foreground masks with high detection rates could be used to produce probable candidates for objects, which could be then further confirmed or rejected using appearance-base classification. The appearance-based classifiers could be adapted to the specific scene by continuously training them with the most likely positive and negative examples provided by the foreground mask phase.

CHAPTER 5:

METHODOLOGY AND TECHNICAL DESCRIPTION OF PRODUCT

For this project, we have used the Incremental Model of Software Process Model. This model combines linear sequential model with the iterative prototype model. When an incremental model is used, the first increment is a “core product”. The plan addresses the modification of the core product to meet the needs of the customer and the delivery of additional features and functionality. Each linear sequence produces a deliverable “increment” of the software.

The process is repeated following the delivery of each increment, until the complete product is produced.

Incremental model includes the following phases:

Analytic Phase- In this phase, the requirements of the software were analyzed which resulted in “Software Requirement Specifications”.

Design Phase- In this phase, analysis was translated into the system’s design. Context Diagram, Use-Case Diagram, ER Diagram and Class Diagram were developed.

Coding Phase- This phase involvement the coding as per the design and formation of a working system at the end of the process.

Testing Phase- In this phase, the system was tested. With each testing, certain changes were made as per the suggestion. This was done in an incremental manner until a satisfactory system was made.

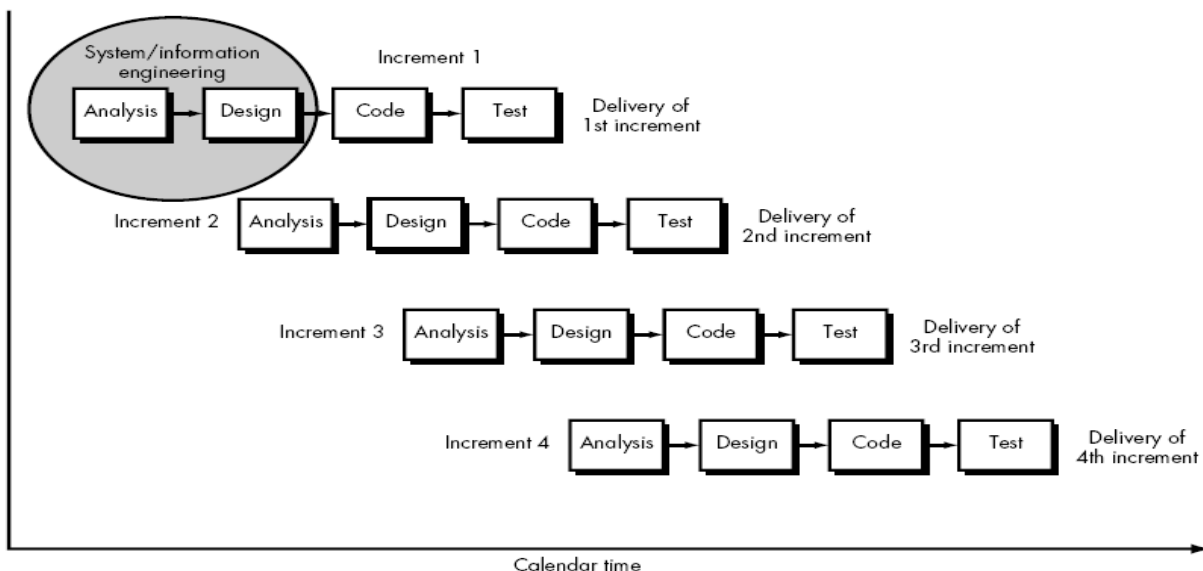


Figure 1: Incremental Model

CHAPTER 6:

TOOLS AND TECHNIQUES USED

The tools and techniques that we have deployed in our system are as follows:

1. **MYSQLI DATABASE:** It is used for complete backend database of our webpage.
2. **PHP:** It is used for web programming in our project.
3. **CSS, BOOTSTRAP:** They are used for web design.
4. **JavaScript, Ajax, JQuery:** They are used for web programming, real-time database handling and developing web page
5. **OpenCV:** It is used for face recognition.
6. **SQLITE Database:** It is used for backend keeping the record of employees using face recognition.
7. **Tensor flow:** It is used for object detection. In our project it is used for detecting the human.
8. **PHP mailer:** This library is used for sending an email in php.
9. **TCPDF:** This library is used for making the pdf document.

CHAPTER 7:

PERFORMANCE ANALYSIS METHODOLOGY AND VALIDATION

In our project, we have used LBPH (Local Binary Pattern Histogram) for face recognition. The algorithm for LBPH is given below:

- i) Read in the video stream from a camera which is connected to the computer.
- ii) Detect a face in the current frame of the image sequence (Viola and Jones Algorithm for detection of face in our project).
- iii) Allow to store the face and link a label to it. (label=face name)
- iv) Recognize the stored face in another video stream and show the correct label.

Architecture of LBPH algorithm is given below for this algorithm:

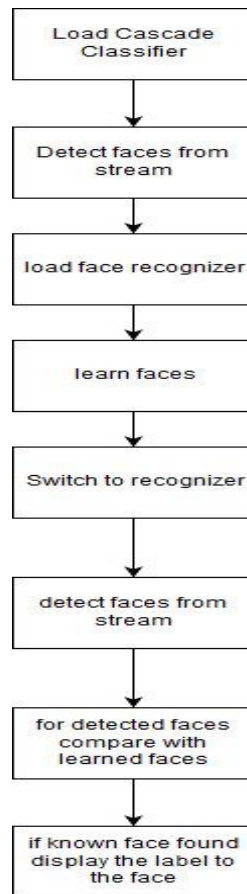


Figure2: LBPH algorithm architecture

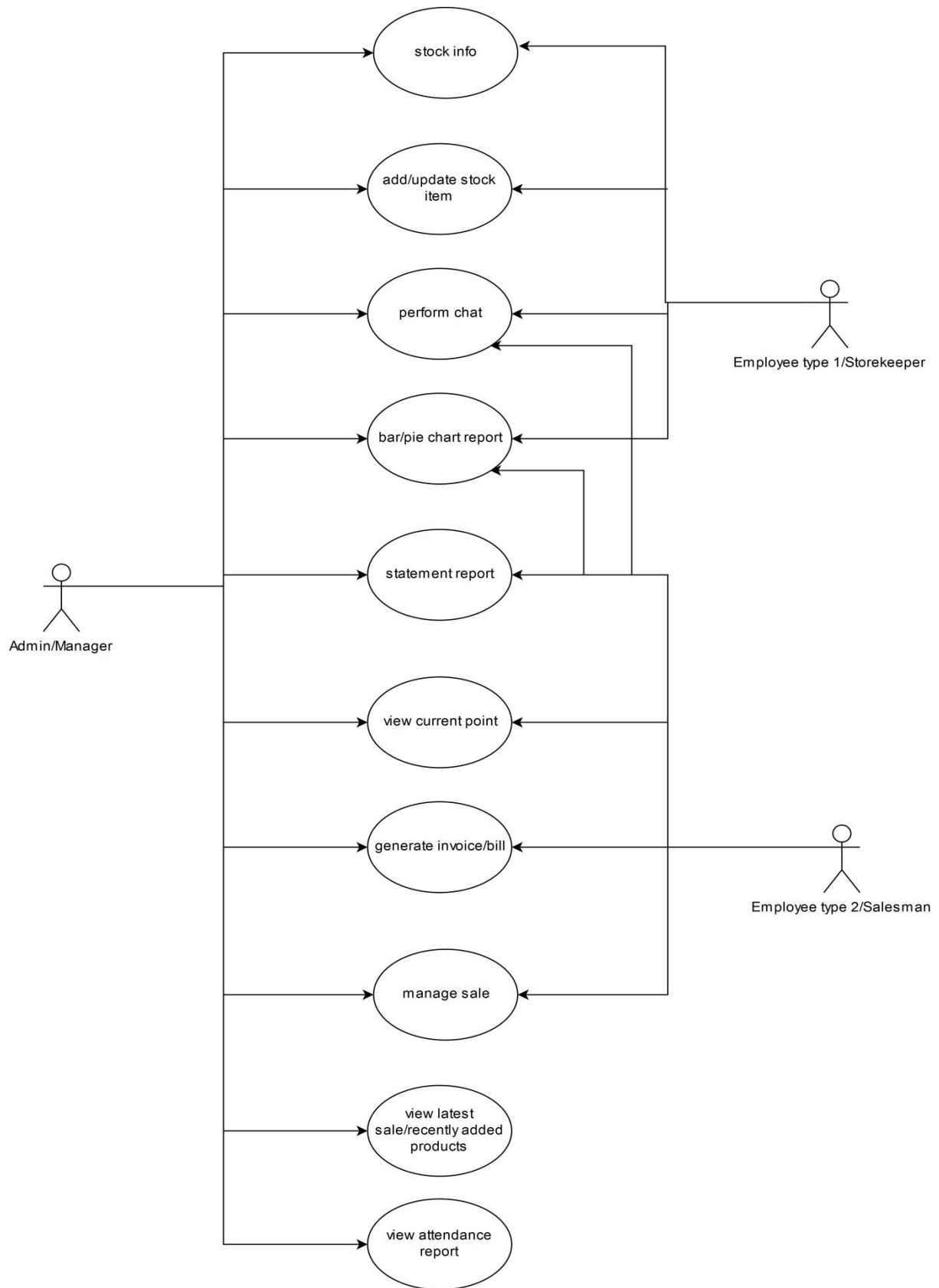


Figure :Use Case diagram

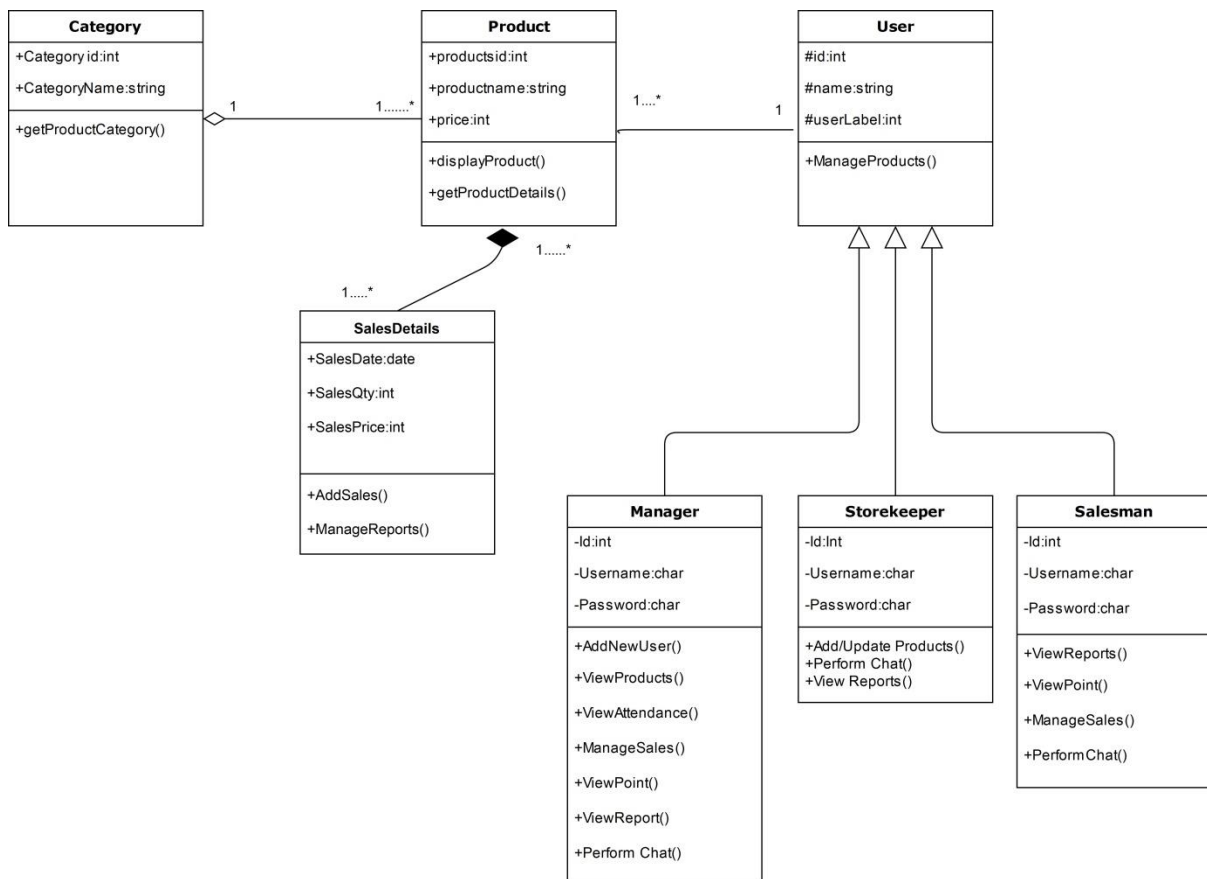


Figure3: Class Diagram

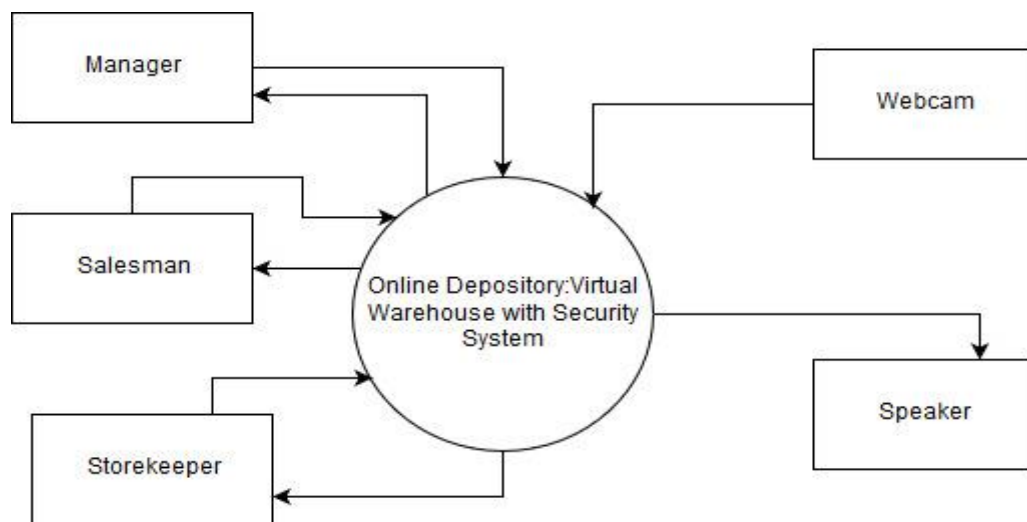


Figure4: DFD level 0

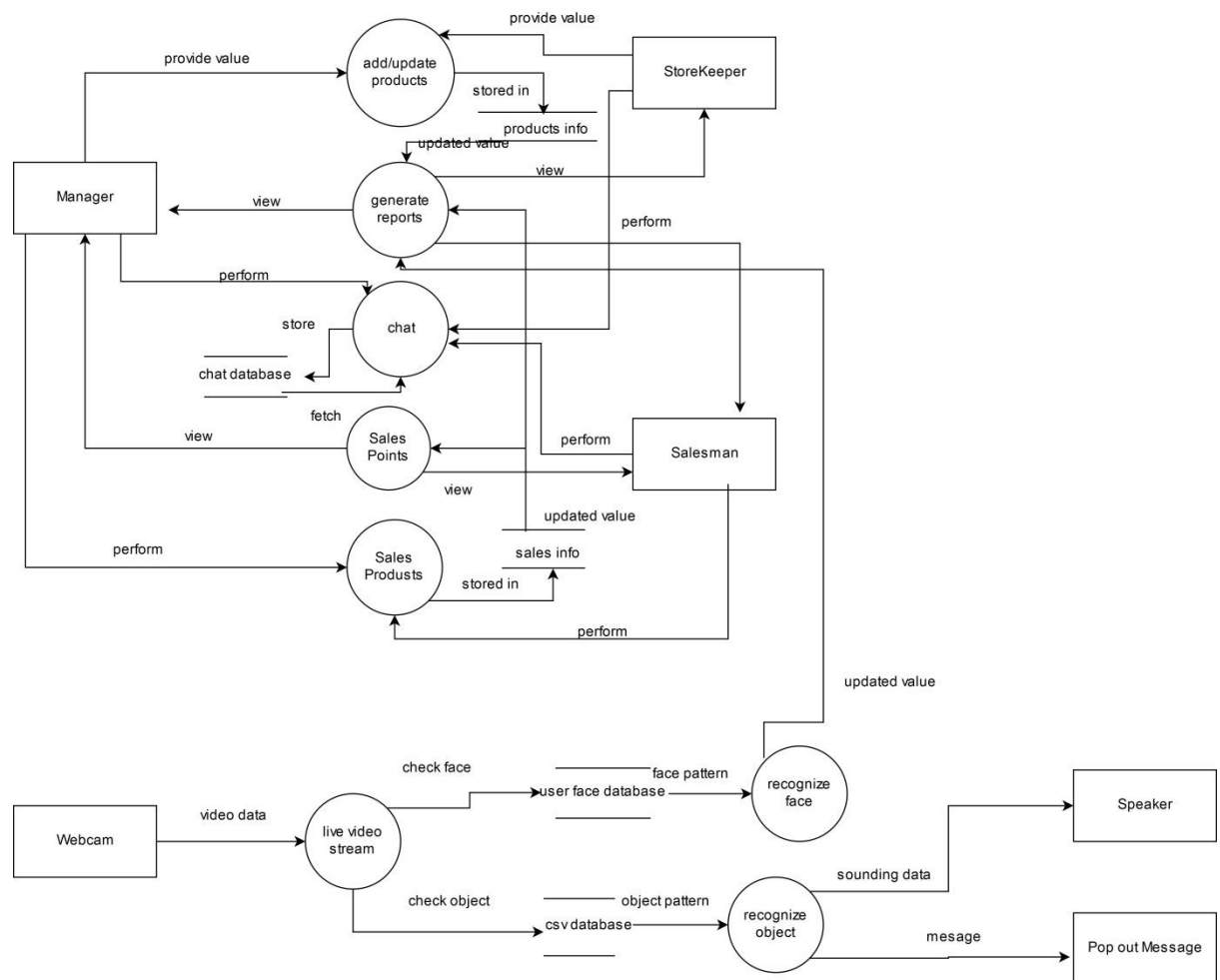


Figure5: DFD level1

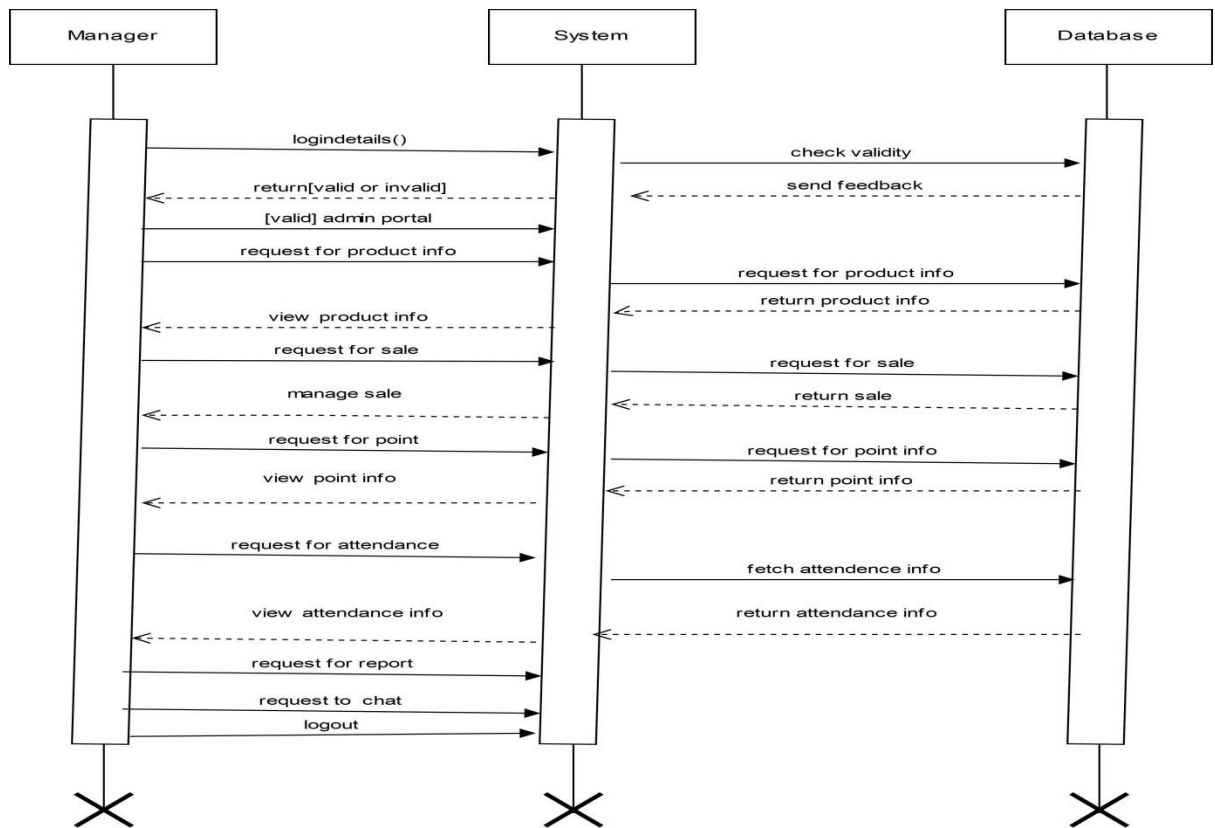


Figure: Sequence Diagram for Manager

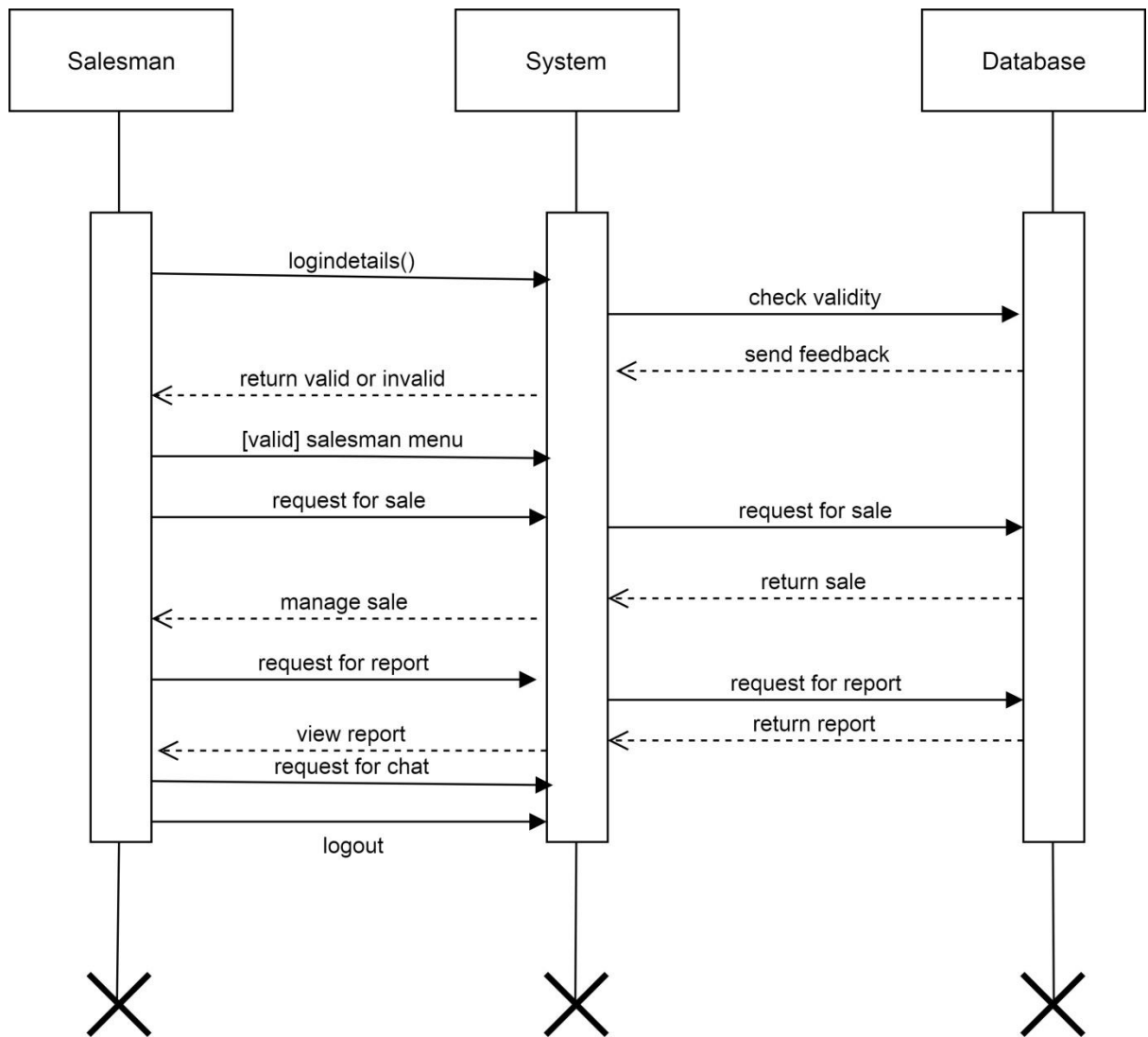


Figure: Sequence Diagram for Salesman

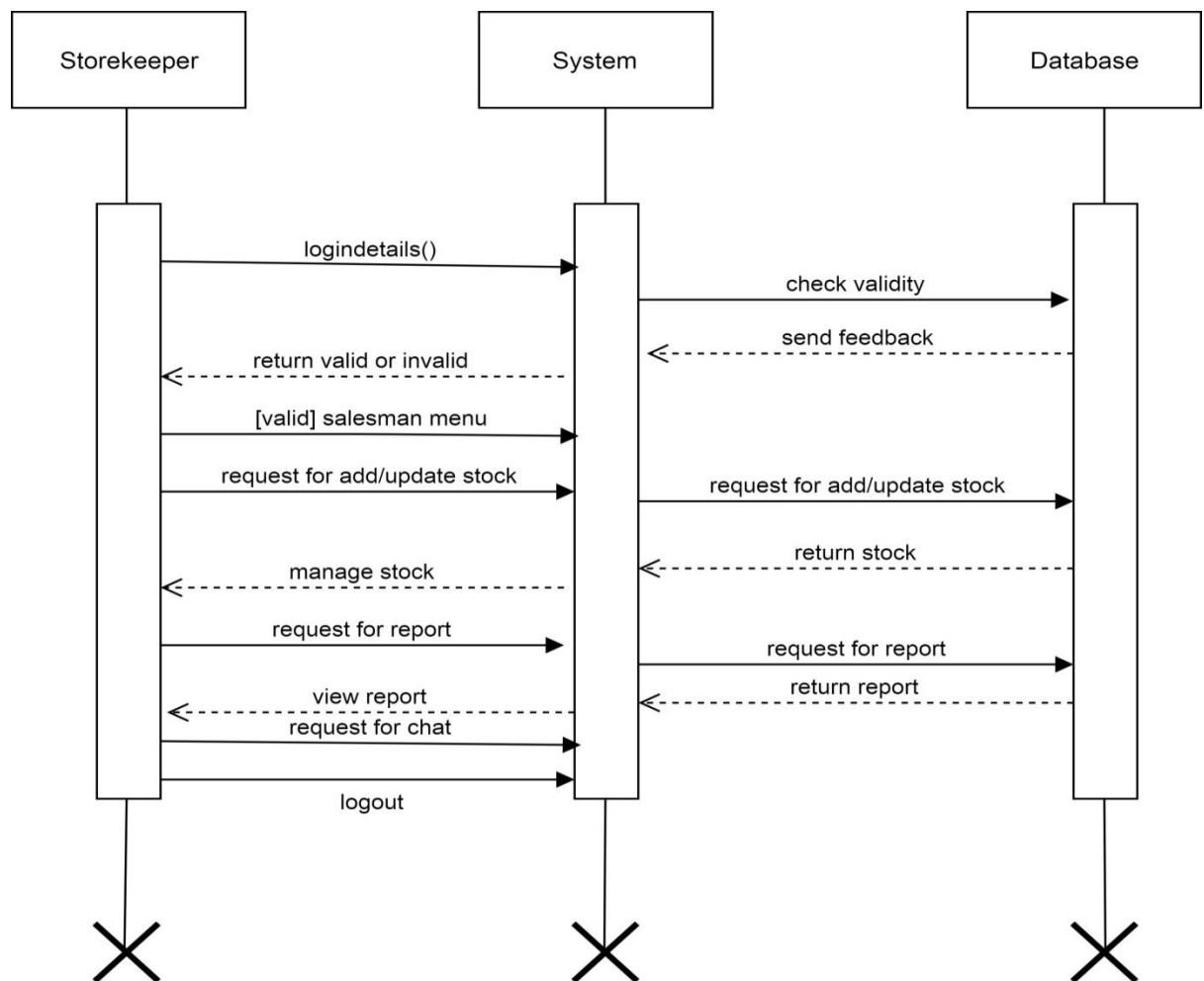


Figure: Sequence Diagram for Storekeeper

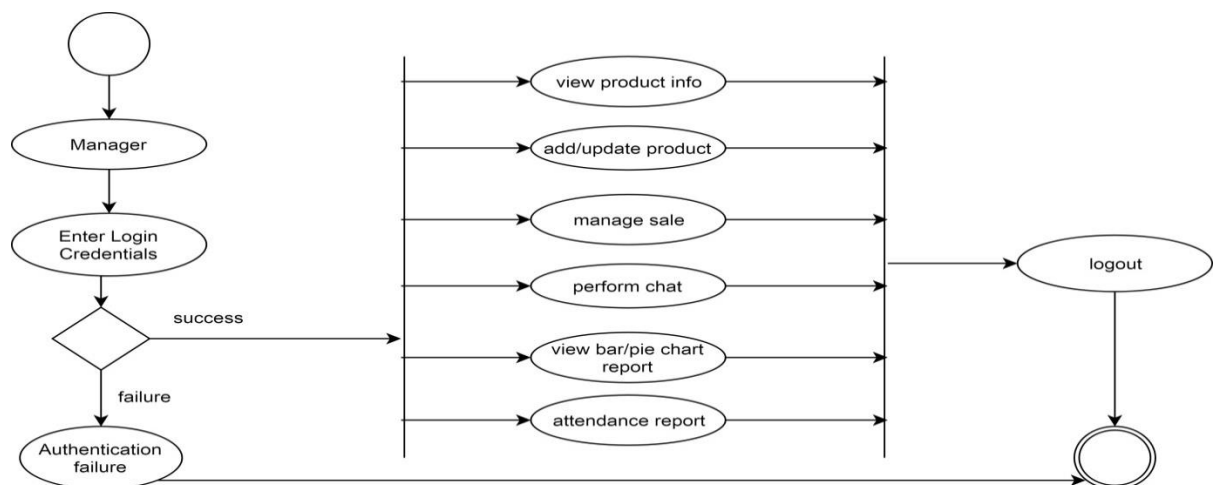


Figure: Activity Diagram for Manager

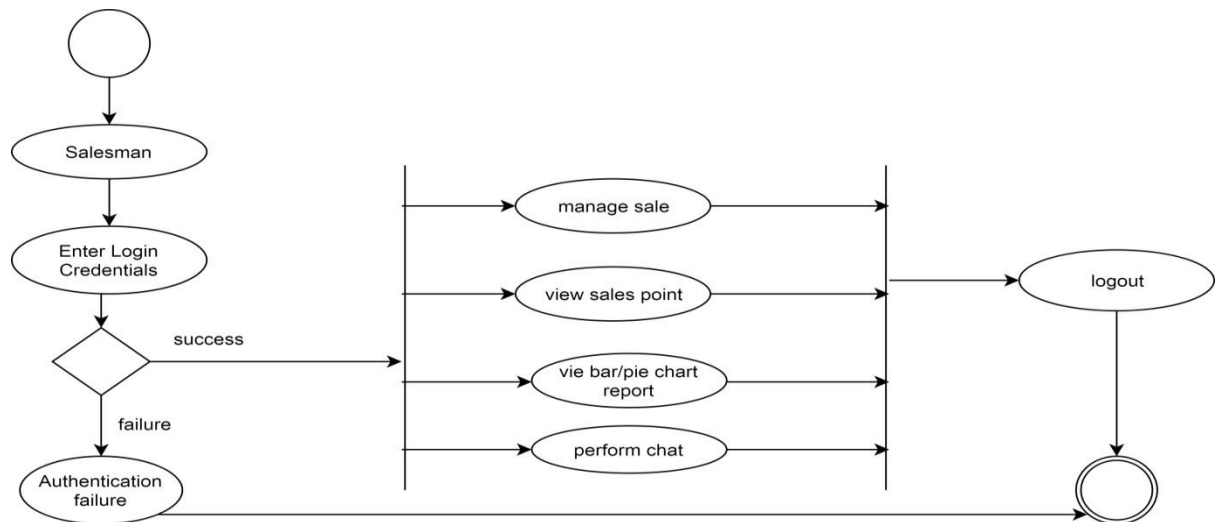


Figure: Activity Diagram for Salesman

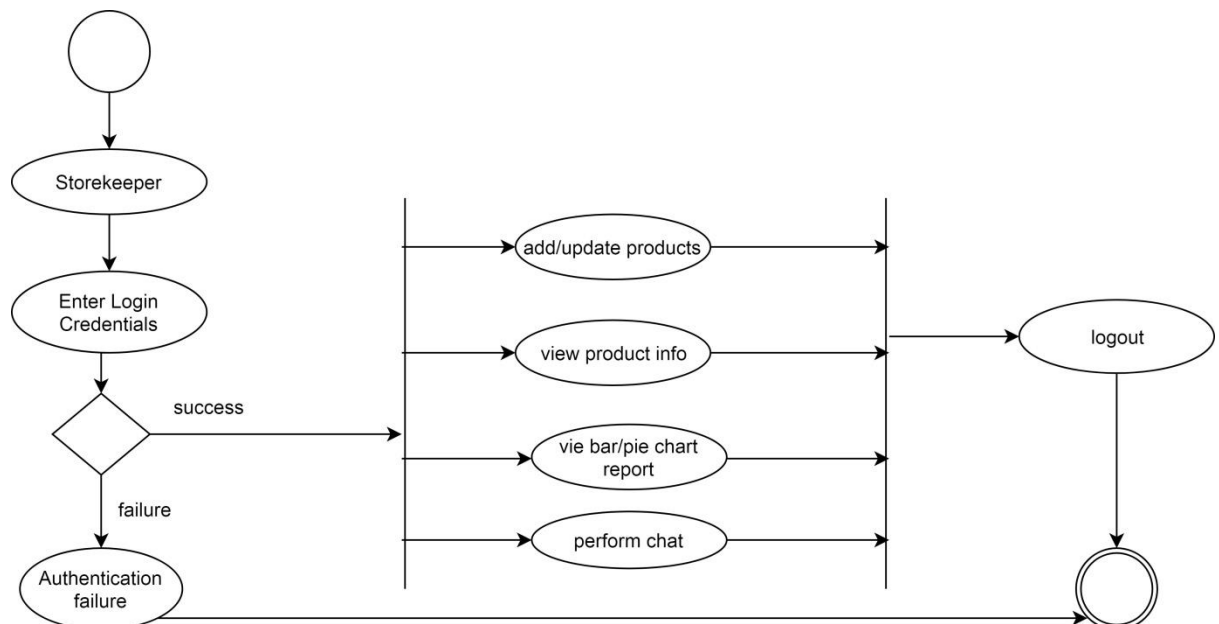


Figure: Activity Diagram for storekeeper

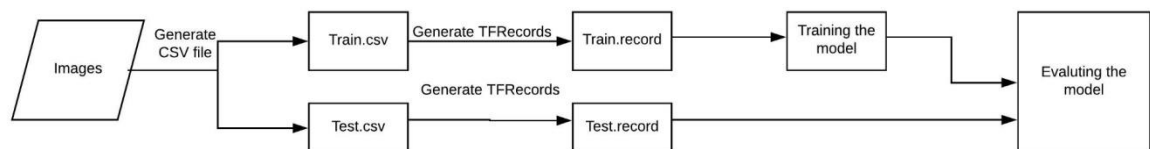


Figure6: Flowchart for object training and detection using tensorflow

CHAPTER 8:

PROJECT TASK AND TIME SCHEDULE

8.1 TEAM MEMBERS AND DIVIDED ROLES

For this project, different team members and their roles and responsibilities is shown in the table below:

Name	Roles and Responsibilities
Santosh Devkota	<ul style="list-style-type: none">• Design system interface• Develop system interface• Test system interface•
Ashmin Dhungel	<ul style="list-style-type: none">• Documentation• Testing of overall system
Abiral Sangroula	<ul style="list-style-type: none">• Overall planning of project• Handle database operations• Schedule development• Documentation

Table 1: Team Members and Divided Roles

8.2 Gantt Chart

S.N	Task	2018					
		9 Jun- 15Jul	15 Jul- 30Aug	30Aug -9Sep	9Sep- 30Oct	30Oct- 9Nov	9Nov- 1Dec
1.	Preliminary Investigation						
2.	Problem and Requirement Analysis						
3.	Feasibility Study						
4.	Group discuss						
5.	Development (coding)						
6.	Testing						
7.	Implementation						
8.	Documentation						

Fig 7:- Gantt chart of the project

CONCLUSION

“Online Depository: Virtual Warehouse with Security” is an application that provides a platform for different employees in a store to perform inventory activities. Also the application provides real-time webcam security and automatic attendance of employees using face-recognition technology.

FUTURE WORKS

The further extensions of the system are:

- Create a conveyer belt in the store and use the face and voice recognition system to recommend items the customer according to previous history of purchase and command
- Using tensorflow to analyze the behavior of customer

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APPENDIX:

Testing:

Testing is important phase to ensure that the system meets the requirements that guided its design and development, responds correctly to all kinds of inputs and achieves the general result its stakeholders desire. We wanted to evaluate our system (Online Depository: Virtual Warehouse with Security) to make sure that all the developed elements worked properly. For this test plan of our work was created, in which elements such as validation, reliability and user acceptance was tested. The system was tested for normal condition, primarily. Testing was performed on each unit.

<i>TEST NO.</i>	<i>FORM</i>	<i>TEST</i>	<i>EXP. RESULT</i>	<i>ACTUAL RESULT</i>	<i>EVIDENCE</i>	<i>RESULT</i>
1.	Login	Incorrect Username/password	Username/ Password not matched	Username/ Password not matched	Test 1.1	Failed
2.	Login	Correct Username/ Password	Successfully Logged In	Successfully Logged In	Test 1.2	Passed
3.	Add/ Update Items	Change Items Information	Items needs to be Added	Items Added Successful	Test 1.3	Passed
4.	Delete Items	Delete Items	Items needs to be Deleted	Deletion Successful	Test 1.4	Passed
5.	Attendance	Users Presence Record	Face needs to be recognizer	Face Recognition Successful	Test 1.5	Passed
6.	Bar Graph	Items Sales and Stock remaining	Information to be displayed	Successfully displayed	Test 1.6	Passed
7.	Pie Chart	Items Sales and	Information	Successful	Test 1.7	Passed

		<i>Stock remaining</i>	<i>n to be displayed</i>	<i>y displayed</i>		
8.	<i>Points Table</i>	<i>Bonuses and Rewards to Employees</i>	<i>Incentives to Employees</i>	<i>Incentives Given</i>	<i>Test 1.8</i>	<i>Passed</i>
9.	<i>Pop Up Message</i>	<i>Unauthorized Access detection</i>	<i>Message to be displayed on the home page</i>	<i>Successfull y displayed</i>	<i>Test 1.9</i>	<i>Passed</i>
10.	<i>Chat</i>	<i>Chat between Warehouse Employees</i>	<i>Chat between Users</i>	<i>Chat Successful</i>	<i>Test 1.10</i>	<i>Passed</i>

Test 1:

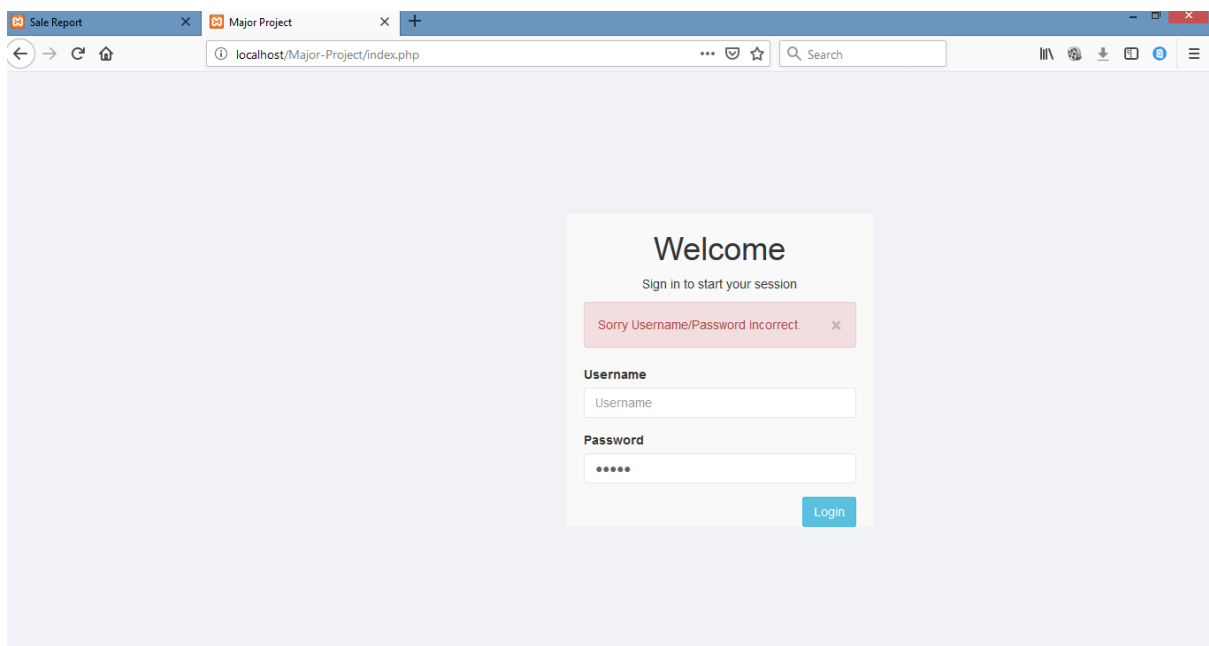


Figure: Login Unsuccessful

Test 2:

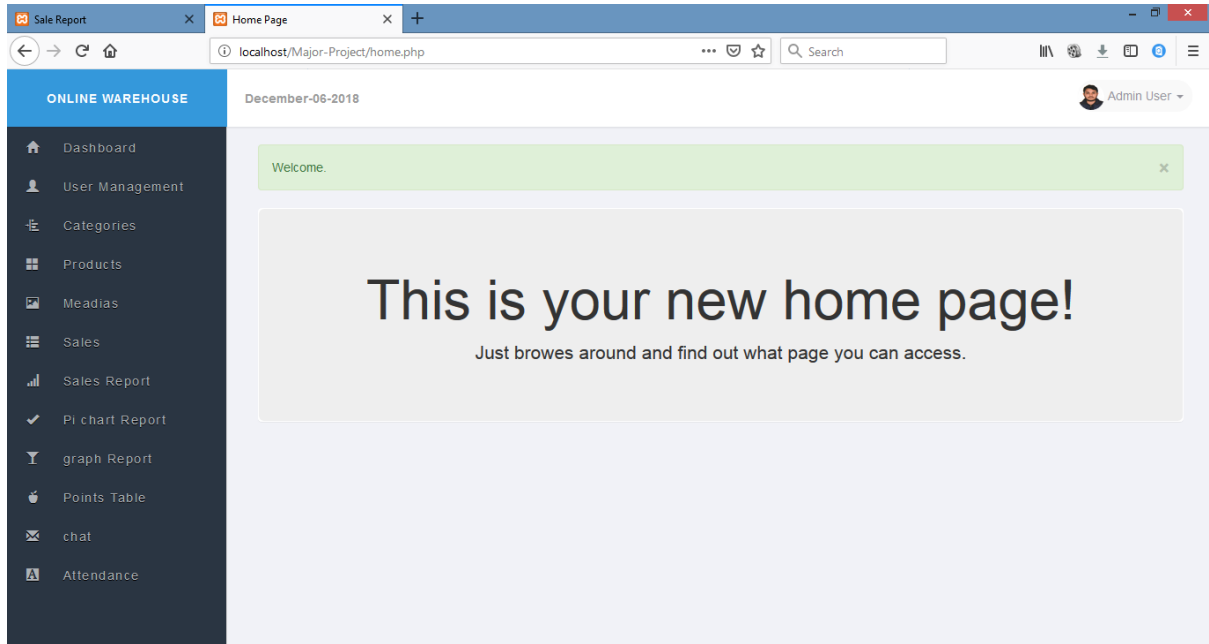


Figure: Login Successful

Test 3:

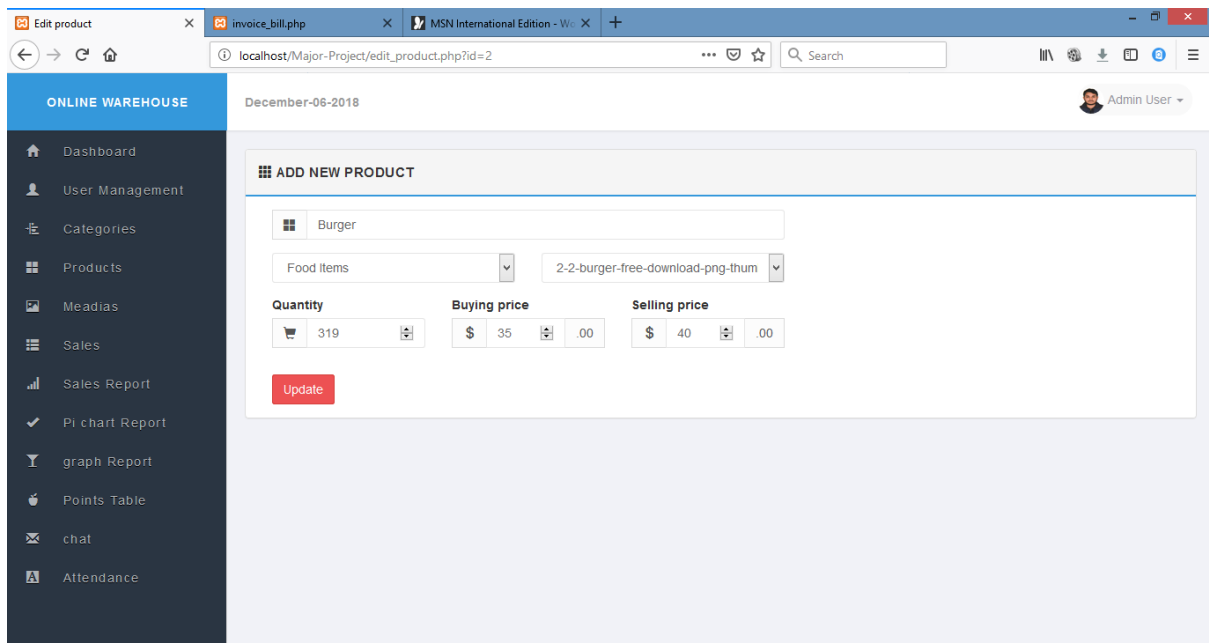


Figure: Items Updated

Test 4:

ONLINE WAREHOUSE

December-06-2018

Admin User

Products deleted.

ADD NEW

#	Photo	Product Title	Categorie	Instock	Buying Price	Saleing Price	Product Added	Actions
1		Burger	Food Items	319	35.00	40.00	June 1, 2018, 8:49:25 am	
2		Drink	Liquor Items	7	35.00	40.00	June 1, 2018, 8:50:38 am	
3		coffee	Liquor Items	8	40.00	45.00	June 1, 2018, 8:51:41 am	
4		cake	Food Items	3	400.00	500.00	June 1, 2018, 8:52:05 am	
5		Pizza	Food Items	6	40.00	50.00	June 1, 2018,	

Figure: Items Deleted

Test 5:

Sale Report

Admin User

localhost/Major-Project/attendance.php

Admin User

img

id name date status

1	Santosh	2018-11-26	P
2	Ashwin	2018-11-26	P
3	Abiral	2018-11-26	P
4	Santosh	2018-11-27	P
5	Santosh	2018-11-28	P
6	Abiral	2018-11-28	P
7	Ashwin	2018-11-28	P
8	Ashwin	2018-11-30	P
9	Abiral	2018-11-30	P
10	Santosh	2018-11-30	P
11	Abiral	2018-12-01	P
12	Ashwin	2018-12-01	P
13	Ashwin	2018-12-06	P
14	Santosh	2018-12-06	P

Attendance

Figure: Attendance of the employees

Test 6:

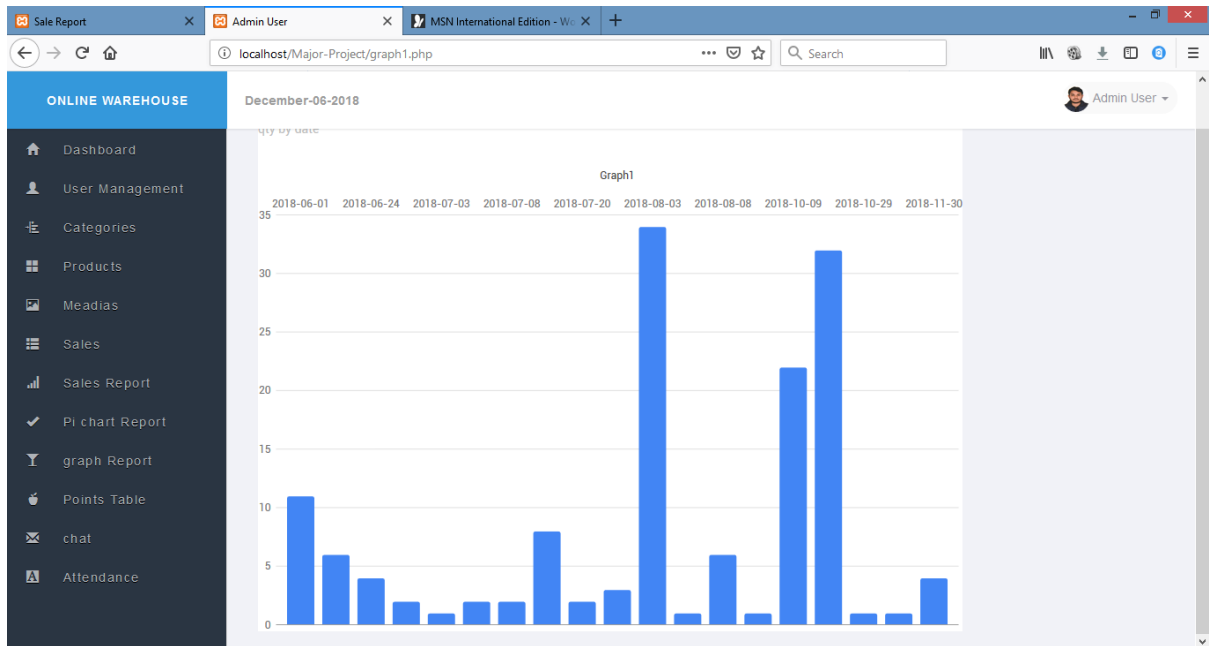


Figure: Bar Chart with Sales and Stocks remaining records

Test 7:

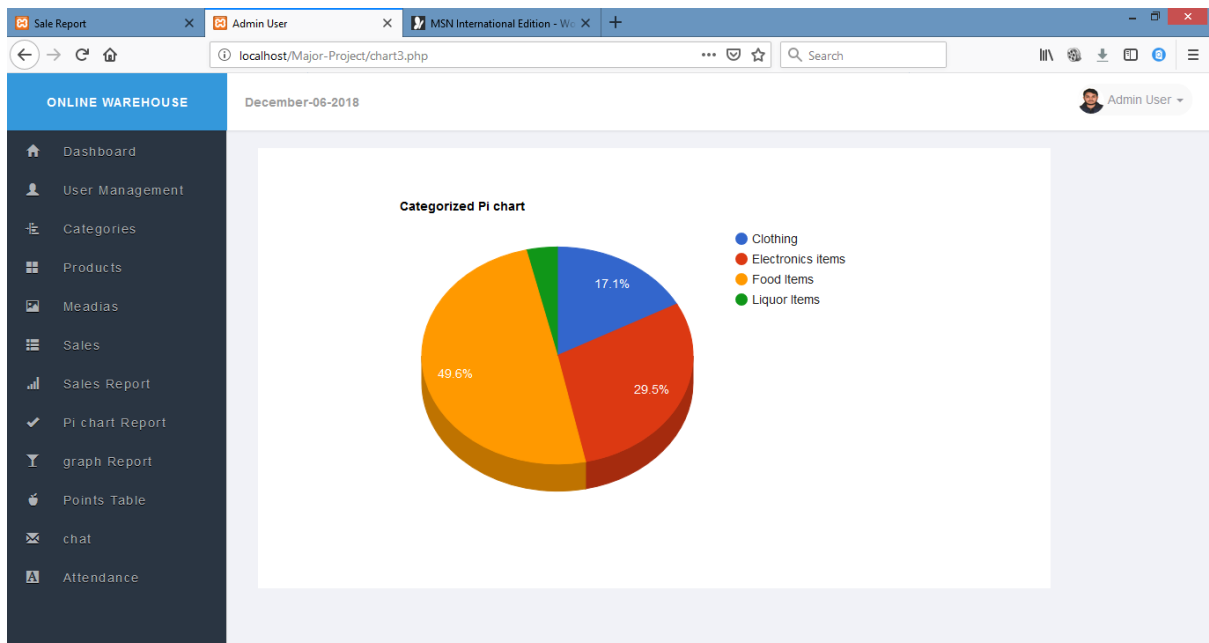


Figure: Pie Chart Records

Test 8:

The screenshot shows a web application titled "ONLINE WAREHOUSE". The left sidebar contains a menu with the following items: Dashboard, User Management, Categories, Products, Meadias, Sales, Sales Report, Pi chart Report, graph Report, Points Table, chat, and Attendance. The main content area displays the date "December-06-2018" and the user "Admin User". Below this is a table with the following data:

#	Points	Prize
1	100	Rs 50
2	500	Rs 100
3	1000	Gift hamper worth Rs500

Below the table, it states "Your current point is 54".

Figure: Point Table for Employees of the Warehouse

Test 9:

The screenshot shows a web application titled "Major Project" displaying a video feed. The video feed shows a person wearing glasses and a jacket. Two green bounding boxes are overlaid on the video, indicating person detection. The first box is labeled "person: 91%" and the second box is labeled "person: 62%". In the bottom left corner, there is a message: "Person Unknown Person Detected".

Figure: Pop Up message.

Test 10:

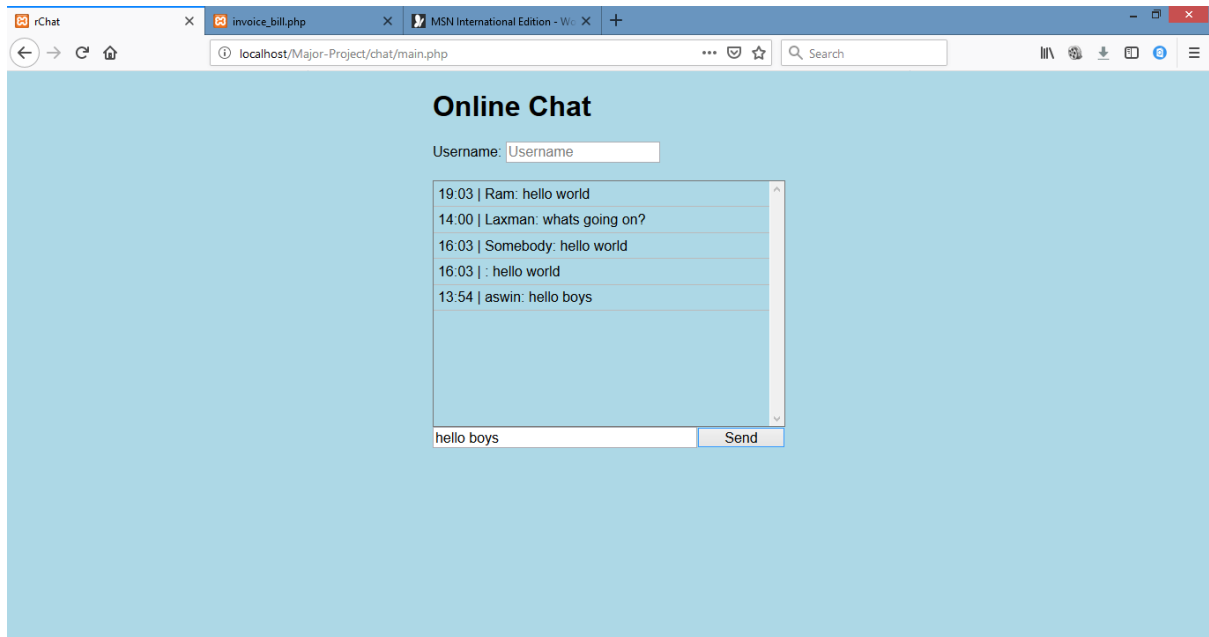


Figure: Chat between the Employees working in the warehouse