WALL OF FAME AND CUSTOMER REVIEW ANALYSIS

A Project-II Report

Submitted in partial fulfillment of requirement of the

Degree of

BACHELOR OF TECHNOLOGY in COMPUTER SCIENCE & ENGINEERING

BY

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May 2020

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Report Approval

The project work **"Wall of Fame and Customer review analysis"** is hereby approved as a creditable study of an engineering/computer application subject carried out and presented in a manner satisfactory to warrant its acceptance as prerequisite for the Degree for which it has been submitted.

It is to be understood that by this approval the undersigned do not endorse or approved any statement made, opinion expressed, or conclusion drawn there in; but approve the "Project Report" only for the purpose for which it has been submitted.

Internal Examiner

Name:

Designation

Affiliation

External Examiner

Name:

Designation

Affiliation

Declaration

We hereby declare that the project entitled **"Wall of Fame and Customer review Analysis"** submitted in partial fulfillment for the award of the degree of Bachelor of Technology in 'Computer Science Department' completed under the supervision of **Prof. Ruchi Patel, Assistant Professor of the Computer Science Department,** Faculty of Engineering, Medi-Caps University Indore is an authentic work.

Further, we declare that the content of this Project work, in full or in parts, have neither been taken from any other source nor have been submitted to any other Institute or University for the award of any degree or diploma.

SHAIKH EAJAJUDDIN (EN16CS301241)……

SHUBHAM SHARMA (EN16CS301256)……

SURYANSH SINGH TOMAR (EN16CS301271)……

Certificate

This is to certify that the project entitled **"Wall of Fame and Customer Review Analysis"** submitted in partial fulfillment for the award of the degree of Bachelor of Technology by **Shaikh Eajajuddin (EN16CS301241)** is the record carried out under my guidance and that the work has not formed the basis of award of any other degree elsewhere.

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Acknowledgements

We would like to express our deepest gratitude to Honorable Chancellor, **Shri R C MITTAL,** who has provided us with every facility to successfully carry out this project, and we profound indebtedness to **Prof. (Dr.) SUNIL K SOMANI,** Vice Chancellor, Medi-Caps University, whose unfailing support and enthusiasm has always boosted up my morale. We also thank **Prof. (Dr.) D K PANDA,** Dean, Faculty of Engineering, Medi-Caps University, for giving us a chance to work on this project. We would also like to thank our Head of the Department **Prof. (Dr.) SURESH JAIN** for his continuous encouragement for betterment of the project.

We express my heartfelt gratitude to our **Internal Guide, Prof. RUCHI PATEL (Assistant Professor) and Prof. SACHIN SOLANKI (Assistant Professor), Department of Computer Science** without whose continuous help and support, this project would ever have reached to the completion.

It is their help and support, due to which we are able to complete the design and technical report.

Without their support this report would not have been possible.

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Abstract

Facial recognition:

A Facial recognition system is a technology capable of identifying or verifying a person from a digital image or a video frame from a video source. There are multiple methods in which facial recognition systems work, but in general, they work by comparing selected facial features from given image with faces within a database. It is also described as a Biometric Artificial Intelligence based application that can uniquely identity a person by analyzing patterns based on the person's facial textures and shape. While initially a form of computer application, it has seen wider uses in recent times on mobile platforms and in other forms of technology, such as robotics. It is typically used as access control in security systems and can be compared to other biometrics such as fingerprint, or eye iris recognition systems.

Sentiment analysis:

Sentiment analysis (also known as opinion mining or emotion AI) refers to the use of natural language processing, text analysis, computational linguistics, and biometrics to systematically identify, extract, quantify, and study affective states and subjective information. Sentiment analysis is widely applied to voice of the customer materials such as reviews and survey responses, online and social media, and healthcare materials for applications that range from marketing to customer service to clinical medicine.

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CHAPTER-1
INTRODUCTION

1.1 Introduction of Company

The International Business Machines Corporation (**IBM**) is an American multinational information technology company headquartered in armong, New York, with operations in over 170 countries. IBM produces and sells computer hardware, middleware and software, and provides hosting and consulting services in areas ranging from mainframe computers to nanotechnology.

The IBM Innovation Center for Education co-creates technology- and business-based undergraduate and graduate degrees in collaboration with leading universities and engineering colleges around the globe. By working with educators and other tech industry leaders, we prepare students to excel in the latest technology industry developments, including: AI, Blockchain, Cybersecurity tools, Cloud and Hybrid Multiclouds.

1.2 Introduction of Project

Our project title is "**Wall of Fame and Customer review system**" which is basically made up of two modules:

1. Wall of Fame
2. Customer review system

These two modules are separate units but they belong to one platform called Options Technika.

What is Options Technika?

Options Technika is a combined platform of MAAC (Maya Academy of Advanced Cinematic), Aptech Solutions, Aptech Aviation and etc. Basically Options Technika provides software solutions, education and other services in India. Through Wall of Fame, Options

Technika can track their employees. Through Customer review analysis, Options Technika can improve their services.

What is Wall of Fame?

"Wall of Fame" is an online platform in which a person can get details of employee of the company by capturing image of that employee. This system only gives information of those people who works in the company or organization otherwise it shows an error message.
This system stores images and information of employee. User captures image of an employee using camera and then he get the details of that employee or an error message. This system compares captured image with stored image in database and then bring results. Wall of Fame is inspired by Google lens. Difference between Wall of Fame and Google lens is that Google lens can give results by capturing image of any object, person etc while Wall of Fame is restricted to work only on human faces. In this system, there is a section in which Admin can add employee details and images into it.

What is Customer review analysis?

Customer review analysis is based on the sentimental analysis of customer reviews. Through customer review analysis companies get knowledge about what do customers think about their products and services and then companies can improve their services and products. This sentiment analysis is based on neural networks hence by storing results of neural network we can automate the customer review analysis. Sentiment analysis used here is text analysis of customer reviews. A basic task in sentiment analysis is classifying the polarity or label of a given text at the document, sentence, or feature/aspect level-whether the expressed opinion in a document, a sentence or an entity feature/aspect is positive, negative, or neutral.

1.3 Objective

For Wall of Fame:

To create a system which will capture the image of a person and then compares that image with the images that are stored in database and bring results.

Following steps are taken to achieve this objective.

- Designing and creation of database is done.
- Initial data is inserted into the database.
- Creation of camera module is done which captures the images.
- Creation of image comparator module is done which compares the captured image with the database images.
- Creation of frontend pages is done which shows the results.
- Integration of all the modules and database is done to make a whole system.
- At the end, Testing is done.

For Customer review Analysis:

To create a system which will automatically detect the given customer review is positive or negative. To create this system, we have learned and implemented the concept of neural networks and stored the results. We have used this result to create an automated review system.

Following steps are taken to achieve this objective.

- Analysis of reviews has been done.
- Based on these reviews, a neural network has been trained with reviews and their respective labels (positive or negative).
- After training, testing has been done to check whether a system gives results with high accuracy or not.
- If it gives results with high accuracy then we have to store the results and if not then we have to train the network with different parameters and factors.
- After getting high accuracy, these stored results have been used to create a system which automatically detects a given review (provided by user) is positive or negative.

1.4 Significance

Significance of Wall of Fame:

Wall of Fame is a based on the concept of face comparison and recognition so it can be used for security purposes. It can help organizations in many ways. Many organizations using this technology in various fields like:

- Android and Apple smart phones uses this technology as a smart lock.
- Alibaba (The Chinese e-commerce Company) integrated this technology in their Alipay for safe payments and transactions.
- Snapchat Users can now choose their own privacy setting for photographs using this technology.

This technology is helpful in many fields:

- **Find missing persons**: Face recognition can be used to find missing children and victims of human trafficking.
- **Aid forensic investigation**: Facial recognition can aid forensic investigations by automatically recognizing individuals in security footage or other videos.
- **Protect schools from threats**: Face recognition surveillance systems can instantly identify when expelled students, dangerous parents, drug dealers or other individuals that pose a threat to school safety enter school grounds. By alerting school security guards in real time, this technology can reduce the risk of violent acts and etc.

Significance of Customer review analysis:

Customer review analysis is based on sentimental analysis of customer reviews using deep learning (Neural networks). Nowadays the era is of digitization and automation. Customer review analysis using deep learning can be helpful to build automated review system which will automatically understand the needs of users, which in turn will help service providers to improve their services.

This technology is helpful in many fields:

- **Reputation management**: Through sentimental analysis, Companies track the perception of the brand by the customers. Hence it helps companies to improve their products and services.

- **Social media monitoring**: It automate media monitoring process and the accompanying the alert system
- **Market research and Competitor analysis**: It helps in market research; sometimes it helps to establish new startups. It also helps a company to get ahead of other company in competition and etc.

1.5 Research Design

For Wall of Fame:

I have worked on the face comparison module of Wall of Fame. For face comparison, Facepplib library (Python library) is used. So I have done research work on this library. Research design used here is "Exploratory design" for Wall of Fame.

The goals of exploratory research are intended to produce the following possible insights:

- Familiarity with basic details, settings and concerns.
- Well grounded picture of the situation being developed.
- Generation of new ideas and assumption, development of tentative theories or hypotheses.
- Determination about whether a study is feasible in the future.
- Issues get refined for more systematic investigation and formulation of new research questions.
- Direction for future research and techniques get developed.

For Customer review system:

I have developed the complete neural network which detects whether the given review is positive or negative. Before developing the neural network, I have done research work on following topics:

- Analysis of customer reviews has been done with their results (positive or negative).
- Analysis of how to use customer reviews on neural network has been done.
- Exploration of programming language has been done to implement neural network on customer reviews for sentiment analysis (in our case programming language is

python).

- Neural network has been build using python data structures and built-in methods (Numpy and its methods) and then this network has been trained and tested using customer reviews (24000 reviews for training and 1000 reviews for testing).
- Further analysis of network has been done to increase the accuracy of network.
- After reaching maximum accuracy, the results have been stored to create the automated review system.

Research design used here is “Experimental design” for Wall of Fame.

Experimental research design is helpful in the following ways:

- Experimental research allows the researcher to control the situation. In so doing, it allows researchers to answer the question, “what causes something to occur?”.
- Permits the researcher to identify cause and effect relationships between variables and to distinguish placebo effects from treatment effects
- Experimental research designs support the ability to limit alternative explanations and to infer direct causal relationships in the study.

1.6 Source of Data

Wall of Fame:

All the data related to “Wall of Fame” like images of employees, details of employees are provided by the company.

Research related data like how to work on this project, which technologies we have to use, etc. we have gathered all the things from the internet. I will mention all the links in the bibliography section of this report.

Customer review analysis:

All the data related to “Customer review analysis” like customer reviews with their labels (positive or negative) are provided by the company.

Research related data like how to work on neural networks, customer reviews and etc., which technologies we have to use, etc. we have gathered all the things from the internet. I will mention all the links in the bibliography section of this report.

CHAPTER-2
PROJECT HANDLED

The project handled by me is a Computer vision, deep learning and website based project named, "**Wall of Fame and Customer review analysis**". Basically, it consists of two separate modules:

- Wall of Fame
- Customer review system.

In the project "**Wall of Fame**" we have tried to build a platform where a user can capture image of a person, if that person is a employee of the organization or company which uses "**Wall of Fame**" then user will get details of that employee otherwise get an error message that a person doesn't belong to this organization or company. In this project there is an admin who can add details and image of employees in the database.

In the project "**Customer review system**" we have tried to analyze the customer reviews by using neural networks. Then by using the results of trained neural network we tried to make automated and intelligent customer review system which would automatically detects whether the given review is positive or negative.

Wall of Fame:

User activities:

- Firstly, he/she has to open camera in Wall of Fame.
- Then can capture the image of a person and get details and results.

Admin activities:

- Firstly he/she has to login by entering right User Id and Password.
- Then they can details and images in the database.

Customer review analysis:

User activities:

- User gives feedback about the services and products.
- Then our system will automatically detect the given review is positive or negative.

Admin activities:

- Admin can improve company's products and services.

2.1 Technology Used:

Technologies used are:

For Front end

- HTML
- CSS
- JavaScript
- Bootstrap

For Back end

- Sqlite

For Frontend – Backend Connectivity

- Python
- Django

Packages Used

- Opencv (Python package)
- Django (Python package)
- Facepplib (Python package)
- Numpy (Python package)
- Pandas (Python package)

2.2 Training Schedule

The training at Tech Achiever started from 6th January 2020 till 6st May 2020. During the training task performed each are enlisted in the following table.

MONTH	TASK
MONTH 1	1. Here I got guidance about the different technologies to be used like Python, Mysql,Tkinter, Pygame, Pycharm(IDE) 2. I have worked in library management system project using Tkinter and Mysql, and also made a game using Pygame.
MONTH 2	1. Here I got guidance about Django framework of Python and how to make a web application using it. 2. I have worked in web application project called Options Technika.
MONTH 3	1. Here I got guidance how to work on images. 2. "Wall of Fame" project assigned to me. This project is based on facial comparison and recognition.

MONTH 4	1. Here I got guidance how to work on neural networks. 2. I worked in customer review analysis.

Table 1. Monthly Tasks

2.3 Snapshots of work done:

Wall of Fame:

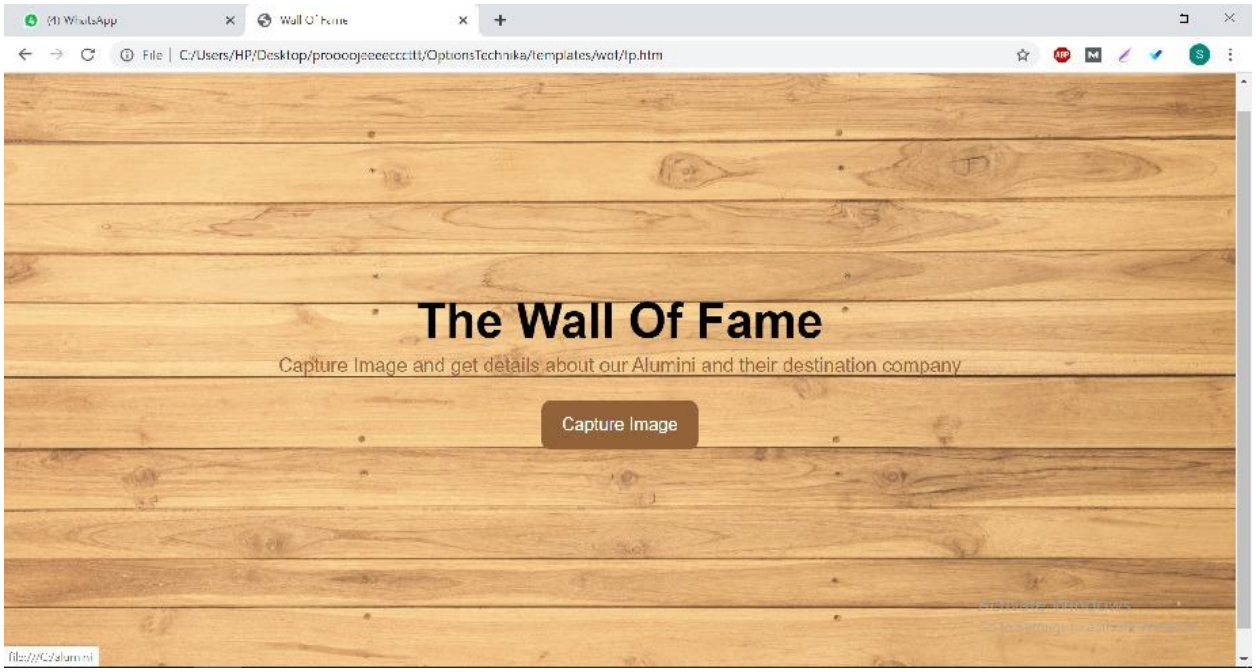

Fig.1 Front page of Wall of Fame

Fig.2 Profile page of Employee

Customer review analysis (using neural network):

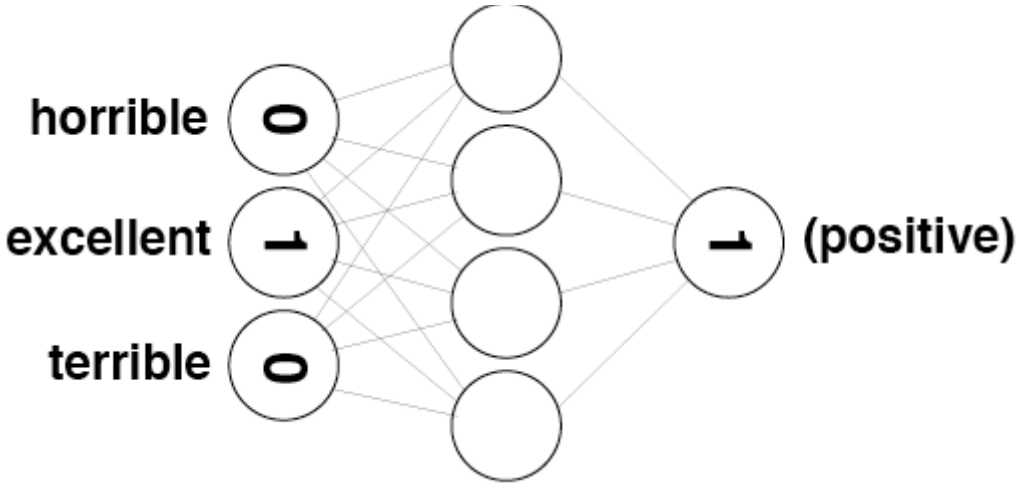

Fig.3 Neural network for customer review analysis

My trainer Sonal is amazing and very knowledgeable. The course content is well-planned, comprehensive, and elaborate. Thank you, Simplilearn!

Fig.4 Customer review

```
labels[0]
```

```
'POSITIVE'
```

Fig.5 Label of above customer review

2.4 OTHER PROJECTS DURING INTERNSHIP:

I have worked in multiple projects shown below:

- Library management system (Desktop application) using Tkinter (Python)
- Invoice or bill generator (Desktop application) using Tkinter and Reportlab (Python)

- Options Technika (Web application) using Django and Sqlite (Python)

2.5 LIMITATIONS OF PROJECT:

Limitations of Wall of Fame:

- Unable to differentiate same looking person: Wall of Fame is unable to differentiate among same looking persons like in case of twins, etc.
- Slow processing: Wall of Fame based on image comparison and processing hence it takes lot of time to give the results.
- Unable to process on bad quality images: If you are capturing bad quality image (blurry image etc.) of a person then Wall of Fame will be unable to recognize that person.
- Cannot process big sized images: Wall of Fame is unable to process big sized images which have size greater than two megabytes.

Limitations of Sentimental analysis:

- Computer programs have problems recognizing things like sarcasm and irony, negations, jokes, and exaggerations.
- 'Disappointed' may be classified as a negative word for the purposes of sentiment analysis, but within the phrase “I wasn't disappointed", it should be classified as positive.
- With short sentences and pieces of text, there might not be enough contexts for a reliable sentiment analysis.

CHAPTER-3
SYSTEM ANALYSIS

3.1 INFORMATION FLOW REPRESENTATION

An information flow diagram or data flow diagram is a Unified Modeling Language (UML) representation that illustrates how information/data is being exchanged between system entities within a process. An information flow diagram assists user in understanding the entire flow of data from beginning to end. It emphasizes the process of information flow rather than relation between data points. Users can get a comprehensive picture on the steps that are involved within the process.

This kind of analysis would help the study team to visualize any gaps that could hinder the patient care flow process. Specifically, these diagrams help users to identify areas within the process that affect the overall efficiency of the process and need improvement. Information flow diagrams also help to identify redundancies and opportunities within the process flows.

3.1.1 Use-case Diagram of Wall of Fame

A UML use case diagram is the primary form of system/software requirements for a new software program underdeveloped. Use cases specify the expected behavior (what), and not the exact method of making it happen (how). Use cases once specified can be denoted both textual and visual representation (i.e. use case diagram). A key concept of use case modeling is that it helps us design a system from the end user's perspective. It is an effective technique for communicating system behavior in the user's terms by specifying all externally visible system behavior.

A use case diagram is usually simple. It does not show the detail of the use cases:

- It only summarizes **some of the relationships** between use cases, actors, and systems.

- It does **not show the order** in which steps are performed to achieve the goals of each use case.

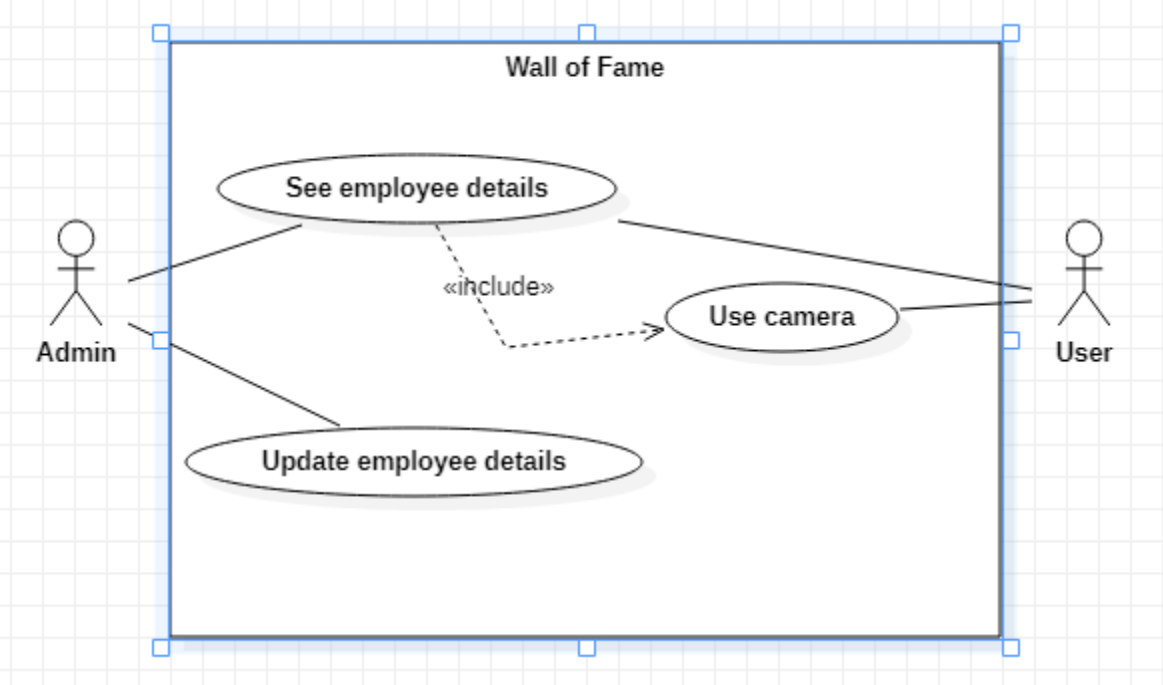

Fig.6 Use Case Diagram (Wall of Fame)

3.1.2 Class Diagram of Wall of Fame

In software engineering, a class diagram in the Unified Modeling Language (**UML**) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects.

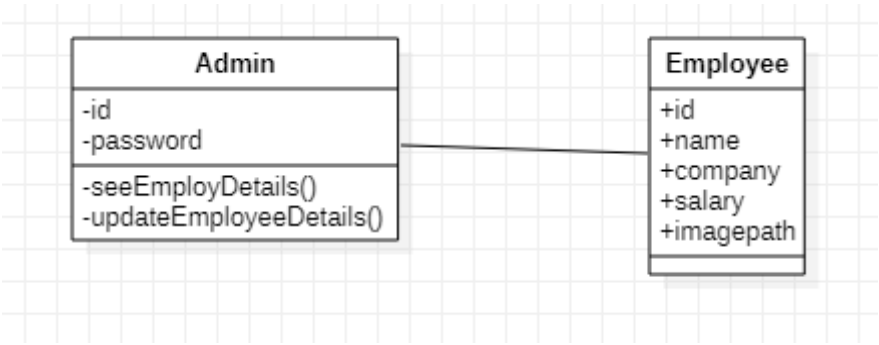

Fig.7 Class Diagram (Wall of Fame)

3.1.3 E-R Diagram of Wall of Fame

The ER or (Entity Relational Model) is a high-level conceptual data model diagram. Entity-Relation model is based on the notion of real-world entities and the relationship between them.ER modeling helps you to analyze data requirements systematically to produce a well-designed database. So, it is considered a best practice to complete ER modeling before implementing your database.

Entity relationship diagram displays the relationships of entity set stored in a database. In other words, we can say that ER diagrams help you to explain the logical structure of databases. At first look, an ER diagram looks very similar to the flowchart. However, ER Diagram includes many specialized symbols, and its meanings make this model unique.

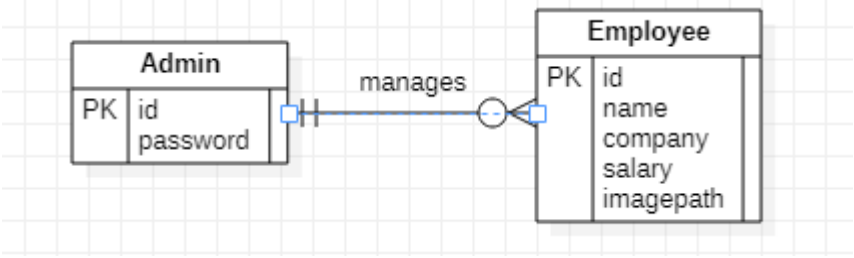

Fig.8 E-R Diagram (Wall of Fame)

3.1.4 Activity Diagram of Wall of Fame

Activity diagrams illustrate the dynamic nature of a system by modeling the flow of control from activity to activity. An activity represents an operation on some class in the system that results in a change in the state of the system. Typically, activity diagrams are used to model workflow or business processes and internal operation.

Activity diagrams are used to model workflow or business processes and internal operation. The following figure shows the work flow the system.

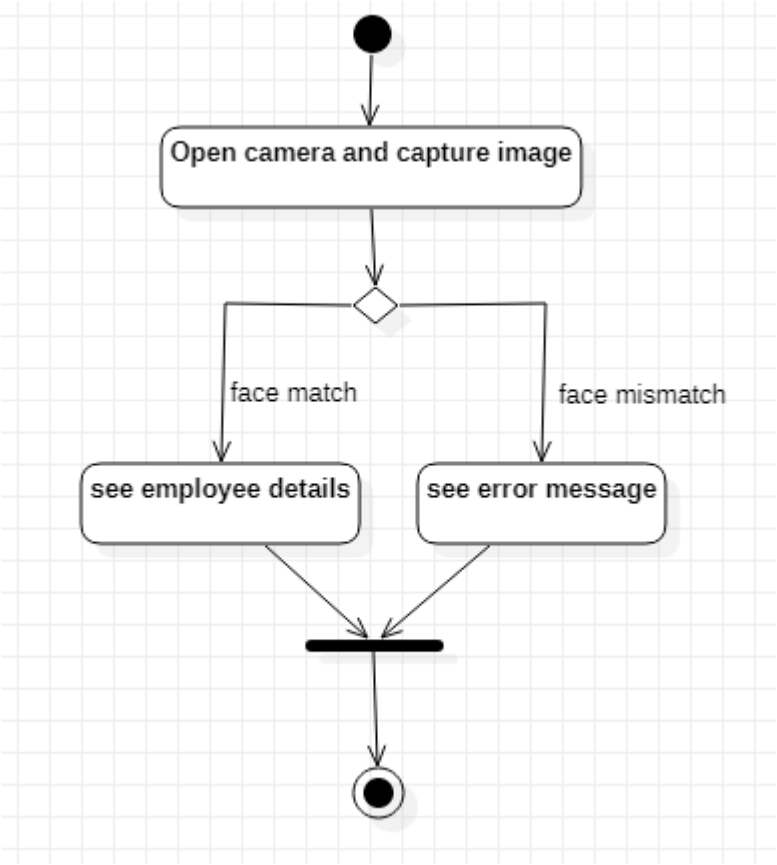

Fig.9 Activity Diagram of User (Wall of Fame)

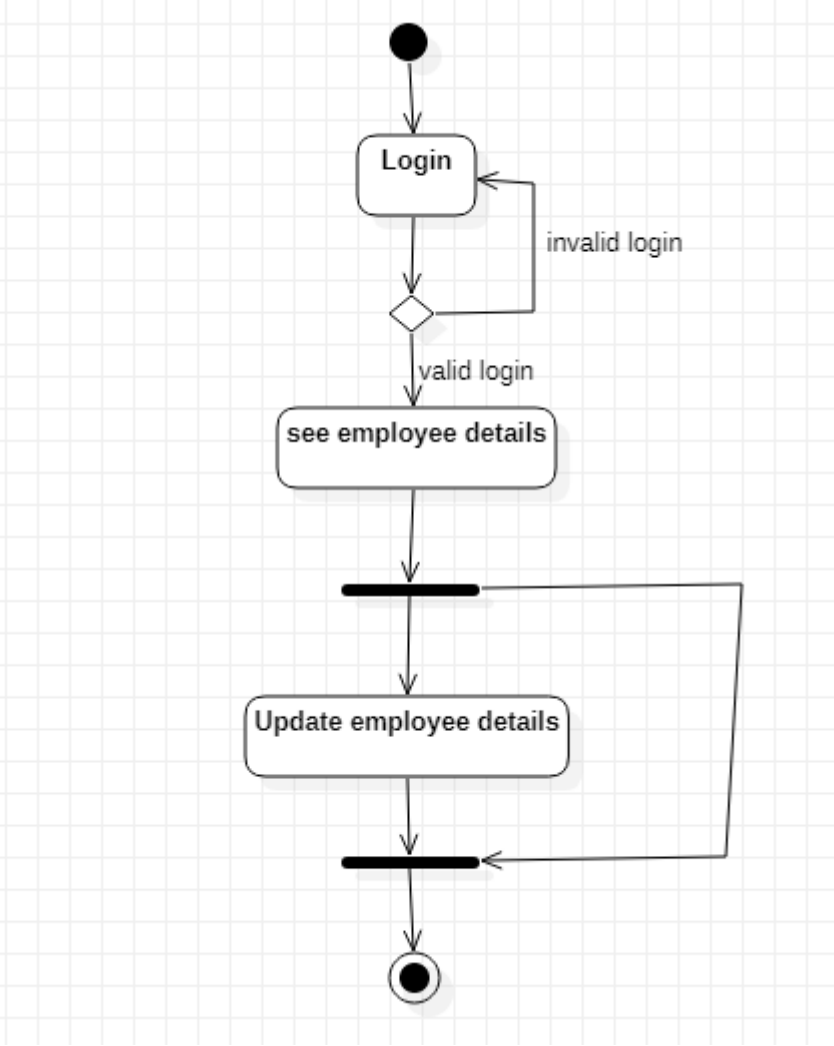

Fig.10 Activity Diagram of Admin (Wall of Fame)

CHAPTER-4
Learning after Training

This Internship was a full package of lots of learning's it was so executed that it covers most of the topics which we were familiar only in the books. With the help of this internship we had an opportunity to apply what we have learnt in our course curriculum. This internship helped me in a lot of things in technical domain. Also, this internship helped in soft skills as well as I was exposed to the office culture it made me learn about the corporate culture. Some of the key learning's of this internship are:

- Improvement in communication skills.
- Time Management.
- Learnt about new functionalities in Python technology.
- Learnt about development and deployment of website application.
- Work in the field of Deep learning and Data Science
- Made network with professionals in the field.
- Learnt how to cooperate with the team.
- Develop and refine skills.

CHAPTER-5
RESULTS AND DISCUSSIONS

Wall of Fame:

Facepplib library works really well with faces comparison hence Wall of Fame works really well. Facepplib can also be used in face detection, face search, face landmarks, emotion detection etc. Execution of Facepplib is slow because it works on image processing but gives great results. It gives 80 to 85 percentage of face match in comparison of image with its blurry image.

But there are some disadvantages of Facepplib shown below:

- It gives bad results with bad quality images.
- It gives error in case of face comparison when you compare image with its 90 degree rotated image.
- It cannot process images having size greater than 2 megabytes.

Customer review analysis:

Sentimental analysis of customer reviews using neural networks is giving good results with training and testing data (reviews).

In training, system is giving accuracy more than 83% in first iteration, more than 90% in second iteration and more than 92% in third iteration as we can see in the following figure:

```
mlp = SentimentNetwork(reviews[:-1000],labels[:-1000], learning_rate=0.1)
mlp.train(reviews[:-1000],labels[:-1000])
mlp.train(reviews[:-1000],labels[:-1000])
```

```
Progress:0.0% Speed(reviews/sec):0.0 #Correct:1 #Trained:1 Training Accuracy:100.%
Progress:10.4% Speed(reviews/sec):319.5 #Correct:1822 #Trained:2501 Training Accuracy:72.8%
Progress:20.8% Speed(reviews/sec):335.4 #Correct:3834 #Trained:5001 Training Accuracy:76.6%
Progress:31.2% Speed(reviews/sec):336.0 #Correct:5934 #Trained:7501 Training Accuracy:79.1%
Progress:41.6% Speed(reviews/sec):346.3 #Correct:8054 #Trained:10001 Training Accuracy:80.5%
Progress:52.0% Speed(reviews/sec):355.9 #Correct:10187 #Trained:12501 Training Accuracy:81.4%
Progress:62.5% Speed(reviews/sec):354.1 #Correct:12319 #Trained:15001 Training Accuracy:82.1%
Progress:72.9% Speed(reviews/sec):348.7 #Correct:14437 #Trained:17501 Training Accuracy:82.4%
Progress:83.3% Speed(reviews/sec):355.4 #Correct:16610 #Trained:20001 Training Accuracy:83.0%
Progress:93.7% Speed(reviews/sec):367.9 #Correct:18780 #Trained:22501 Training Accuracy:83.4%
Progress:0.0% Speed(reviews/sec):0.0 #Correct:1 #Trained:1 Training Accuracy:100.%uracy:83.7%
Progress:10.4% Speed(reviews/sec):726.4 #Correct:2271 #Trained:2501 Training Accuracy:90.8%
Progress:20.8% Speed(reviews/sec):502.3 #Correct:4507 #Trained:5001 Training Accuracy:90.1%
Progress:31.2% Speed(reviews/sec):448.8 #Correct:6734 #Trained:7501 Training Accuracy:89.7%
Progress:41.6% Speed(reviews/sec):426.7 #Correct:8993 #Trained:10001 Training Accuracy:89.9%
Progress:52.0% Speed(reviews/sec):405.6 #Correct:11252 #Trained:12501 Training Accuracy:90.0%
Progress:62.5% Speed(reviews/sec):393.9 #Correct:13506 #Trained:15001 Training Accuracy:90.0%
Progress:72.9% Speed(reviews/sec):382.8 #Correct:15751 #Trained:17501 Training Accuracy:90.0%
Progress:83.3% Speed(reviews/sec):374.7 #Correct:18046 #Trained:20001 Training Accuracy:90.2%
Progress:93.7% Speed(reviews/sec):374.0 #Correct:20312 #Trained:22501 Training Accuracy:90.2%
Progress:99.9% Speed(reviews/sec):375.3 #Correct:21680 #Trained:24000 Training Accuracy:90.3%
```

Fig.11 Accuracy during training after first and second iteration

```
Progress:0.0% Speed(reviews/sec):0.0 #Correct:1 #Trained:1 Training Accuracy:100.%uracy:90.3%
Progress:10.4% Speed(reviews/sec):309.7 #Correct:2330 #Trained:2501 Training Accuracy:93.1%
Progress:20.8% Speed(reviews/sec):334.8 #Correct:4658 #Trained:5001 Training Accuracy:93.1%
Progress:31.2% Speed(reviews/sec):358.9 #Correct:6962 #Trained:7501 Training Accuracy:92.8%
Progress:41.6% Speed(reviews/sec):349.9 #Correct:9286 #Trained:10001 Training Accuracy:92.8%
Progress:52.0% Speed(reviews/sec):336.2 #Correct:11607 #Trained:12501 Training Accuracy:92.8%
Progress:62.5% Speed(reviews/sec):330.9 #Correct:13917 #Trained:15001 Training Accuracy:92.7%
Progress:72.9% Speed(reviews/sec):339.4 #Correct:16216 #Trained:17501 Training Accuracy:92.6%
Progress:83.3% Speed(reviews/sec):332.5 #Correct:18570 #Trained:20001 Training Accuracy:92.8%
Progress:93.7% Speed(reviews/sec):333.6 #Correct:20887 #Trained:22501 Training Accuracy:92.8%
Progress:99.9% Speed(reviews/sec):330.7 #Correct:22280 #Trained:24000 Training Accuracy:92.8%
```

Fig.12 Accuracy during training after third iteration

In testing, after first iteration of training, system is giving 85.1% accuracy. After second iteration of training, system is giving 85.2% accuracy. After third iteration of training, system is giving 85.1% accuracy again. After first iteration of training, the model is slightly Under-fitting because training accuracy is 83.7% and testing accuracy is 85.1% (Under-fitting condition: Training accuracy is less than testing accuracy). After second iteration of training, the model is slightly Over-fitting because training accuracy is 90.3% (high increase from 83.7% to 90.3%) and testing accuracy is 85.2% (slight increase). Over-fitting condition: Training accuracy is more than testing accuracy. After third iteration of training, the model is moving to Over-fitting state

because training accuracy is 92.8% (high increase) but testing accuracy is 85.1% (slight decrease or no change in accuracy). Hence we should use the results or model after second iteration of training of the system.

```
mlp.test(reviews[-1000:],labels[-1000:])
```

```
Progress:99.9% Speed(reviews/sec):556.8 #Correct:851 #Tested:1000 Testing Accuracy:85.1%
```

Fig.13 Validation accuracy after first iteration of training

```
mlp.test(reviews[-1000:],labels[-1000:])
```

```
Progress:99.9% Speed(reviews/sec):428.7 #Correct:852 #Tested:1000 Testing Accuracy:85.2%
```

Fig.14 Validation accuracy after second iteration of training

```
mlp.test(reviews[-1000:],labels[-1000:])
```

```
Progress:99.9% Speed(reviews/sec):556.8 #Correct:851 #Tested:1000 Testing Accuracy:85.1%
```

Fig.15 Validation accuracy after third iteration of training

CHAPTER-6

SUMMARY AND CONCLUSIONS

Wall of Fame:

"Wall of Fame" is an online platform in which a person can get details of employee of the company by capturing image of that employee. This system only gives information of those people who works in the company or organization otherwise it shows an error message. This system stores images and information of employee. User captures image of an employee using camera and then he get the details of that employee or an error message. This system compares captured image with stored image in database and then bring results.

Customer review analysis:

Customer review analysis is based on the sentimental analysis of customer reviews. Through customer review analysis companies get knowledge about what do customers think about their products and services and then companies can improve their services and products. Sentiment analysis is a uniquely powerful tool for businesses that are looking to measure attitudes, feelings and emotions regarding their brand. By investigating and analyzing customer sentiments, these brands are able to get an inside look at consumer behaviors and, ultimately, better serve their audiences with the products, services and experiences they offer.

CHAPTER-7
FUTURE SCOPES

Future scopes of Facial recognition:

A Facial recognition system is a technology capable of identifying or verifying a person from a digital image or a video frame from a video source. There are multiple methods in which facial recognition systems work, but in general, they work by comparing selected facial features from given image with faces within a database.

Future scopes:

Facial recognition can be applied in various fields for the betterment of society.

- In banking and telecom sector, help to know the current process to the customer, allow authentication of credit/debit cards.
- Helps to identify missing children.
- In education, allow attendance tracking of the students and entry to labs.
- In offices, physical access to workspace facilities and etc.

Future scopes of Sentiment Analysis:

Sentiment analysis is a uniquely powerful tool for businesses that are looking to measure attitudes, feelings and emotions regarding their brand. Nowadays the majority of sentiment analysis projects have been conducted almost exclusively by companies and brands through the use of social media data, survey responses and other hubs of user-generated content. By investigating and analyzing customer sentiments, these brands are able to get an inside look at consumer behaviors and, ultimately, better serve their audiences with the products, services and experiences they offer.

Future scopes:

- **Deeper, Broader Insights from Sentiment Analysis:** Sentiment analysis is getting better because social media is increasingly more emotive and expressive. A short while ago, Facebook introduced "Reactions," which allows its users to not just 'Like' content, but attach an emotion, whether it be a heart, a shocked face, angry face, etc. Every time the major social media platforms update themselves and add more features, the data behind those interactions gets broader and deeper. As a result of deeper and better understanding of the feelings, emotions and sentiments of a brand or organization's key, high-value audiences, members of these audiences will increasingly receive experiences and messages that are personalized and directly related to their wants and needs.

- **Not Just for Marketers and Brands:** Social media analytics helped, predict and explain the emotions of concerned parties behind Brexit and the 2016 US election, which has spurred a number of non-brand organizations to investigate how sentiment analysis can be used to predict outcomes and map out the emotional landscape of people, voters and etc.

CHAPTER-8

BIBLIOGRAPHY

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Tkinter- https://docs.python.org/3/library/tk.html

Tools used:

Pycharm- https://www.jetbrains.com/pycharm/download/#section=windows