A
Project Report
On
"FACE LOG – Know you customer"

Prepared by

18DCS007
RUDRA BARAD

Under the Supervision of
Prof. Khushi Patel

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CHARUSAT
CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

CERTIFICATE

This is to certify that the report entitled "**FACE LOG – Know your customer**" is a bonafide work carried out by **Mr. RUDRA BARAD | 18DCS007** under the guidance and supervision of **Prof. KHUSHI PATEL** for the subject **CS343 | Summer Internship-I** of 5th Semester of Bachelor of Technology in **DEPSTAR** at Faculty of Technology & Engineering- CHARUSAT, Gujarat.

To the best of my knowledge and belief, this work embodies the work of candidate himself, has duly been completed, and fulfills the requirement of the ordinance relating to the B.Tech. Degree of the University and is up to the standard in respect of content, presentation and language for being referred to the examiner.

Prof. Khushi Patel
Assistant Professor
Department of Computer Engineering
DEPSTAR, CHARUSAT, Changa, Gujarat

Mrs. Sheetal Patel
HR
ZipBooks Solutions Pvt. LTD
Ahmedabad

Prof. Parth Goel
HOD
Department of Computer Science & Engineering
DEPSTAR, CHARUSAT, Changa, Gujarat

Dr. Amit Ganatra
Principal, DEPSTAR
Dean, FTE
CHARUSAT, Changa, Gujarat.

ZIPBOOKS™

To Whom It May Concern

This is to certify that, **Mr. Rudra Barad** has been associated with **'ZipBooks Software Solutions Pvt. Ltd'** since 22nd April, 2020 to 5th July, 2020. He worked on a project titled **"Face Recognition using OpenCV Python"** in our company.

Your contributions to the organisation and its success will always be appreciated. During this tenure of your association, it has been noted that you are a sincere, hardworking and a good performer.

He is leaving on his own probably for better prospects. We wish him all the very best in his future endeavours.

Yours Truly,

Sheetal Patel
Human Resource Department

ABSTRACT

Today the world is growing at a great speed. Along with the advancement in Technology and Businesses, Competition is also growing proportionally. It becomes extremely important for the businesses to analyze their products as well as to keep an eye on the footfall of the customers.

The total number of customers that visited your shop, which age group they belonged to, how many times a particular Customer visited the shop, their feedback all these things plays a crucial role in growing of a business.

I got an opportunity to work on a project that helps to resolve this problem. We developed a Face Recognition System using OpenCV Python that captures image of the customers and identifies whether the customer is new or repeated. We are also predicting the Gender, Age, Sentiments of the customer.

ACKNOWLEDGEMENT

I, the developer of the project entitled as "FACE LOG – Know your customer", with immense pleasure and commitment would like to present the project assignment. The development of this project has given me wide opportunity to think, implement and interact with various aspects of management skills as well as the new emerging technologies.

Every work that one completes successfully stands on the constant encouragement, good will and support of the people around. I hereby avail this opportunity to express my gratitude to number of people who extended their valuable time, full support and cooperation in developing the project. I express deep sense of gratitude towards Company HR Mrs. Sheetal Patel for providing me this opportunity and project guide Mr. Mohan Motiani for the support during the whole project.

I express deep sense of gratitude towards our Head of the CSE Department, Prof. Parth Goel and project guide Prof. Khushi Patel for the support during the whole session of study and development. It is because of them, that I was prompted to do hard work, adopting new technologies.

I would also like to thank all the mentor for their guidelines throughout the development phase of the project. They encouraged me to look forward to learn and implement new and emerging technologies. They also guided me to go for some user friendly and extremely useful real-life application.

They altogether provided me favorable environment, and without them it would not have been possible to achieve my goal.

INDEX

CHAPTER 1:
PROJECT DEFINITION

The main highlight of our project is face Recognition using OpenCV Python, in which we capture image of customers through web cam and then check that image in database in order to know whether the customer is new or repeated.

We have also used incorporated ML models for predicting Age, Gender and Sentiments of the customer which could prove to be useful to the business owners. We have used SQlite3 for storing images of the customers and other details like Id, Age, Gender, Sentiments etc in database.

We have also made a website that operates on Server side using Pug and HTML/CSS for front end and Node Js for back end. Now the Owner can directly view the relevant details directly on the website.

CHAPTER 2:
PROJECT DESCRIPTION

2.1 PROJECT OVERVIEW :

It As and when a customer buys something or proceeds for the payment, his/her image will be captured using webcam and will be stored in unknown folder. By this time ML models that we have incorporated will be activated and it would predict Gender, Age and Sentiments of the customers. That captured image will now be compared with the already existing images of few customers that are stored in known folder.

Now there are 2 scenarios:

- CASE 1: Match Found

  This means the customer is a repeated customer. Then in this case a message will be displayed stating "Match Found" and it would fetch the ID of the image and increment the counter in the database. The captured image will be discarded.

- CASE 2: Match Not Found

  This means the customer is a new customer and has visited the shop for the first time. Then in this case a message will be displayed stating "Match Not Found".

  Once this message is received, it will automatically save the image in the known folder as well in the database with a particular ID along with all the details like Age, Gender, Sentiments, etc. while it would delete the image from the unknown folder.

We have made a Server-side website for displaying the data using PUG/HTML/CSS in front end and Node JS in the backend.

2.2 INTRODUCTION TO DOMAINS :

REAL TIME COMPUTER VISION

Computer vision is a rapidly growing field devoted to analyzing, modifying, and high-level understanding of images. Its objective is to determine what is happening in front of a camera and use that understanding to control a computer or robotic system, or to provide people with new images that are more informative or aesthetically pleasing than the original camera images. Application areas for computer-vision technology include video surveillance, biometrics, automotive, photography, movie production, Web search, medicine, augmented reality gaming, new user interfaces, and many more.

OpenCV provides three algorithms of face recognition:
- Eigenfaces and Fisher faces find a mathematical description of the most dominant features
- Local Binary Patterns Histograms (LBPH)
- **Haar Classifier** (harrcascade_frontalface_default.xml)

MACHINE LEARNING

Machine learning is the subset of Data Analytics and Artificial Intelligence. Machine Learning is the field of study that gives computers the capability to learn without being explicitly programmed. ML is one of the most exciting technologies that one would have ever come across. As it is evident from the name, it gives the computer that makes it more similar to humans: The ability to learn. Machine learning is actively being used today, perhaps in many more places than one would expect.

Models incorporated in this project:

- age_net.caffemodel
- deployage.prototxt
- facial_expressison_model_structure.json
- facial_expression_model_weight.h5
- gender_detection.model
- shape_predictor_68_face_landmarks.dat

Python Libraries explored during this project:

- cv2
- dlib
- face_recognition
- glob
- subprocess
- Pillow
- datetime

CHAPTER 3:
SOFTWARE AND HARDWARE ENVIRONMENT

3.1 <u>SOFTWARE USED</u>:

- Python Compiler (Pycharm/Anaconda) (3.8.5)
- OpenCV Module (4.2.0.34)
- SQlite 3 (3.28.0)
- NodeJS (12.8.3)
- VS Code (1.47.3)
- DB Browser (3.12.0)

3.2 <u>HARDWARE USED</u>:

- Laptop/computer with Core i5 Processor
- Minimum 2 GB Hard disk storage (4 GB Recommended).
- A Webcam

CHAPTER 4:
MAJOR FUNCTIONALITIES

4.1 Image Capturing and Comparison

Image is captured only if face of the person is visible. It will not capture any other part of our body. Then the captured image is compared with other images that are already present in the database and accordingly process further things.

4.2 Age, Gender and Sentimental Analysis

We are incorporating different models in our system that predicts approximate Age, Gender and Sentiments of the customer.

4.3 Updating the database:

Once the image is captured, comparison is done and the values are predicted then we are storing that data. We have used SQlite3 in the backend. It is more feasible to use SQlite3 in place of Mysql as it is server less, fast and we can easily store images in it.

4.4 Linking data to the Website:

We have made a server-side website so that it can be easily accessed by the Business owners. We have used simple yet attractive UI/UX for their convenience. We have used Node JS for dynamically linking the data to the website.

CHAPTER 5:
FLOWCHART

I. Flowchart depicting different models that we have incorporated
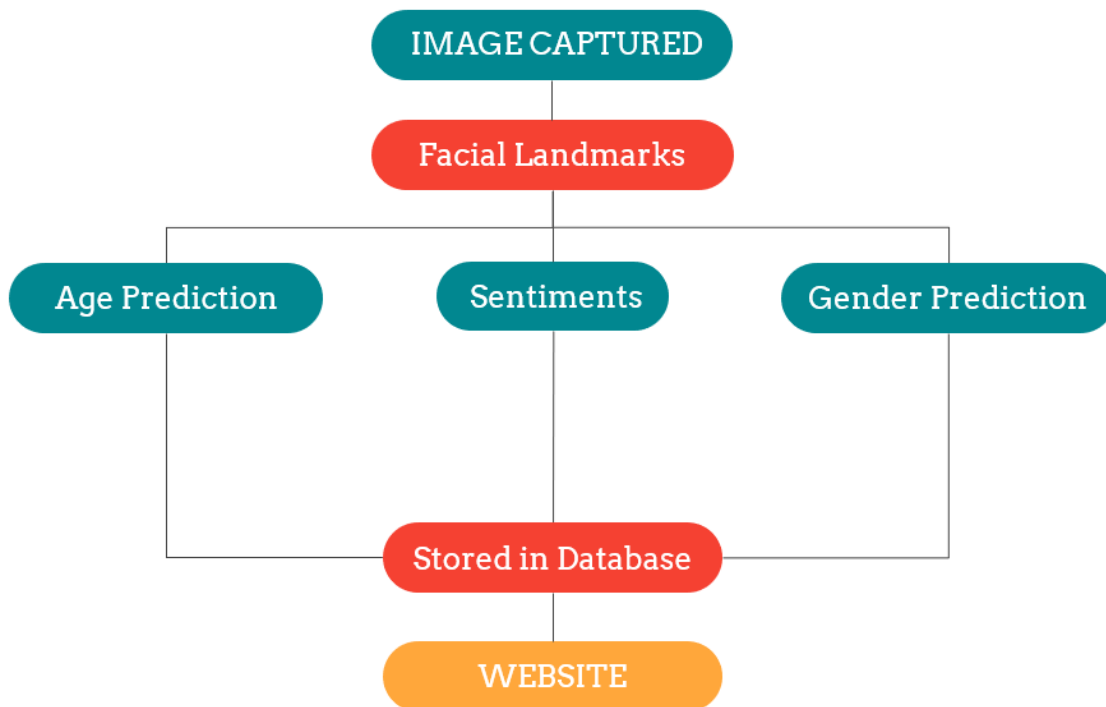
II. Flowchart depicting Image comparison
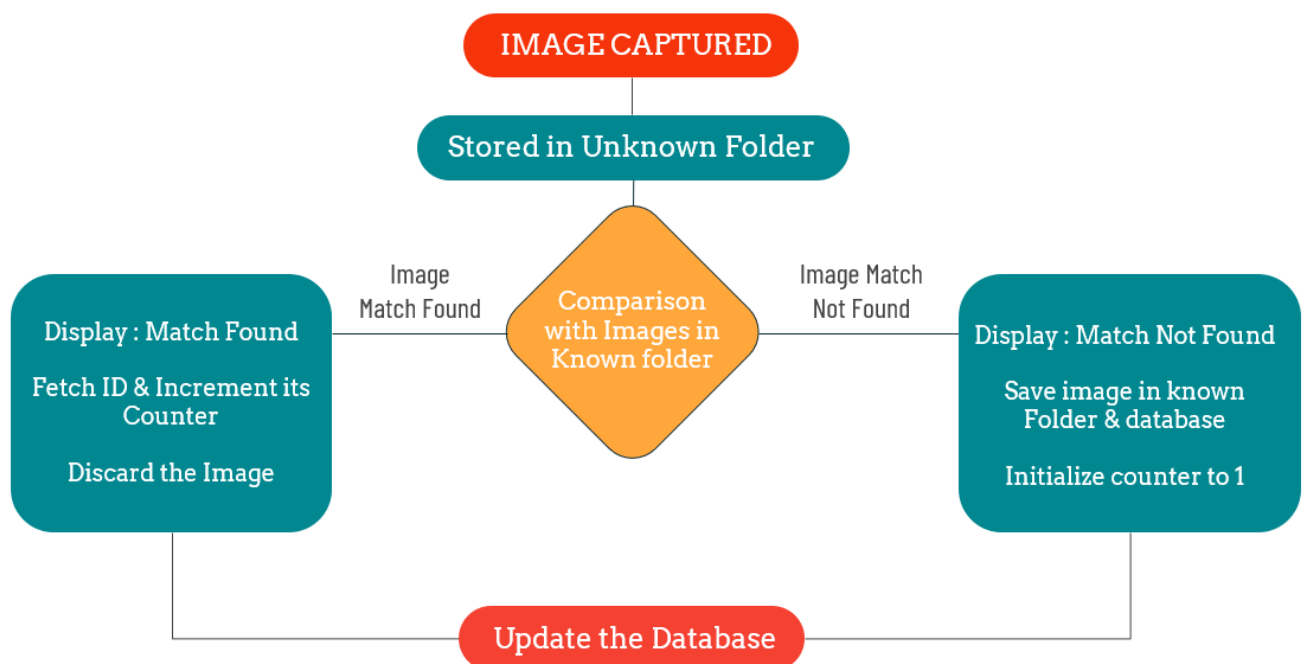
III. Flowchart of Website
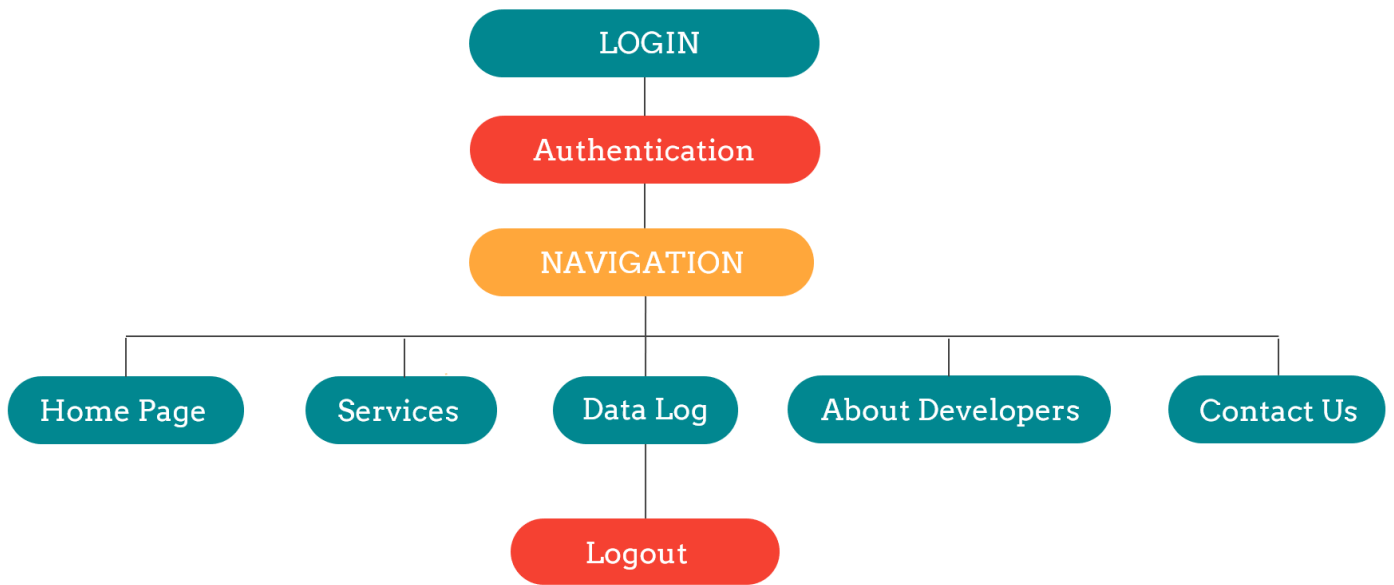
CHAPTER 6:
DATA DICTIONARY

CUSTOMER IMAGE MASTER TABLE

cust_image_master	
Customer_ID	VARCHAR(10)
Image	BLOB
Counter	INTEGER

CUSTOMER MASTER TABLE

customer_master	
Customer_ID	VARCHAR(10)
Gender	CHARACTER
Age	INTEGER
Counter	INTEGER

LOCATION MASTER TABLE

location_master	
Location_ID	VARCHAR(10)
Location_Name	TEXT

VISIT REGISTER TABLE

visit_register	
Visit_Date	DATE
Visit_Time	DATE
Customer_ID	VARCHAR(10)
Location_ID	VARCHAR(10)
New_Customer	TEXT
Sentiment	TEXT

CHAPTER 7:
SCREENSHOTS OF IMPLEMENTATION

CASE 1: Match Not Found

```
Looking for Faces...
Image stored in Unknown Folder
0
Comparing Images
NOT MATCHED
New Customer Saved with 3 .jpg
New Image stored in Known Folder
Database Connected
Database Closed
Image deleted from Unknown Folder
```

CASE 2: Match Found

```
Looking for Faces...
Image stored in Unknown Folder
3
Comparing Images
MATCHED
Matched Image removed from the Unknown Folder
Database Donnected
id = 3
Database Closed
```

LOCATION MASTER TABLE

	Location_ID	Location_Name ▾1
	Filter	Filter
1	Loc1	Branch 1
2	Loc2	Branch 2

VISIT REGISTER TABLE

Table: visit_register

	Visit_Date	Visit_Time	Customer_ID	Location_ID	New_Customer	Sentiment
	Filter	Filter	Filter	Filter	Filter	Filter
1	05/08/2020	16:45:19	1	loc2	YES	angry
2	05/08/2020	16:45:31	1	loc2	NO	sad
3	05/08/2020	16:47:38	1	loc2	NO	sad
4	06/08/2020	10:38:50	2	loc2	YES	happy
5	06/08/2020	10:39:02	2	loc2	NO	angry
6	06/08/2020	10:39:37	3	loc2	YES	surprise
7	06/08/2020	10:39:50	3	loc2	NO	surprise
8	06/08/2020	10:40:41	4	loc2	YES	angry
9	06/08/2020	10:41:23	5	loc2	YES	happy
10	06/08/2020	10:41:50	3	loc2	NO	happy
11	06/08/2020	10:43:07	3	loc2	NO	happy
12	06/08/2020	10:43:19	3	loc2	NO	happy
13	06/08/2020	10:43:31	3	loc2	NO	happy
14	06/08/2020	10:43:43	3	loc2	NO	happy
15	06/08/2020	10:44:41	6	loc2	YES	neutral
16	06/08/2020	10:44:53	6	loc2	NO	neutral
17	06/08/2020	10:45:05	6	loc2	NO	fear

CUSTOMER MASTER TABLE

Table: customer_mast

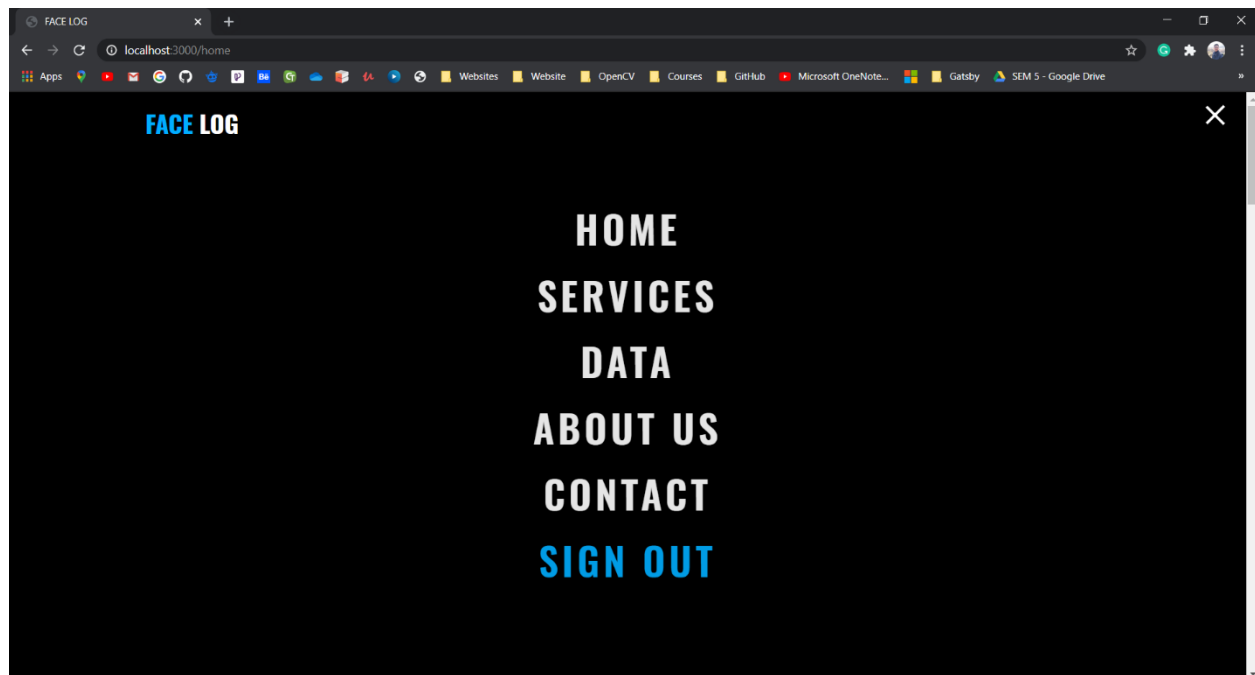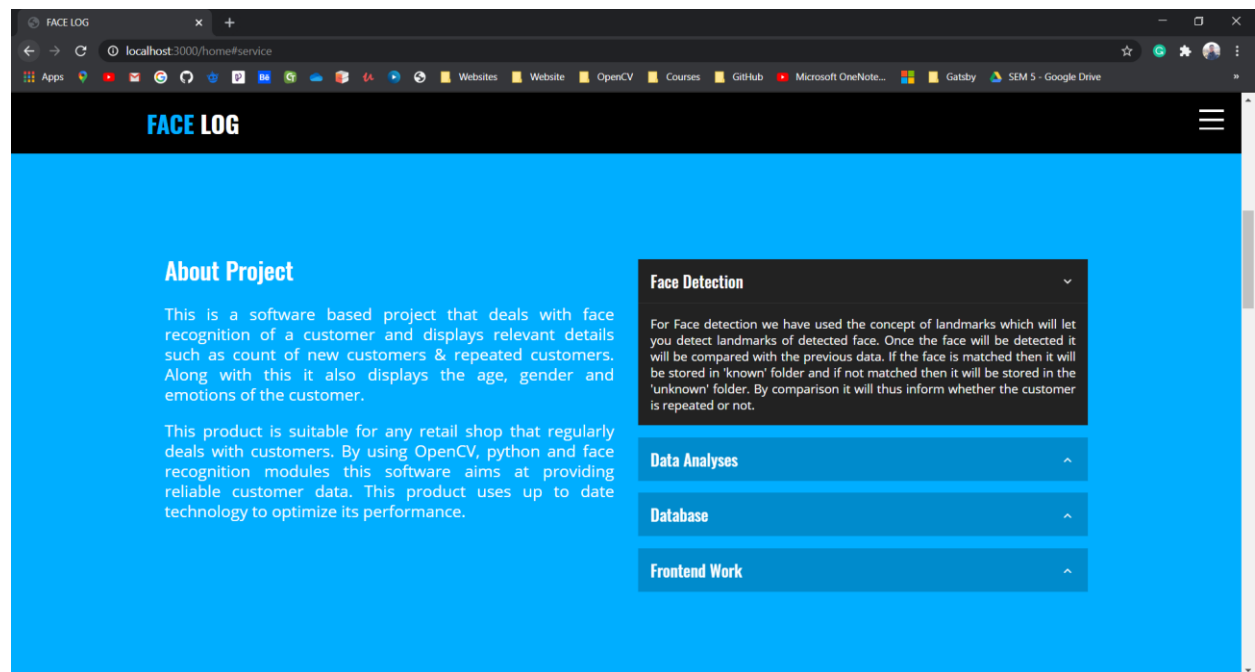|	Customer_ID	Gender	Age	Counter
	Filter	Filter	Filter	Filter
1	1	Female	15–20	7
2	2	Female	38–43	2
3	3	Male	15–20	7
4	4	Female	15–20	1
5	5	Male	8–12	1
6	6	Male	15–20	5
7	7	Female	25–32	6
8	8	Male	48–53	5

WEBSITE SNAPSHOTS
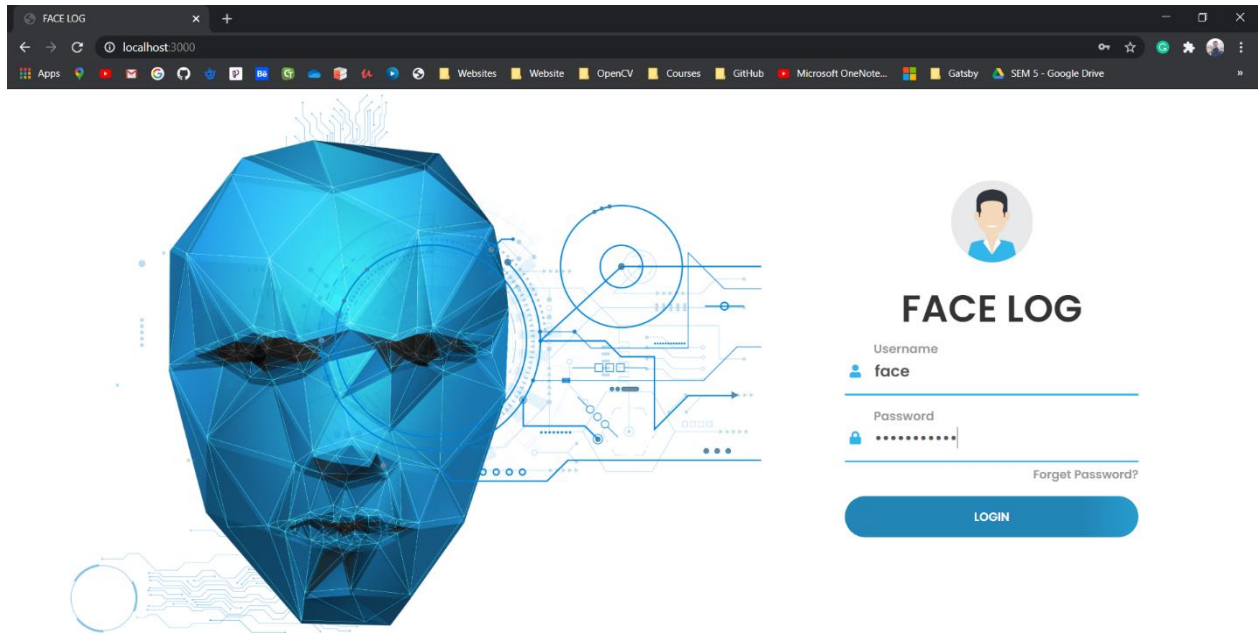
LOGIN PAGE
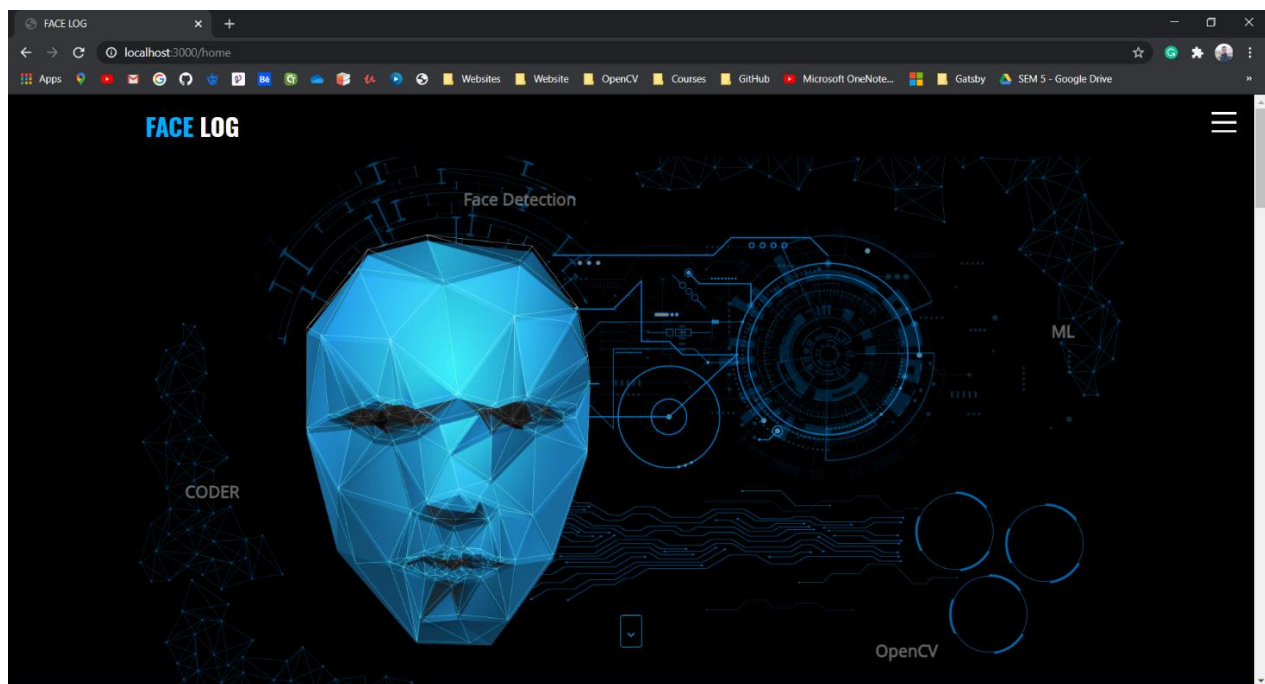
HOME PAGE

NAVIGATION

ABOUT PROJECT AND SERVICES

ABOUT DEVELOPERS

DATA

CONTACT US

CHAPTER 8:

OUTCOMES OF PROJECT

<u>OUTCOMES</u>

- This is a multi-purpose application which can be easily implemented in shops and it can even be acquired by businesses.

- With the help of this system we can find out the customer footfall which is extremely important as far as competition in the market is concerned.

- This system is completely automatic and does not require human intervention. It could run in 24x7 in background.

- The website we made is user friendly and Owners or managers can easily analyse the data.

CHAPTER 9:
CURRENT SYSTEMS & ENHANCEMENTS

CURRENT SYSTEM:

- There are lot of applications or software that makes use of Face

- Recognition using OpenCV python, but there are very few applications that integrate all the things (Age, Gender, Sentiments etc).

- Some professionally developed system provides better accuracy and user interface but is extremely expensive to maintain. They also high maintenance.

- The professionally built system requires high configuration software and devices to maintain and process data.

- The currently existing system requires a user to have some basic understanding of the system to use it.

ENHANCEMENTS:

- Our system does not require any high configuration devices or software to execute or for processing.

- We have tried incorporating as much features as we can in one system.

- The project can be easily implemented by even the users with no knowledge regarding the project, so it is extremely user friendly.

CHAPTER 10:

LIMITATIONS & FUTURE SCOPE

- Proper Positioning of face is required as accuracy of face recognition also depends on the factors like brightness, facial expressions, etc.

- We have allowed the program to run continuously without human intervention, so if a person stands in front of the camera for a long time (more than buffer time) than its counter will be incremented.

- All the processes right now are serialised so that could be made parallelized so that a process doesn't need to wait for all the process to complete. And also, all the process could be done at server side instead of client side to have centralizes data for all the branches.

- Accuracy is directly proportional to available data set. There is always a scope to increase the Accuracy of the models that we have used for predicting age, gender and sentiments.

CHAPTER 11:
REFERENCES

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6. https://www.tutorialspoint.com/nodejs/index.htm
7. https://pugjs.org/api/getting-started.html
8. https://projectsplaza.com/create-dynamic-website-nodejs-mongodb/
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