

EMOTION DETECTION WEBSITE

Submitted in partial fulfillment of the requirements for the degree of

**Bachelor of Technology
in
Computer Science and Engineering**

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(Deemed to be University under section 3 of UGC Act, 1956)

November, 2020

DECLARATION

I hereby declare that the thesis entitled *Emotion Detection* portal submitted by us, for the award of the degree of *Bachelor of Technology in Computer Science and Engineering* to VIT is a record of bonafide work carried out by me under the supervision of Mrs Mythili T.

I further declare that the work reported in this thesis has not been submitted and will not be submitted, either in part or in full, for the award of any other degree or diploma in this institute or any other institute or university.

Place: Vellore

Date: 5/11/20

Prajeeth & Vishal
Signature of the Candidate

ACKNOWLEDGEMENTS

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We would also like to thank the teaching and non-teaching staff of Vellore Institute of Technology for their non-self-centered enthusiasm and provided an environment to work in which further prompted us to complete the project successfully.

Finally, we would also like to thank our family and friends for their constant support and help for the successful completion of the project.

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Vishal Veeramani 18BCE2360

Executive Summary

Human emotion and facial expression is one of the most powerful tools of human interaction. Detecting and recognizing human emotion is a big challenge in computer vision and artificial intelligence. Emotions are a big part of human communication since most of the communication takes place through emotion. Aim of our project is to develop a robust system which can detect human emotion. This can be used by people affected by autism to make them understand these emotions better.

It is done using html, css and javascript with face-api. The scope of the project is:

- The user login into the website.
- The users select the button to perform 3 actions.
 - The user can upload the image and see the emotion of that particular image.
 - The webcam opens and shows the emotion of the user.
 - It says the accuracy of the user in the webcam in terms of fps (frames per second).
- Users can go back to Home and also go to End as they wish.
- If the user goes to the end page, a feedback form is asked to fill.
- There is also a chat application for the users to chat with the admin.

<u>CONTENTS</u>	<u>PAGE</u>
Title Page	1
Declaration	2
Table of Contents	5
List of Figures	6
 1. INTRODUCTION	 6
1.1 Objective	
1.2 Motivation	
1.3 Background	
 2. PROJECT DESCRIPTION AND GOALS	 7
2.1 Introduction	
2.2 Requirement Analysis	
 3. TECHNICAL SPECIFICATION	 9
3.1 System Requirements	
 4. DESIGN APPROACH AND DETAILS (as applicable)	 11
4.1 Design Approach / Materials & Methods	
4.2 Codes and Standards	
4.3 Constraints, Alternatives and Tradeoffs	
 5. PROJECT DEMONSTRATION	 18
 6. TEST CASES	 25
 7. REAL CLIENTS AND STAKEHOLDER PROFILE	 30
 8. USABILITY TESTING	 30
 9. HCI PRINCIPLES INCORPORATED	 35
 10. SUMMARY AND CONCLUSION	 36
 11. REFERENCES	 37

1. INTRODUCTION

Emotion recognition is the process of identifying human emotion. Emotion Recognition is an important area of research to enable effective human-computer interaction. Human emotions can be detected using speech signal, facial expressions, body language, and electroencephalography (EEG) . People vary widely in their accuracy at recognizing the emotions of others. Use of technology to help people with emotion recognition is a relatively nascent research area. Generally, the technology works best if it uses multiple modalities in context. To date, the most work has been conducted on automating the recognition of facial expressions from video, spoken expressions from audio, written expressions from text, and physiology as measured by wearables.

1.1 Objective:

To program an user friendly application to detect some emotions which are universal to all human beings like angry, sad, happy, surprise, fear, disgust and neutral, which can be used by users with minimal to no experience about current trends in technologies and with the gui and hci principles.

The purpose of this study is to introduce a method based on facial recognition to identify students' understanding of the entire distance learning process. This project demonstrates that emotion recognition based on facial expressions is feasible in distance education, permitting identification of a student's learning status in real time. Therefore, it can help teachers to change teaching strategies in virtual learning environments according to the student's emotions.

1.2 Motivation:

Artificial intelligence using neural networks is used for recognition of faces in photos and videos. Most techniques process visual data and search for general patterns present in human faces. Face recognition can be used for surveillance purposes by law enforcers as well as in crowd management. An even more advanced development in this field is emotion recognition. Implementing emotion detection can raise accuracy in facial recognition which in return can aid to the area of surveillance and behavioral analysis by law enforcement. The website is mainly built for the people with autism.

With the rapid development of technologies it is required to build an intelligent system that can understand human emotion. Facial emotion recognition is an active area of research with several fields of applications. Some of the significant applications are:

- i) Alert system for driving.
- ii) Social Robot emotion recognition system.
- iii) Medical Practices.
- iv) Feedback system for e-learning.
- v) The interactive TV applications enable the customer to actively give feedback on TV Program.
- vi) Mental state identification.
- vii) Automatic counseling system.
- viii) Face expression synthesis. ix) Music as per mood. x) In research related to psychology.
- xi) In understanding human behavior.
- xii) In interview

1.3 Background:

Decades of scientific research have been conducted developing and evaluating methods for automated emotion recognition. There is now extensive literature proposing and evaluating hundreds of different kinds of methods, leveraging techniques from multiple areas, such as signal processing, machine learning, computer vision, and speech processing. The accuracy of emotion recognition is usually improved when it combines the analysis of human expressions from multimodal forms such as texts, physiology, audio, or video. Different emotion types are detected through the integration of information from facial expressions, body movement and gestures, and speech.

2. PROJECT DESCRIPTION AND GOALS

2.1 Introduction:

The goal of this project is to help the people born with a mental disability such as autism and guide them to understand emotions with the project we have created pertaining to a simple interface that can be used by anyone regardless of their expertise to use technology. Suppose we are trying to recognize the emotions of a person. In general, getting to the truth of what emotion is actually present can take some work, can vary depending on the criteria that are selected, and will usually involve maintaining some level of uncertainty. However that may be the case, this project does

help the users understand what emotion is being portrayed which in return can help them in situations where interactions are required.

2.2 Requirement Analysis:

Requirements Analysis is the process of defining the expectations of the users for an application that is to be built or modified. It involves all the tasks that are conducted to identify the needs of different stakeholders.

- Eliciting requirements: This is the part of the process where we need to gather requirements by communicating with the customers. Our target customers are those challenged with mental disabilities and casual users with little to no knowledge with current trends in technologies. So the interface needs to be simple and contain instructions. The interface also needs to be user friendly following all the HCI principles
- Requirements modeling: The requirements are documented in different formats such as use cases, user stories, natural-language documents, or process specification. The following process has been documented below and been used to create the interface model that feels comfortable to the user.
- Review and retrospective: Creating a functional prototype of the desired model and testing the created model to reflect on the previous iterations of requirements gathering in a bid to make improvements in the process going forward.

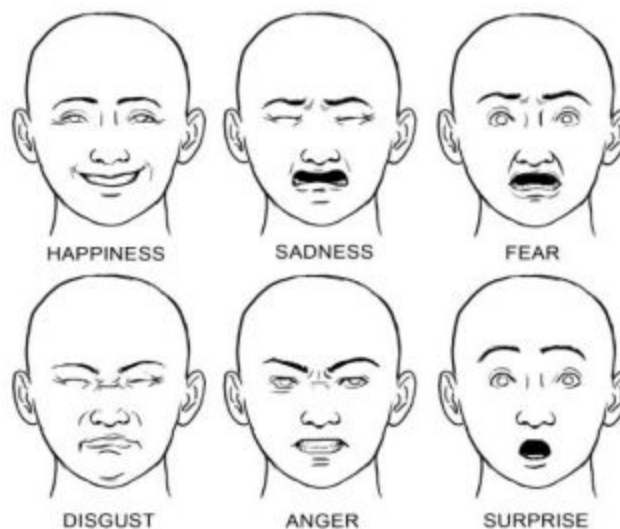
3. TECHNICAL SPECIFICATION

3.1 System Requirements:

- Operating System Used – Windows 10 Home 64-bit
- Language Used for Coding – HTML, CSS, JAVASCRIPT
- Tools Used:
 - Visual Studio Code: A source code editor with a primary focus on web development.
 - Libraries: The **face-api.js** JavaScript module implements convolutional neural networks to solve for face detection and recognition of faces and face landmarks. The face-api.js leverages TensorFlow.js and is optimized for the desktop and mobile web.
- Hardware Requirements:
 - Processor – Intel(R) Core(TM) i7-6500U CPU @ 2.50GHz(\$ CPU), ~2.60GHz
 - RAM – 16.0GB
 - ROM - 512GB
 - SSD storage

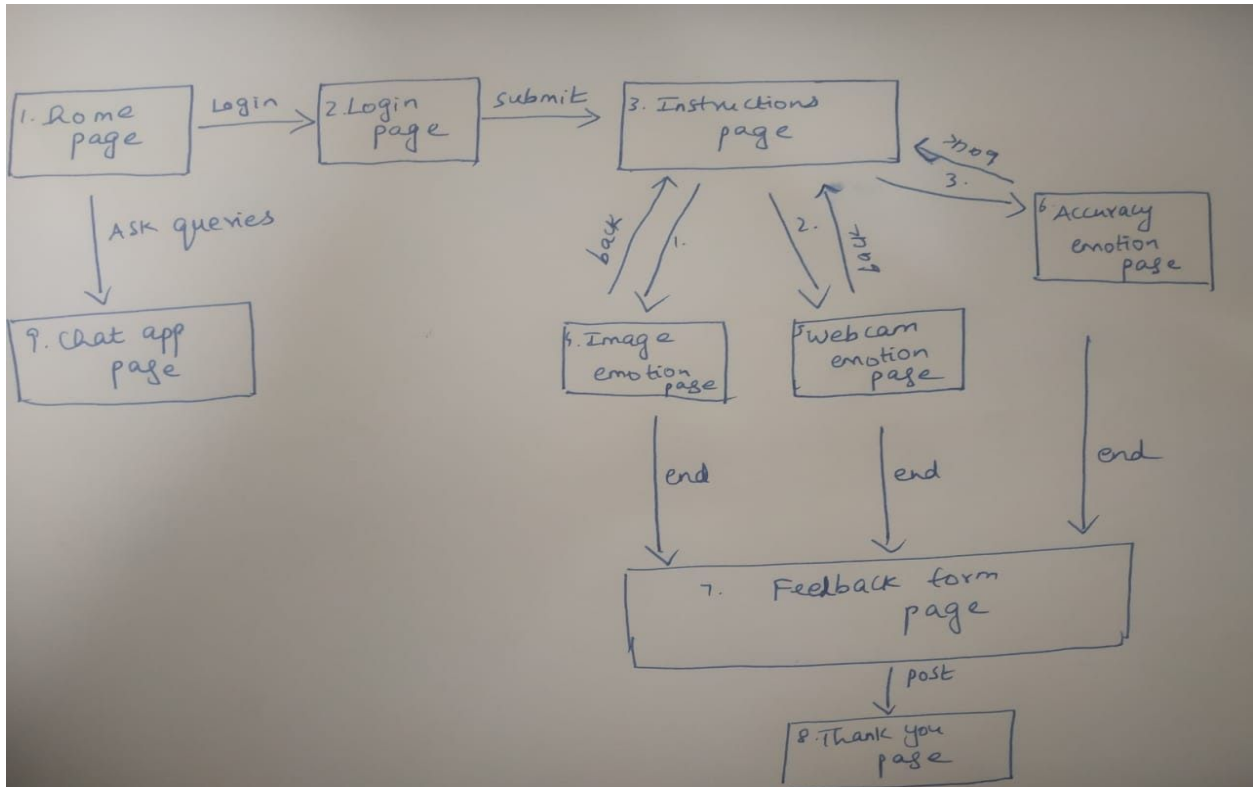
4. DESIGN APPROACH AND DETAILS

Universal Emotion Identification		
Emotion	Definition	Motion of facial part
Anger	Anger is one of the most dangerous emotions. This emotion may be harmful so, humans are trying to avoid this emotion. Secondary emotions of anger are irritation, annoyance, frustration, hate and dislike.	Eyebrows pulled down, Open eye, teeth shut and lips tightened, upper and lower lids pulled up.
Fear	Fear is the emotion of danger. It may be because of danger of physical or psychological harm. Secondary emotions of fear are Horror, nervousness, panic, worry and dread.	Outer eyebrow down, inner eyebrow up, mouth open, jaw dropped
Happiness	Happiness is most desired expression by human. Secondary emotions are cheerfulness, pride, relief, hope, pleasure, and thrill.	Open Eyes, mouth edge up, open mouth, lip corner pulled up, cheeks raised, and wrinkles around eyes.
Sadness	Sadness is opposite emotion of Happiness. Secondary emotions are suffering, hurt, despair, pity and hopelessness.	Outer eyebrow down, inner corner of eyebrows raised, mouth edge down, closed eye, lip corner pulled down.
Surprise	This emotion comes when unexpected things happens. Secondary emotions of surprise are amazement, astonishment.	Eyebrows up, open eye, mouth open, jaw dropped
Disgust	Disgust is a feeling of dislike. Human may feel disgust from any taste, smell, sound or touch.	Lip corner depressor, nose wrinkle, lower lip depressor, Eyebrows pulled down



4.1 Design Approach/ Materials & Methods

I. Architecture Diagram: Fig 1



II. Task Analysis

- A. **Goal:** Infer and project the emotion that is given
- B. **Plans:** Using faceapi.js, a javascript library, initialize the program and classify an output with the projected image
- C. **Object:** JavaScript libraries(faceapi.js), Camera module, CPU System, VS Code editor, live server, browser
- D. **Objectives:** Write code to input facial image, image pre-processing with faceapi.js, and detection of the emotion presented with the 3 modules
- E. **Procedure:** Write code for each of the modules present, and corroborate with each module present to validate the workings of the code
- F. **Contingencies:** Refer to the research paper and online sources if tackled with any errors, keep track of progress made with the code and resolve the obstacles faced along the way

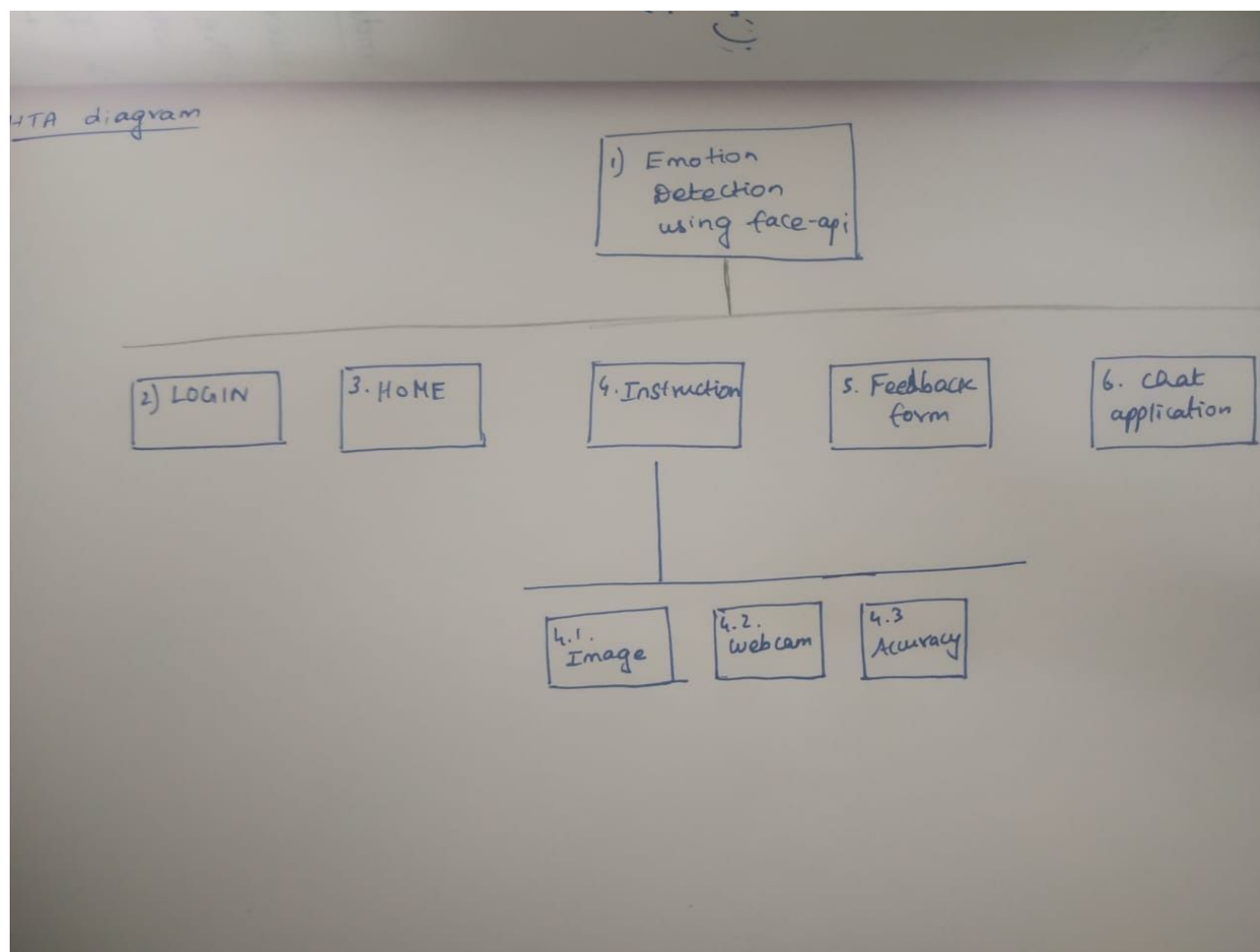
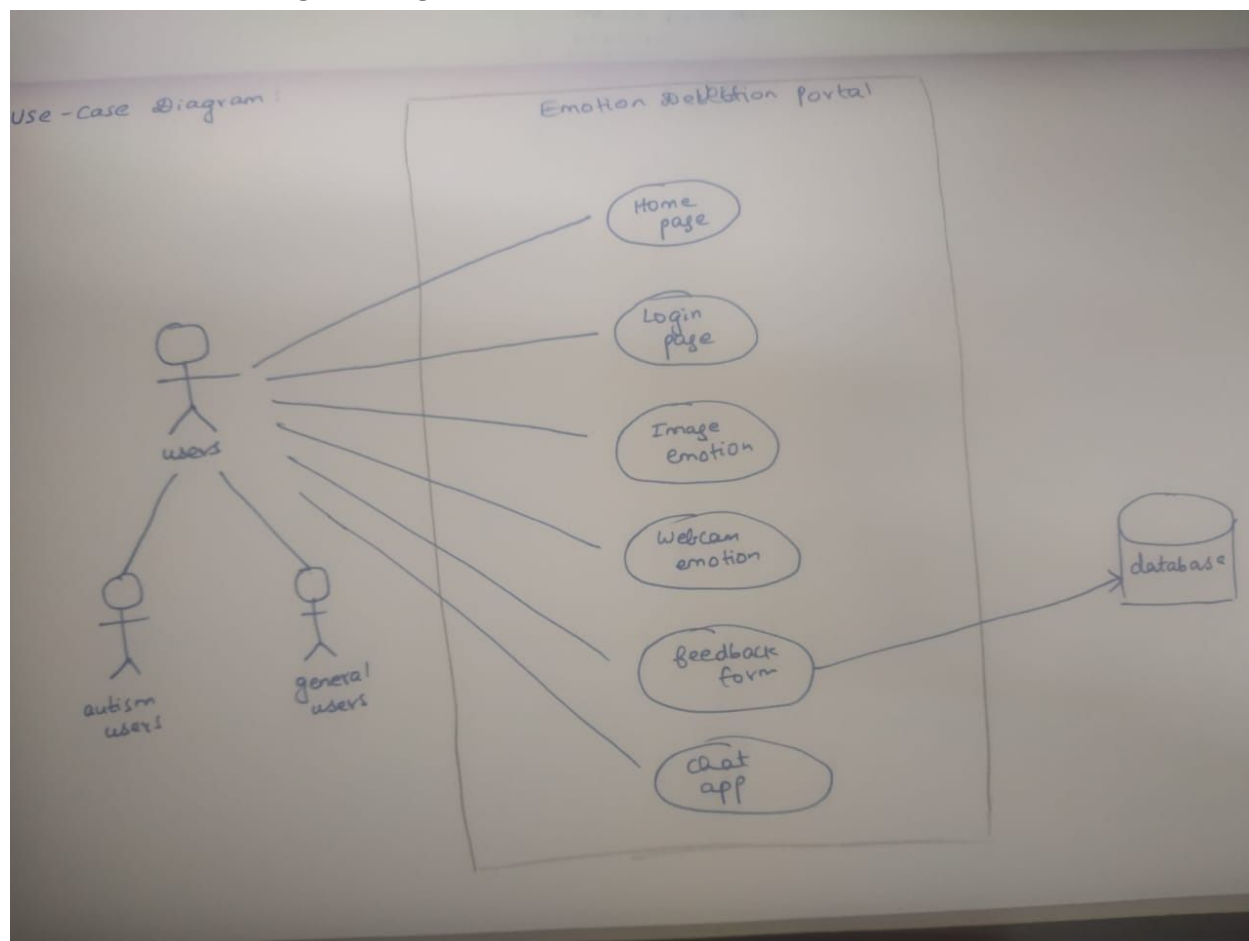


Fig 2: Task Analysis

III. Use Case Diagram: Fig 3



IV. Storyboard

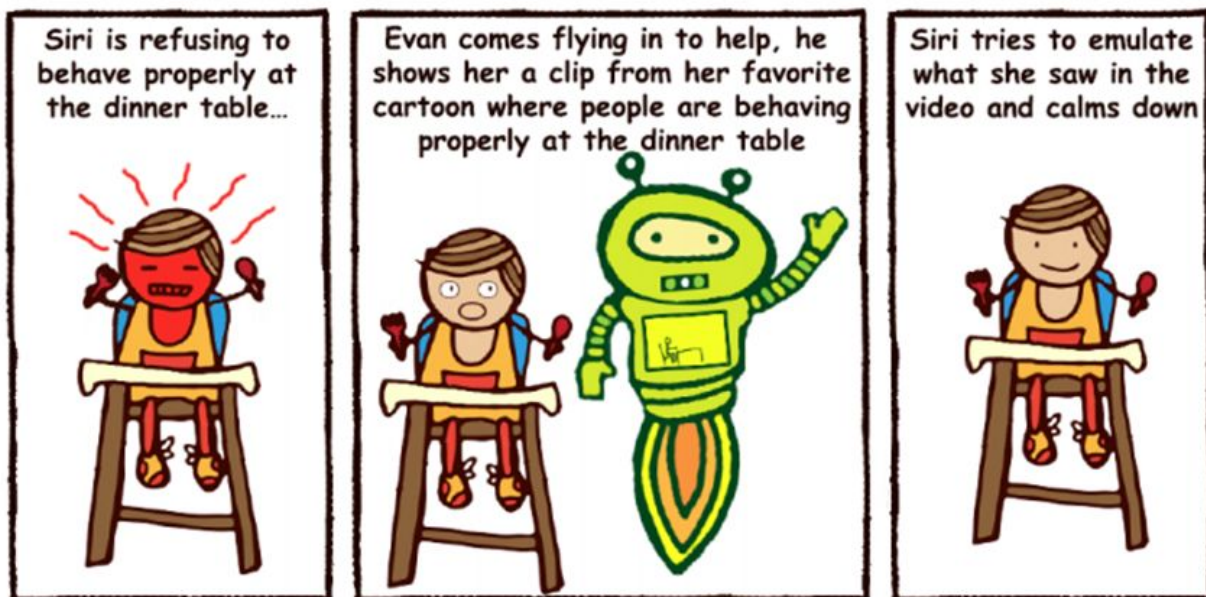
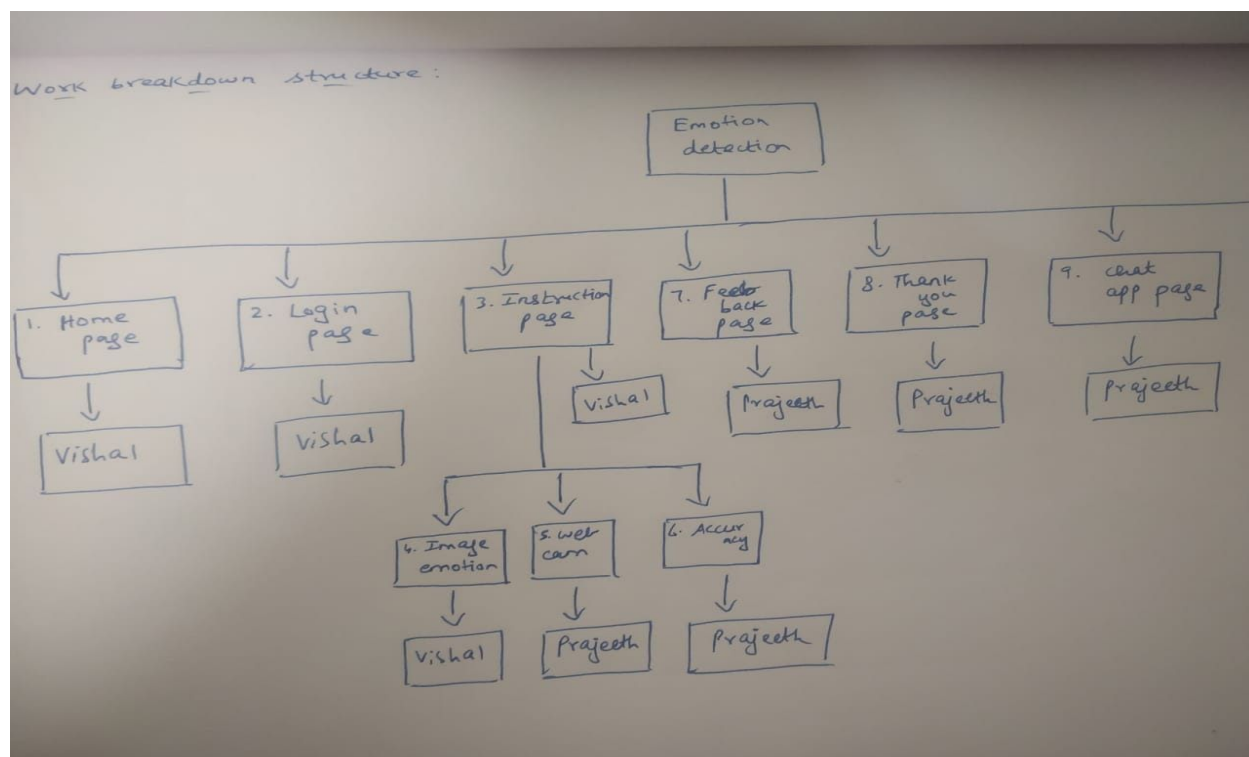


Fig 4: Storyboard I depicts how important emotions are..



Fig 5: Storyboard II depicts the emotion of each person

V. Work Approach



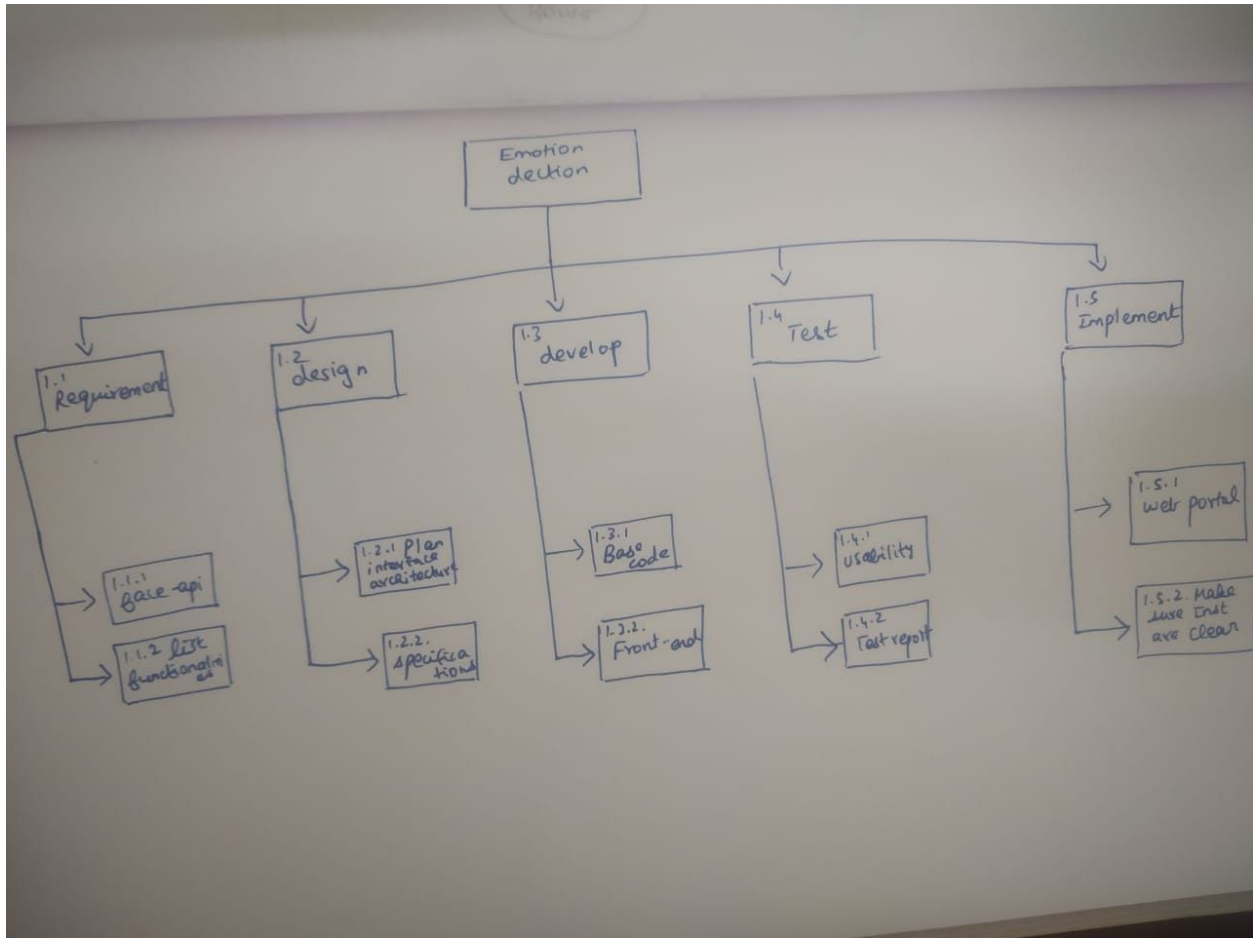


Fig 6: Work Structure

4.2 Codes and Standards

Fig 7: Webcam Emotion Code

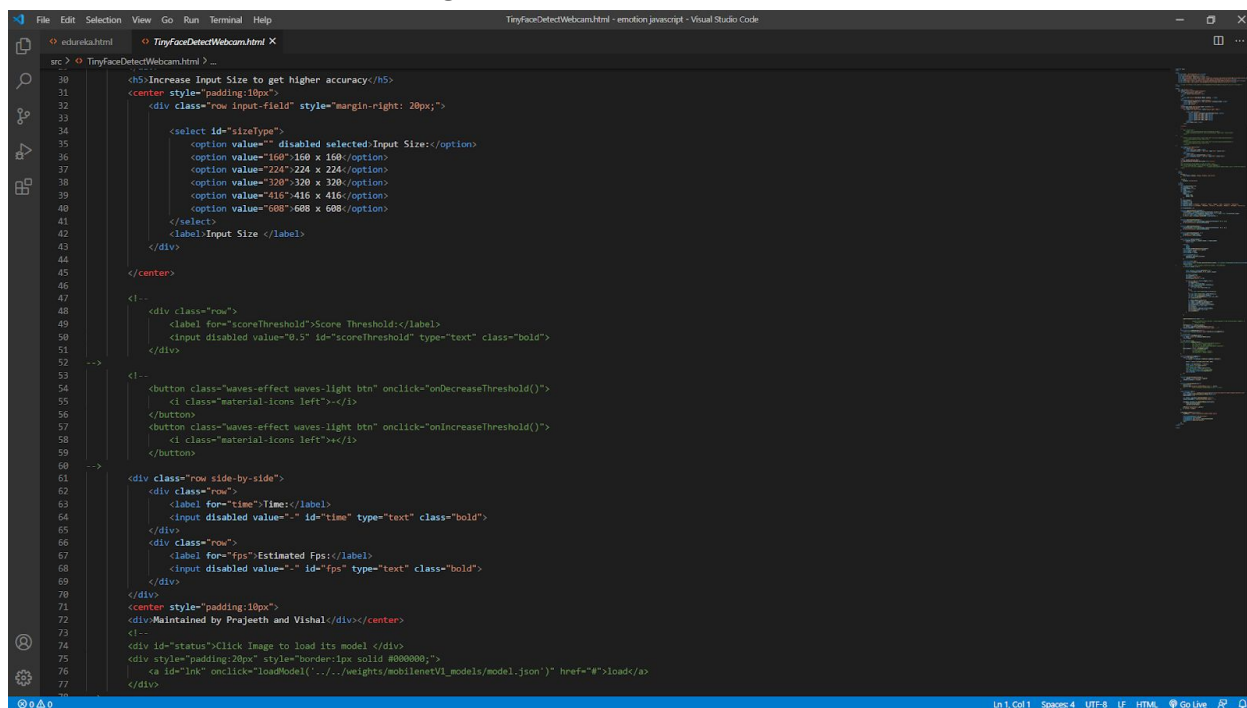


Fig 8: Accuracy Emotion Code

```

112 // convert image to model input format
113 function preprocess(imgData) {
114   return tf.tidy(() => {
115     let tensor = tf.fromPixels(imgData).toFloat();
116
117     tensor = tensor.resizeBilinear([100, 100])
118
119     tensor = tf.cast(tensor, 'float32')
120     const offset = tf.scalar(255.0);
121     // Normalize the image
122     const normalized = tensor.div(offset);
123     // We add a dimension to get a batch shape
124     const batched = normalized.expandDims(0)
125     return batched
126   })
127 }
128 // use chrome face detector
129 async function detect() {
130   if (window.FaceDetector == undefined) {
131     console.error('Face Detection not supported');
132     return;
133   }
134   var emo = document.getElementById("result_emotion");
135   emo.innerHTML = " Waiting..."
136   var faceDetector = new FaceDetector();
137
138   var inputImgEl = document.getElementById("output_image")
139   const {
140     width,
141     height
142   } = inputImgEl
143   // console.log(width, height)
144   let out_canvas = document.getElementById('overlay');
145   out_canvas.width = width
146   out_canvas.height = height
147   let ctx = out_canvas.getContext("2d");
148   let scale = 1;
149   ctx.drawImage(inputImgEl,
150     0, 0, inputImgEl.naturalWidth, inputImgEl.naturalHeight,
151     0, 0, out_canvas.width, out_canvas.height);
152
153   scale = out_canvas.width / inputImgEl.naturalWidth;
154
155   console.time('detect');
156   return faceDetector.detect(inputImgEl)
157     .then(faces => {
158       // console.log(faces);
159       // Draw the faces on the <canvas>.
160     })

```

Fig 9: Image Emotion Code

```

File Edit Selection View Go Run Terminal Help
edureka.html - emotion javascript - Visual Studio Code
src > edureka.html > ...
31
32 .right {
33   background-color: #f0f5f9;
34   float: left;
35   width: 20%;
36   padding: 15px;
37   margin-top: 7px;
38   text-align: center;
39 }
40
41 @media only screen and (max-width:620px) {
42
43   /* For mobile phones: */
44   .menu,
45   .main,
46   .right {
47     width: 100%;
48   }
49 }
50 </style>
51 </head>
52
53 <body style="font-family:Verdana;color:#000000;">
54
55 <div style="background-color:#4168bd;padding:15px;text-align:center;">
56 <h1>Welcome to Sentimeter Model</h1>
57 <h2>detects the human emotion...</h2>
58 </div>
59
60 <div style="overflow:auto">
61 <div class="menu">
62 <a href="https://www.sciencedirect.com/topics/computer-science/emotion-detection">Emotion detection</a>
63 <a href="login.html">login</a>
64 </div>
65
66 <div class="main">
67 <h2>Emotion Detection</h2>
68 <p>To Awaken Human Emotion Is The Highest Level Of Art</p>
69 </div>
70
71 <div class="right">
72 <h2>About</h2>
73 <p>Human emotion is one of the important hci principle. </p>
74 </div>
75 </div>
76
77 <div style="background-color:#95ebf7;text-align:center;padding:10px;margin-top:7px;">© emotion.co</div>
78
79

```

Fig 10: Homepage Code

```

File Edit Selection View Go Run Terminal Help
login.html - emotion javascript - Visual Studio Code
src > login.html > ...
42
43 img.avatar {
44   width: 40%;
45   border-radius: 50%;
46 }
47
48 .container {
49   padding: 16px;
50 }
51
52 span.psw {
53   float: right;
54   padding-top: 16px;
55 }
56
57 /* Change styles for span and cancel button on extra small screens */
58 @media screen and (max-width: 300px) {
59   span.psw {
60     display: block;
61     float: none;
62   }
63   .cancelbtn {
64     width: 100%;
65   }
66 }
67 </style>
68 </head>
69 <body>
70
71 <h2>Login Form</h2>
72
73 <form action="action_page.php" method="post">
74 <div class="imgcontainer">
75 
76 </div>
77
78 <div class="container">
79 <label for="uname"><b>Username</b></label>
80 <input type="text" placeholder="Enter Username" name="uname" required>
81
82 <label for="psw"><b>Password</b></label>
83 <input type="password" placeholder="Enter Password" name="psw" required>
84
85 <button type="submit">Login</button>
86
87 <input type="checkbox" checked="checked" name="remember"> Remember me
88 </div>
89 </div>
90

```

Fig 11: Login Page Code

4.3 Constraints, Alternatives and Tradeoffs

Identifying a person given an image of their face, the input image. The way we do that, is to provide one (or more) image(s) for each emotion we want to recognize, labeled with the emotion's label, e.g. the reference data. Now we compare the input image to the reference data and find the most similar reference image. If both images are similar enough we output the emotion detected. The constraints are that, since this implements machine learning and deep learning algorithms and it is exploring the uncertainty regions, there will be situations where the expressed emotions will not be fetched the appropriate result.

We were an user friendly interface where people with minimal to no understanding of current trends in technologies can view and review our application. This has primarily been made to target a mentally challenged audience and assist them in their interaction skills that they are bound to face. In this project report, we went over the 3 modules we developed, image emotion, webcam emotion, and webcam emotion to find accuracy. We would like to clean up the interface more and make it look more radiant and professional. Although the interface is user friendly, it does not look polished. We are also looking to add emojis near the faces in the future work.

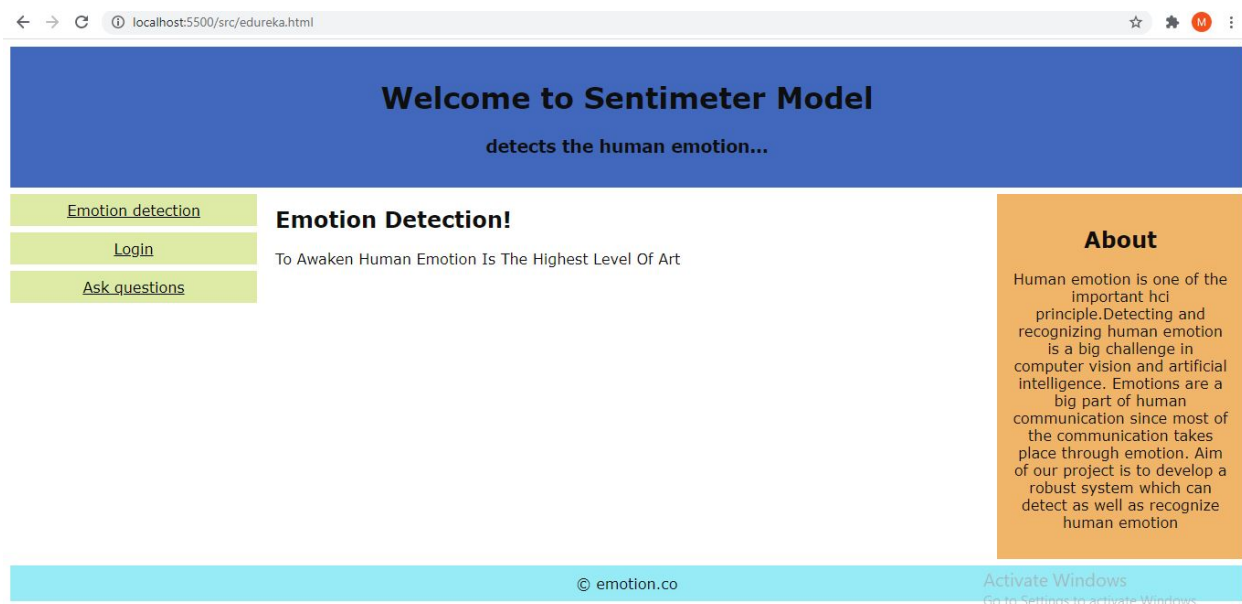


Fig 12: Interface Example (Home Page)

Another tradeoff that has been made is not having a mobile application and a visually pleasing alert that could display an emoji when a prediction has been made. The aim of the project is to reach as many people as we can to assist them with challenges, thus a

mobile app has to be made, we have created a website as an alternative, but we are placing a constraint on the users by not providing them an alternative to run the program.



Fig 13: Alternatives and Tradeoffs

5. PROJECT DEMONSTRATION

A screenshot of a web browser window displaying a login page. The address bar shows 'localhost:5500/src/login.html'. The page content features a 2x3 grid of six yellow emoji characters: an angry face, a face with a sweat drop, a neutral face, a face with sunglasses, a face with a sad expression, and a red heart with a sad expression. Below the grid is a login form with a 'Username' field containing 'prajeeth', a 'Password' field with masked characters, a green 'submit' button, and a 'Remember me' checkbox. At the bottom right, there is a 'Activate Windows' watermark.

Fig 14: Login Page

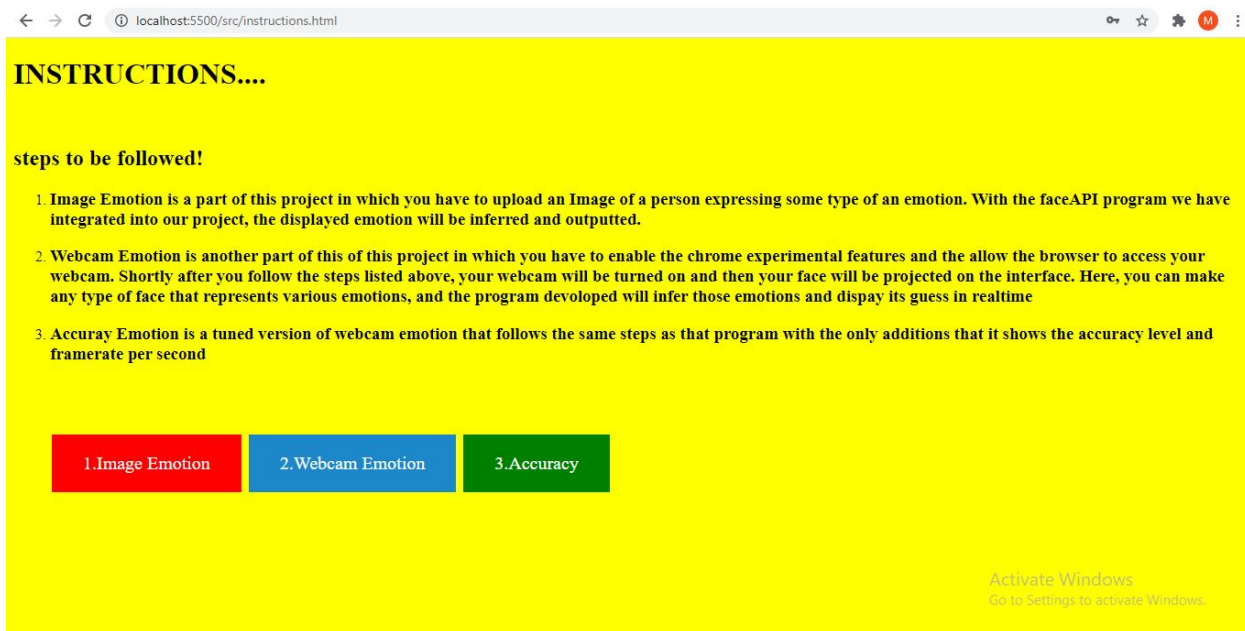


Fig 15: Instruction Page

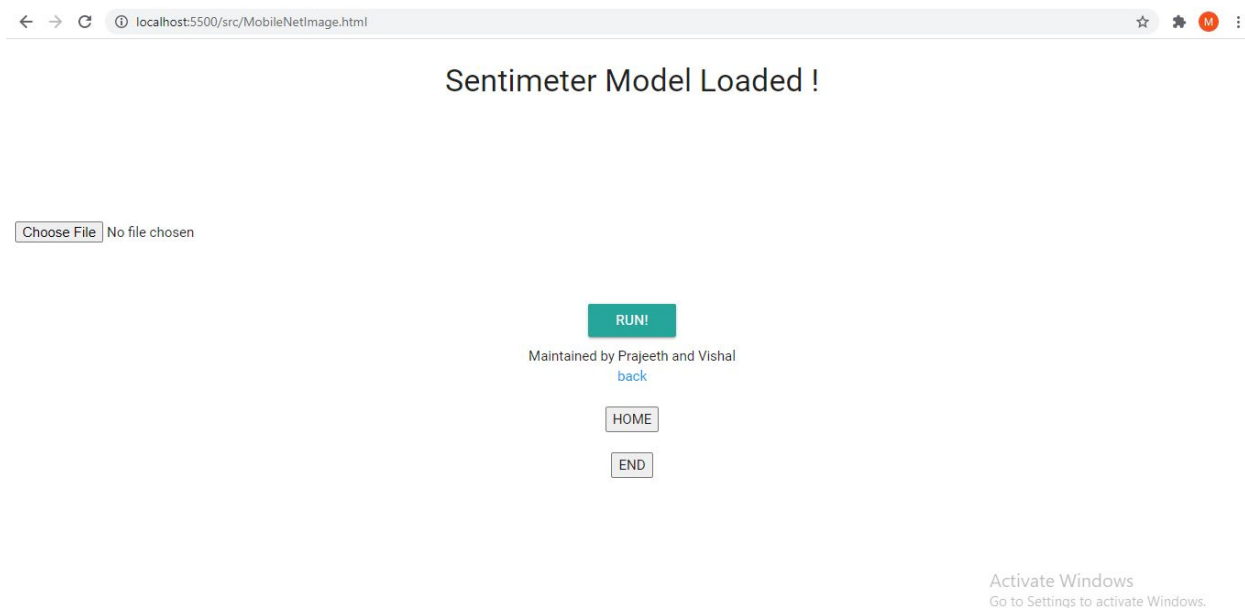


Fig 16: Image Emotion I

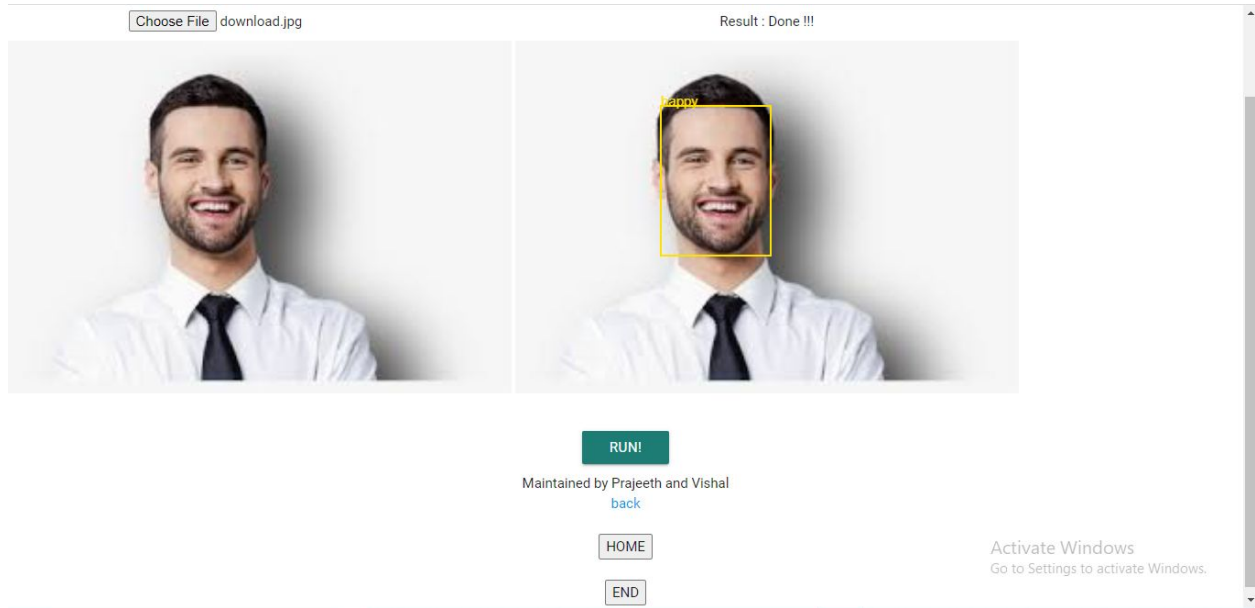


Fig 17: Image Emotion II

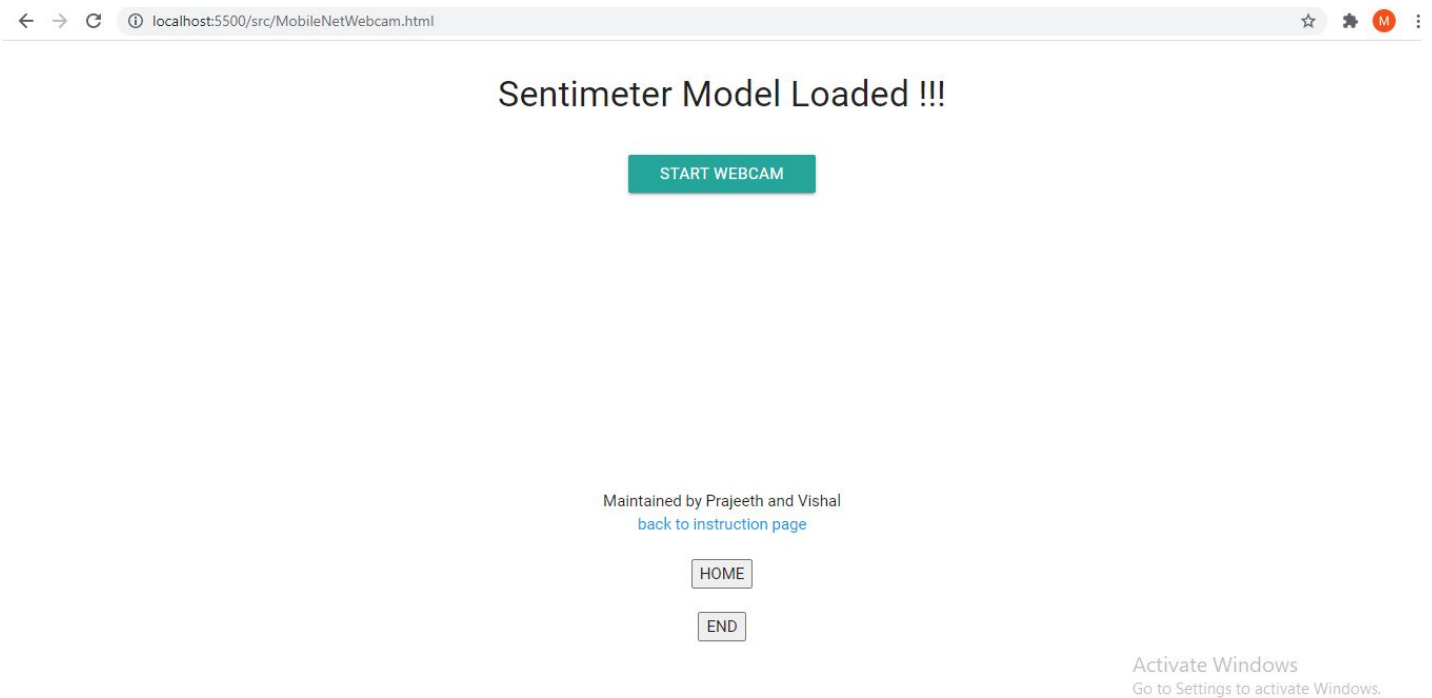


Fig 18: Webcam Emotion I

Running the Sentimeter model ...

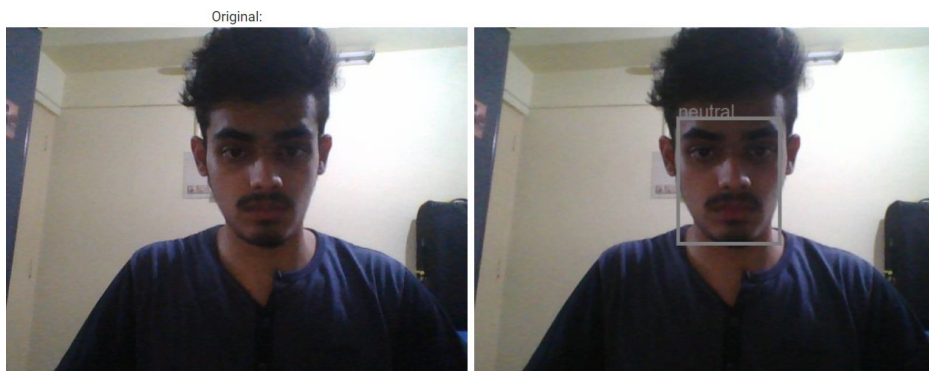


Fig 18: Webcam Emotion II

Running the Sentimeter model ...

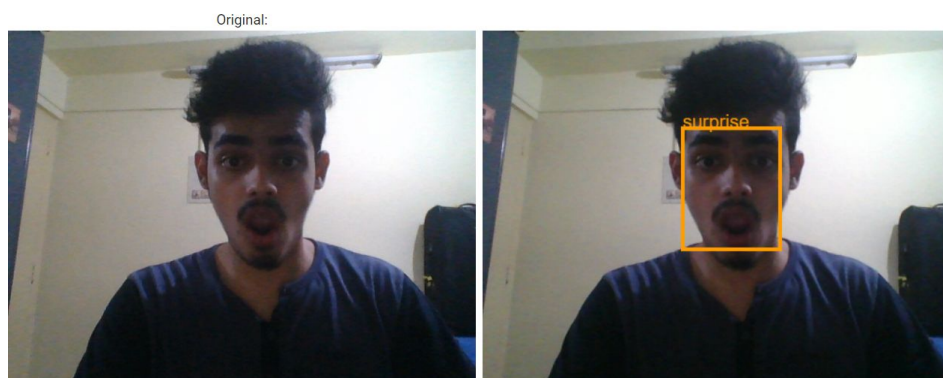


Fig 19: Webcam Emotion III

Running the Sentimeter model ...

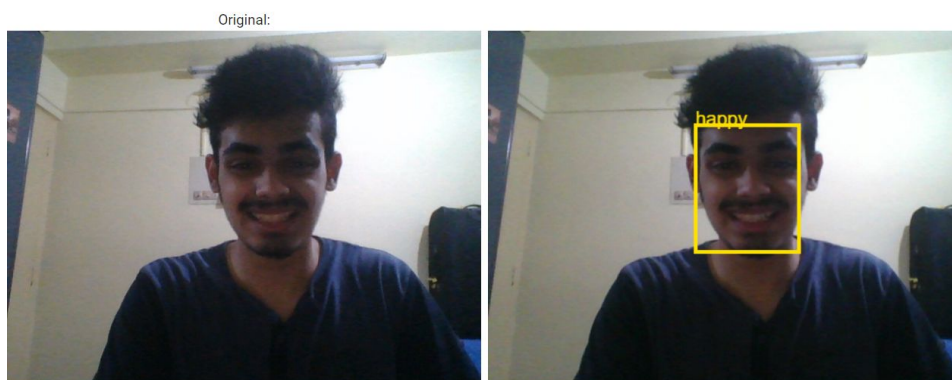


Fig 20: Webcam Emotion IV

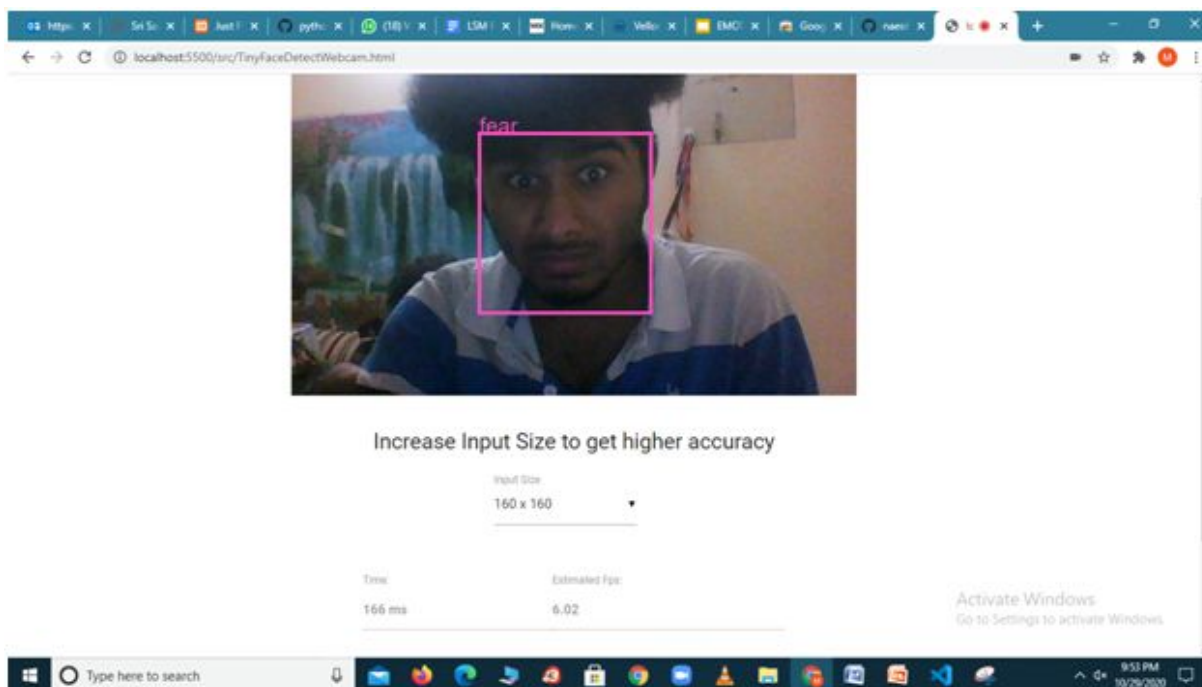


Fig 21: Accuracy Emotion I

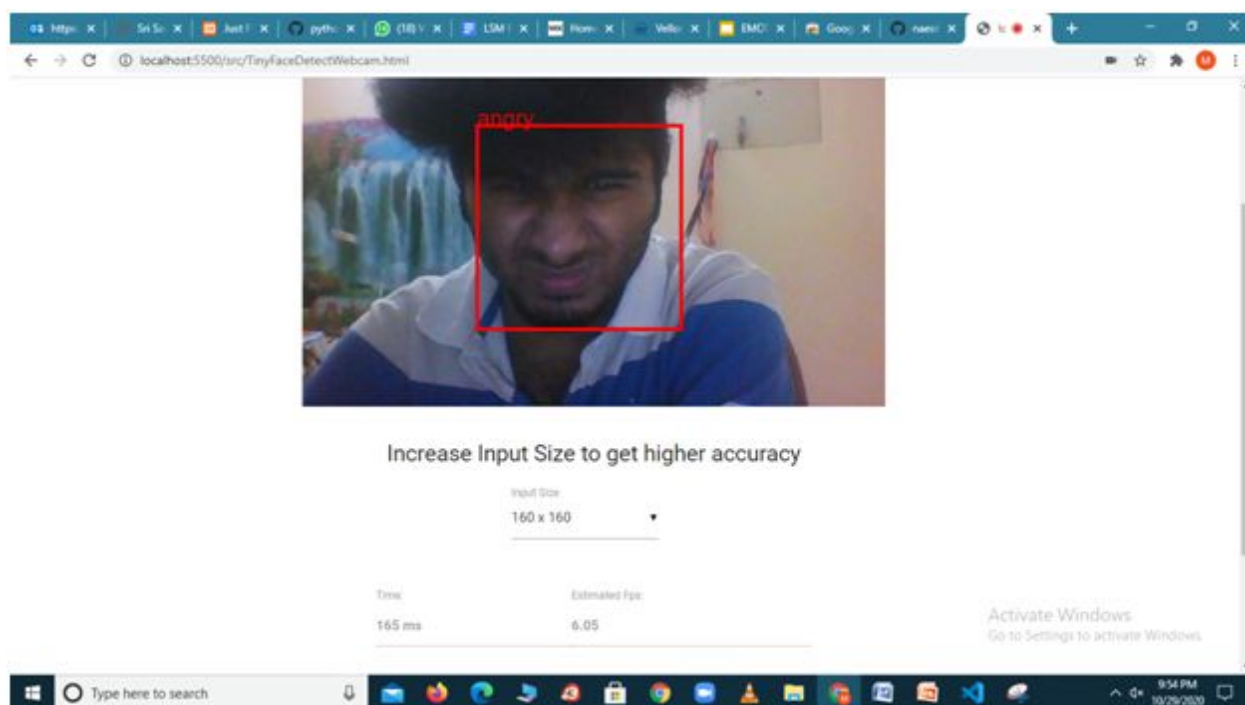


Fig 22: Accuracy Emotion II

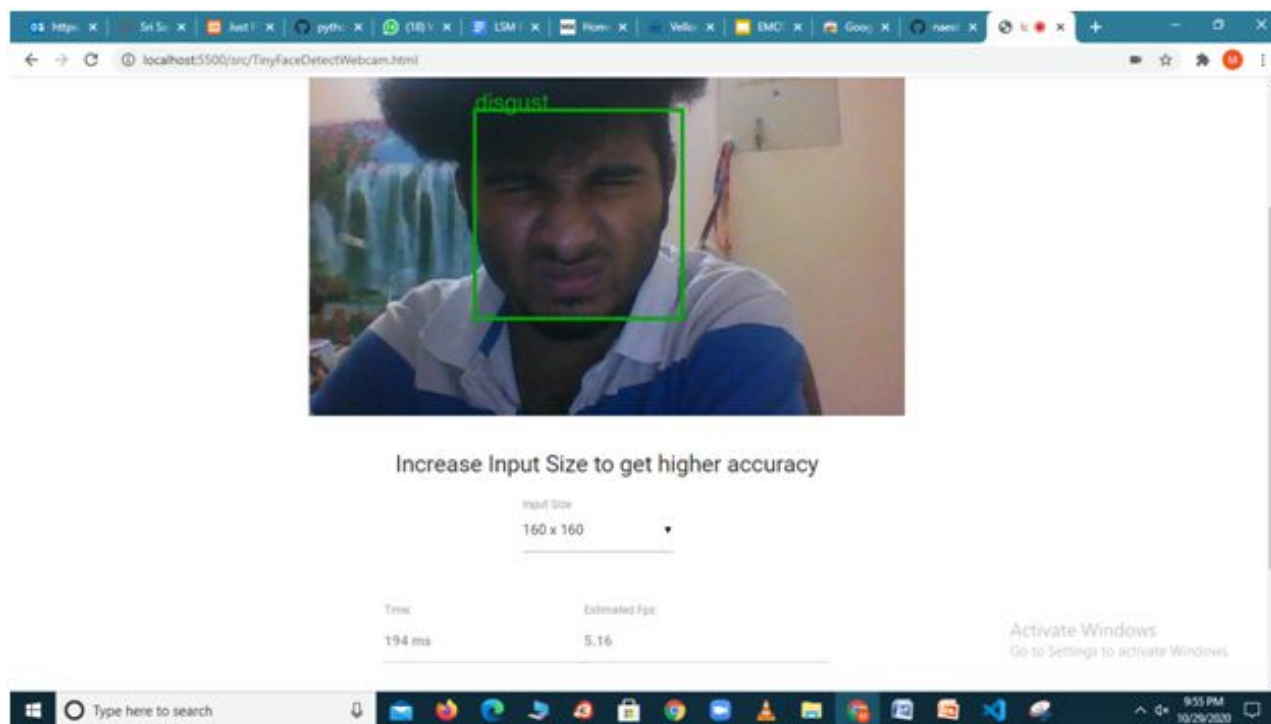


Fig 23: Accuracy Emotion III

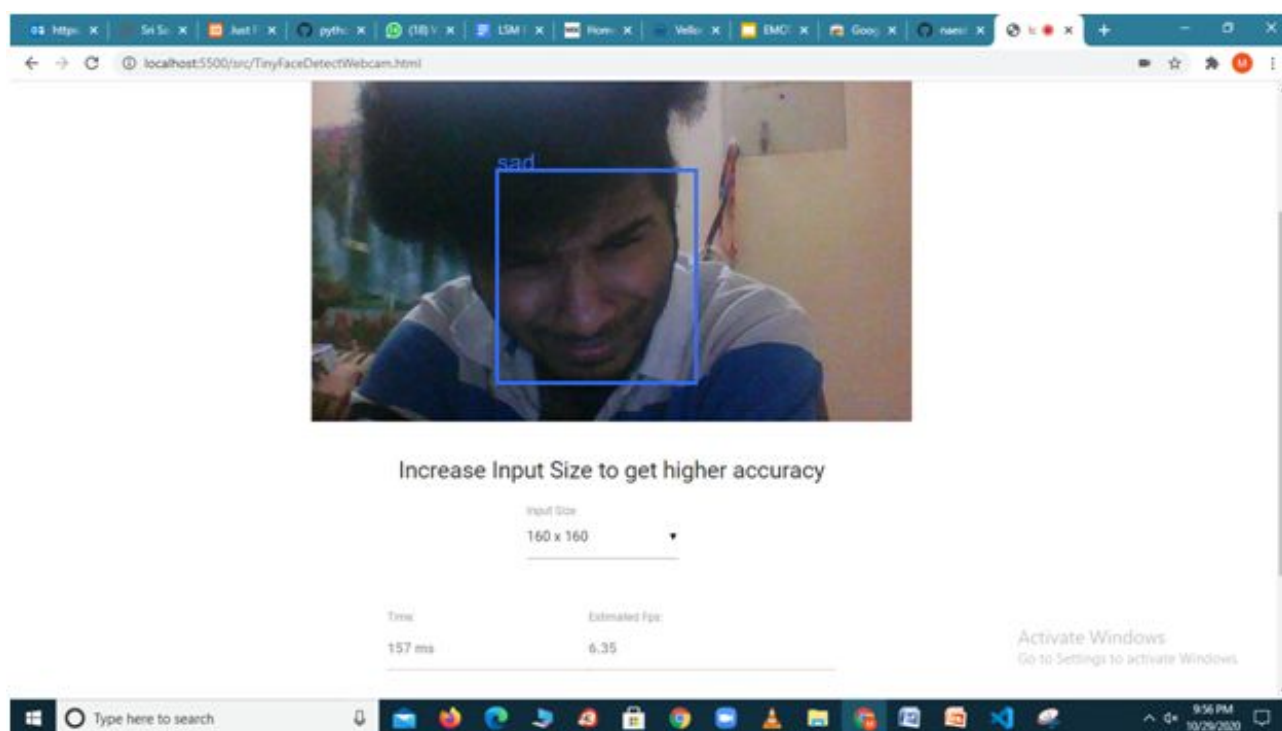
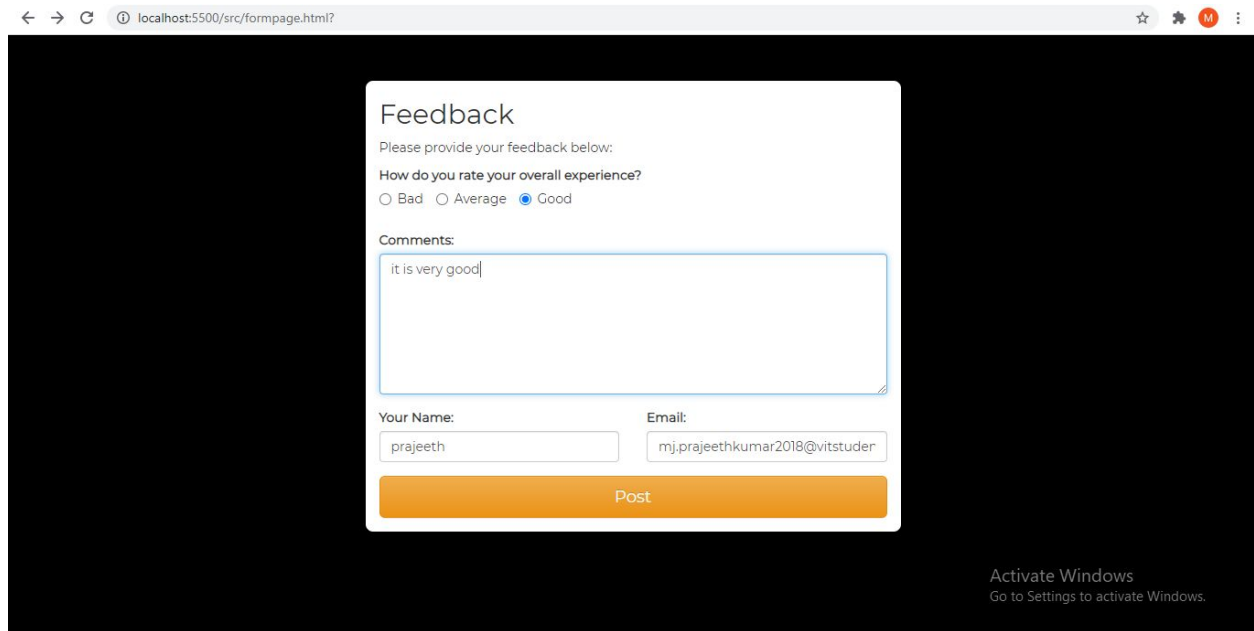


Fig 24: Accuracy Emotion IV



The screenshot shows a web browser window with the address bar displaying `localhost:5500/src/formpage.html?`. The page has a dark background with a white feedback form in the center. The form is titled "Feedback" and includes a text input for comments, radio buttons for rating the experience (Bad, Average, Good), and text inputs for the user's name and email. A green "Post" button is at the bottom of the form. The browser's status bar at the bottom right shows "Activate Windows" and "Go to Settings to activate Windows."

Feedback

Please provide your feedback below:

How do you rate your overall experience?

☐ Bad ☐ Average ☒ Good

Comments:

it is very good

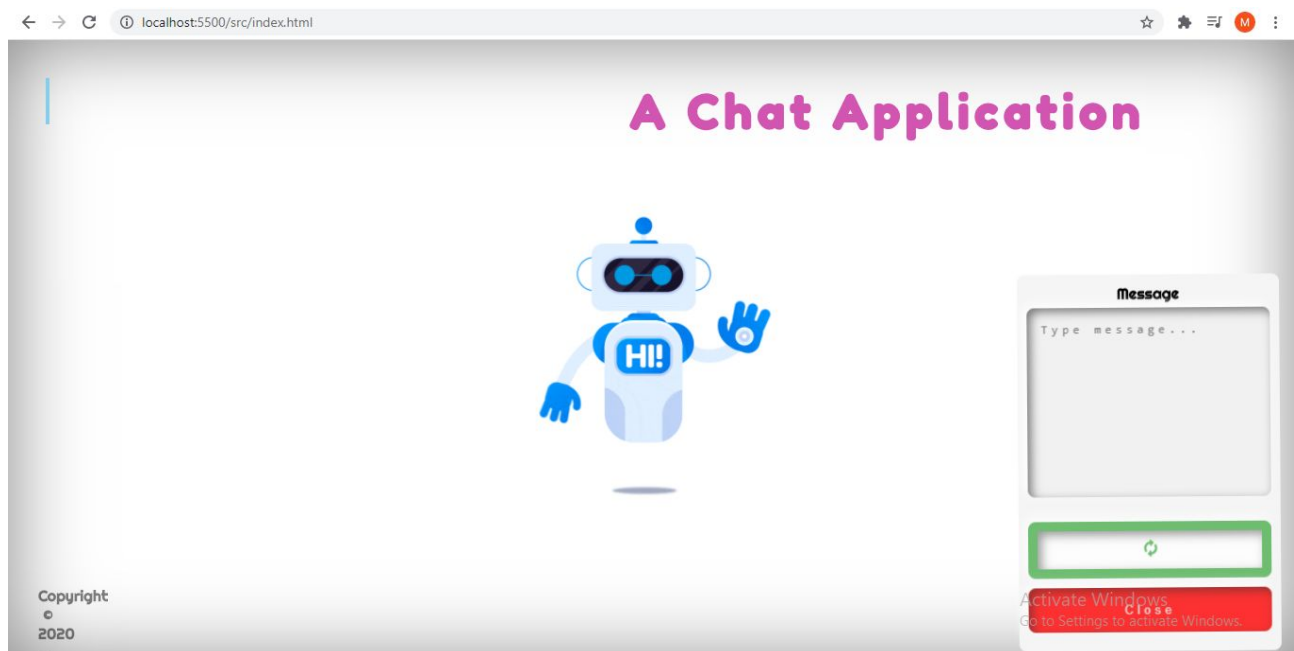
Your Name: prajeeth

Email: mj.prajeethkumar2018@vitstuder

Post

Activate Windows
Go to Settings to activate Windows.

Fig 25: Feedback Page



The screenshot shows a web browser window with the address bar displaying `localhost:5500/src/index.html`. The page has a light gray background. In the center, there is a blue robot character with "HI!" on its chest. To the right, there is a chat interface with a text input labeled "Type message..." and a green "Send" button. The browser's status bar at the bottom right shows "Activate Windows" and "Go to Settings to activate Windows."

A Chat Application

HI!

Message

Type message...

Send

Activate Windows
Go to Settings to activate Windows.

Fig 26: Chat Application Page

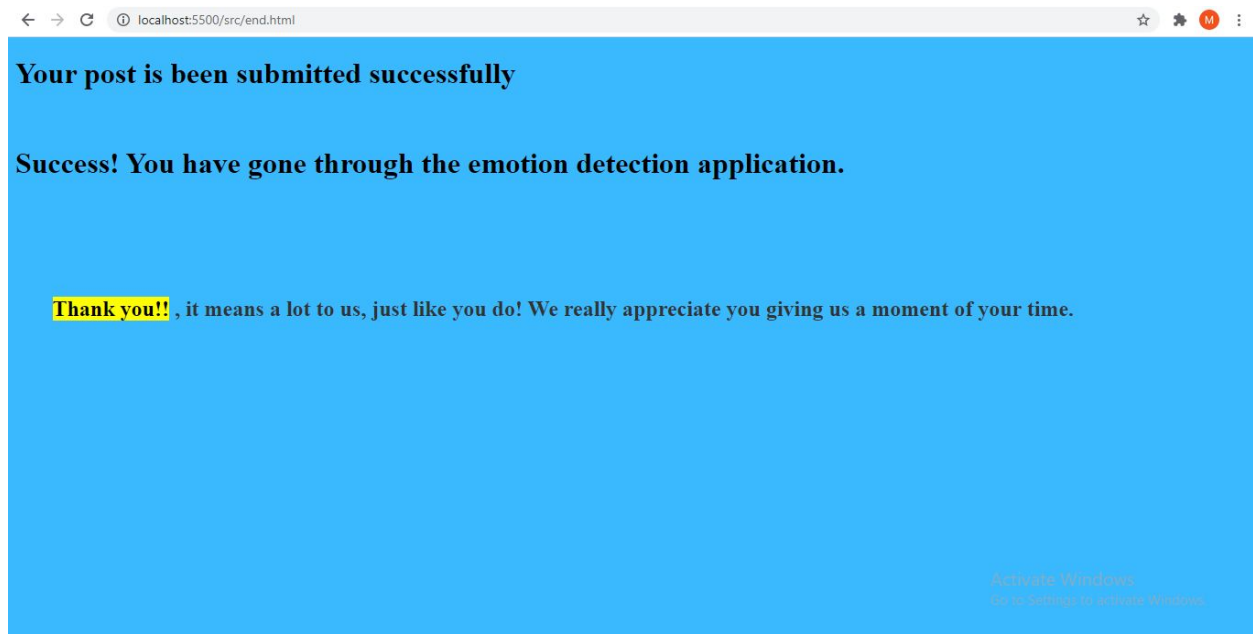


Fig 27: End Page

6. TEST CASES

Prototype testing

Username and password should be made mandatory.

Error messages should come if the face is not shown in webcam.

Test report(validate the proposed work)

The validation test is a complete test before giving it to the client.

Validating the login page

1. Login page

1.1. Giving username and password

1.1.1. Test case 1

Purpose: to verify that username and password is entered or not

A screenshot of a web browser displaying a login page at `localhost:5500/src/login.html`. The page features a header with six emojis arranged in two rows of three. Below the header, there are two input fields: "Username" and "Password". The "Username" field is empty and has a placeholder text "Enter Username". The "Password" field is also empty and has a placeholder text "Enter Password". A green "submit" button is located below the password field. A red "Remember me" checkbox is checked. A red "Cancel" button is located at the bottom left. A validation error message "Please fill out this field." is displayed in a red box next to the password field. The Windows taskbar is visible at the bottom, showing the search bar and various application icons. The system clock shows 12:48 AM on 10/30/2020.

Fig 28: Validation Testing I

A screenshot of the same login page as in Fig 28, but with the "Username" field filled with the text "prajeeth". The "Password" field remains empty. The "submit" button is still green. The "Remember me" checkbox is still checked. The red "Cancel" button is still present. The validation error message "Please fill out this field." is still displayed next to the password field. The Windows taskbar and system clock are still visible at the bottom.

Fig 29: Validation Testing II

Validating webcam

2. Webcam page

2.1. Face detected or not

2.1.1. Test case 2

Purpose: to verify that whether the face is detected or not in webcam It detects only the faces and not any other things.

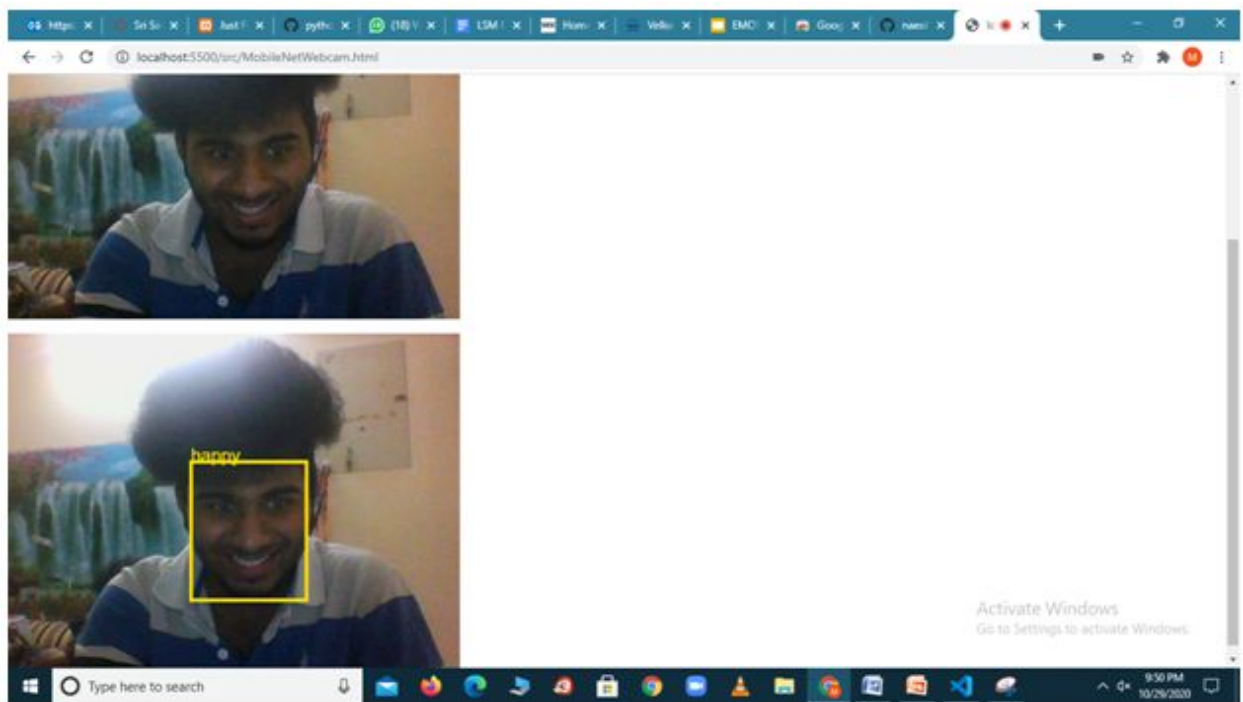


Fig 30: Validation Testing III

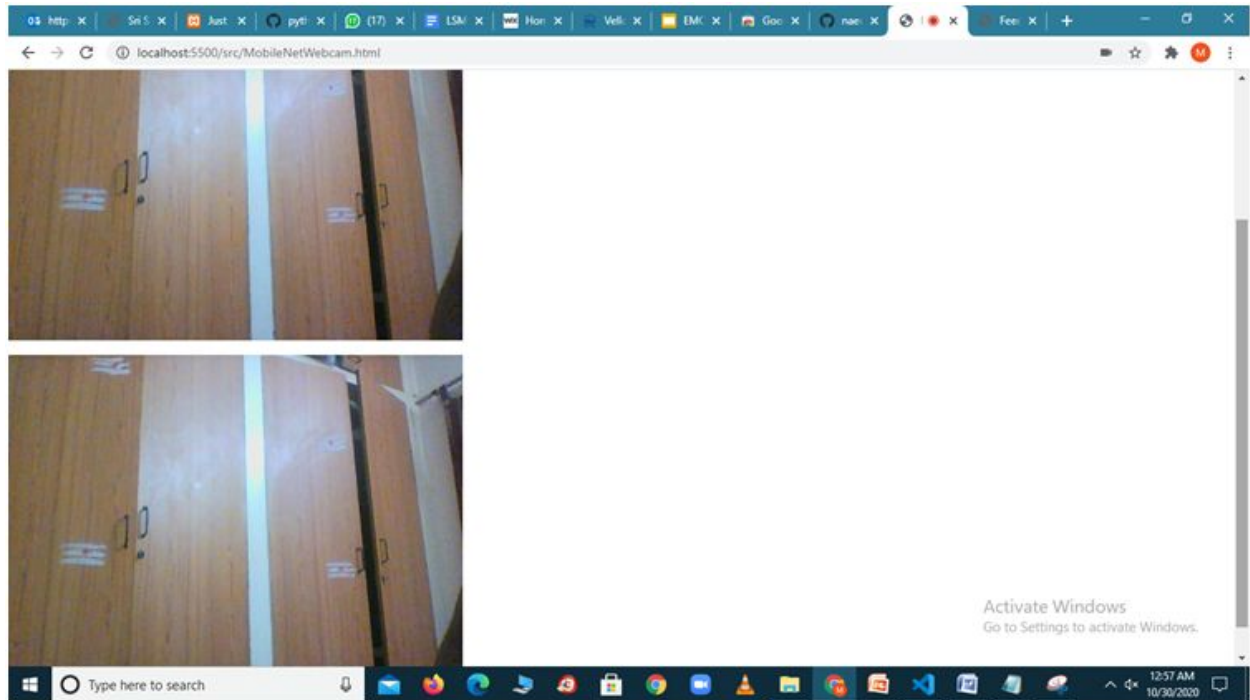


Fig 31: Validation Testing IV

Validating image emotion

Only the image with face reactions only the emotion is detected. The emotion isn't detected for any other images. It shows no face in the result if face is not in the image.

3. Webcam page

3.1. Face detected or not in image

3.1.1. Test case 3

Purpose: to verify that whether the face is detected or not in image emotion. It detects only the faces and not any other images.

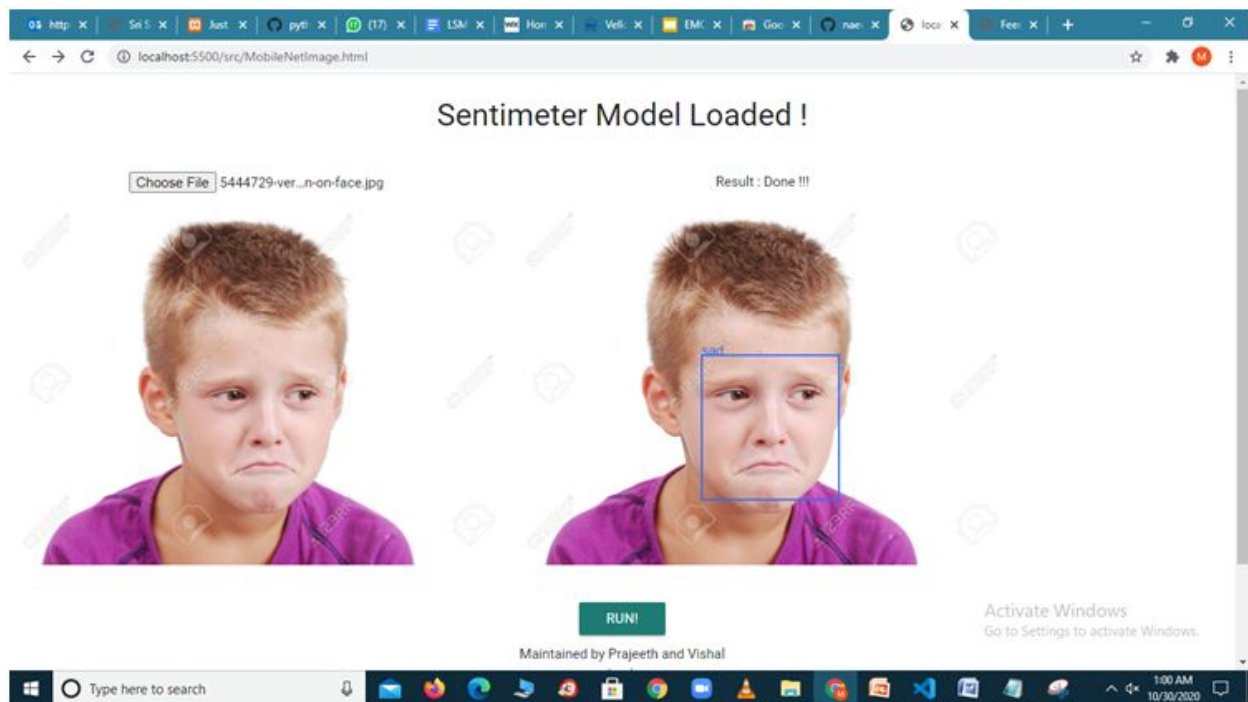


Fig 32: Validation Testing V

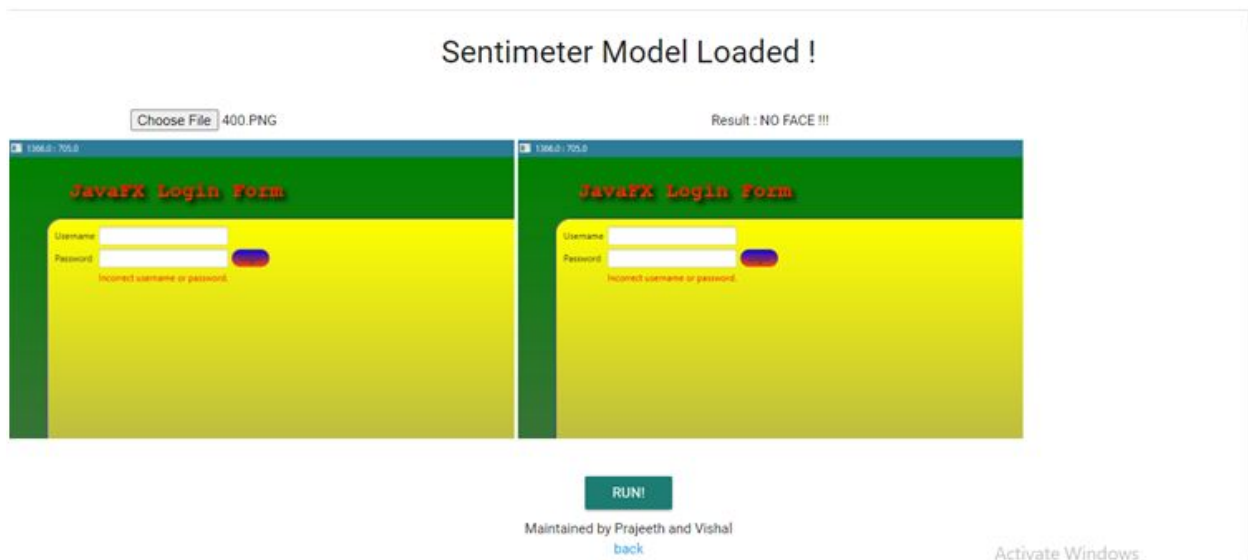


Fig 33: Validation Testing VI

7. REAL CLIENTS AND STAKEHOLDER PROFILES

A bright and colorful website using facial recognition and emotion detection AI to have fun making faces! Entertaining for all types, and especially useful for people with autism and/or asperger's to learn and practice emotional recognition. It is helpful for the physically challenged people to detect their emotion. The users or customers are one of the real clients of the website.

Stakeholder profiles:

Primary- general users

Facilitator- software development team(2 of us), project manager: Mrs.Mythili.T

Indirect- people with autism

8. USABILITY TESTING

We collected the feedback of our website from various users through google forms.

Questions:

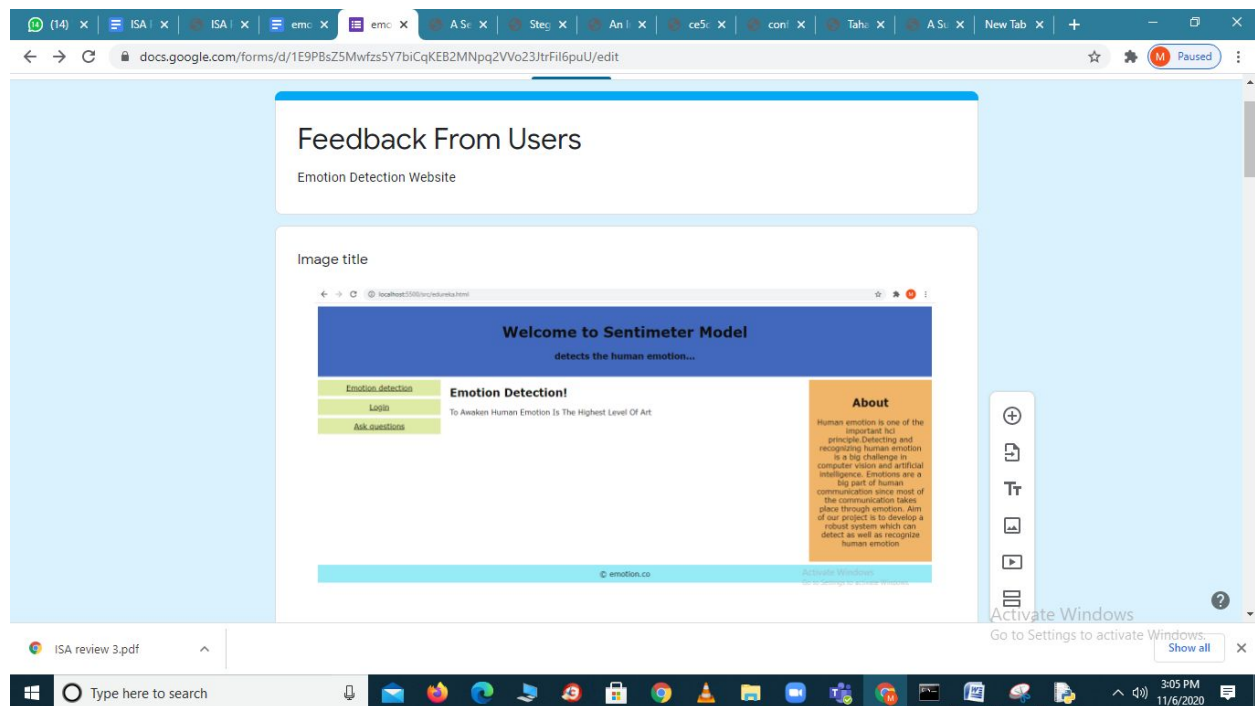


Fig 34: Feedback Form I

What was your first impression of the site? *

Long answer text

Did you like the visual aesthetics of the site? Any changes we can make to the visual appearance? *

Long answer text

What did you like about the site? *

Long answer text

Is there any feature that needs to be added to the site? *

Long answer text

Activate Windows
Go to Settings to activate Windows.
Show all

ISA review 3.pdf

Type here to search

3:05 PM
11/6/2020

Fig 35: Feedback Form II

emotion detection

All changes saved in Drive

Send

Questions Responses 9

Is there any feature that needs to be added to the site? *

Long answer text

What did you dislike about the site? *

Long answer text

How would rate the website (from 1 to 5) *

Long answer text

Activate Windows
Go to Settings to activate Windows.
?

Type here to search

3:05 PM
11/6/2020

Fig 36: Feedback Form III

Responses or Feedback:

The screenshot shows a Google Form titled "emotion detection" with a status of "All changes saved in Drive". The form is in the "Responses" tab, which shows 9 responses. The question is "What was your first impression of the site?". The responses are listed in a table:

Response
Excellent
Wowwww
Nice
I found this to be extremely innovative
It was user friendly and easy to use.
User friendly
Very good site with accurate detection of emotions
Good
It's cool and innovative

At the bottom right, there is a watermark that says "Activate Windows Go to Settings to activate Windows."

Fig 37: Feedback Form IV

The screenshot shows a Google Form titled "emotion detection" with a status of "All changes saved in Drive". The form is in the "Responses" tab, which shows 9 responses. The question is "Did you like the visual aesthetics of the site? Any changes we can make to the visual appearance?". The responses are listed in a table:

Response
Yes
It's perfect
nope, all good
The visual aesthetics are on point. Perfect
All is perfect.
The visual aesthetics need some work
No
Yes it's awesome

At the bottom right, there is a watermark that says "Activate Windows Go to Settings to activate Windows."

Fig 38: Feedback Form V

emotion detection

All changes saved in Drive

Send

Questions Responses 9

What did you like about the site?

9 responses

- The ease of usability of the website
- Everything
- Ability to detect emotions
- It performs its function accurately and efficiently.
- The model detects my expression correct all the time
- The whole concept of helping people understand emotional interaction
- Accurate detection of emotions be it from the webcam or images.
- Emotion detection
- The chat application

Activate Windows
Go to Settings to activate Windows.

Fig 39: Feedback Form VI

emotion detection

All changes saved in Drive

Send

Questions Responses 9

Is there any feature that needs to be added to the site?

9 responses

- No
- More pictures
- Nothing to be added
- nah
- Not necessarily
- This can be integrated with social media apps.
- An improved interface
- Nothing

Activate Windows
Go to Settings to activate Windows.

Fig 40: Feedback Form VII

The screenshot displays a Google Forms interface for a form titled "emotion detection". The top navigation bar includes a menu icon, the title "emotion detection", a star icon, and a status message "All changes saved in Drive". On the right, there are icons for a palette, eye, settings, a "Send" button, and a profile picture. The form has two tabs: "Questions" and "Responses", with the "Responses" tab selected and showing a count of 9.

The first question is "What did you dislike about the site?", which has 9 responses. The responses are listed in a table:

Response
Nothing
N/A
Stop joking
nothing
Nothing.
Color scheme
Nothing

The second question is "How would rate the website (from 1 to 5)", which has 9 responses. The responses are listed in a table:

Response
5
4
4.5

An "Activate Windows" watermark is visible in the bottom right corner of the screenshot.

Fig 41: Feedback Form VIII

9. HCI PRINCIPLES INCORPORATED

- ***Visibility of system status:*** The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.
 - A notice be provided by the browser that the camera is to be turned on and the application is going to be launched promptly.
- ***Match between system and the real world:*** The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms.
 - Since the project contains some complexity, and new users might be overwhelmed by its working, we are providing an instruction screen for the users of what the experience might be like.
- ***User control and freedom:*** Users often choose system functions by mistake and will need a clearly marked exit to leave the unwanted state without having to go through an extended dialogue.
 - If the user wants to leave the application, we have planned to provide them a button that will close the web interface the program is launched in.
- ***Consistency and standards:*** Users should not have to wonder whether different words, situations, or actions mean the same thing.
 - All platform conventions are going to be followed that support recall and recognition actions for a smoother interaction
- ***Error prevention:*** Even better than good error messages is a careful design which prevents a problem from occurring in the first place.
 - Dialogue box is going to be set for the user to confirm if they want to terminate the application
- ***Recognition rather than recall:*** Minimize the user's memory load by making objects, actions, and options visible.
 - Instructions will be placed in the screen of the user, so user can comprehend what they need to if they get stuck anywhere
- ***Flexibility and efficiency of use:*** Cater to both inexperienced and experienced users, and allow users to tailor frequent actions.
 - Since the project isn't large scale, accelerators aren't required for efficiency. We cater to the users flexibility with ease in operating the application

- ***Aesthetic and minimalist design:*** Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.
 - The UI/UX of the application is very minimalistic, containing only the information and components for a smooth interaction
- ***Help users recognize, diagnose, and recover from errors:*** Error messages should be expressed in plain language, precisely indicate the problem, and constructively suggest a solution.
 - Accessing the webcam from the user might be an issue that we face, and we plan to leave a solution to the users on how to fix this if they encounter this errors along with others
- ***Help and documentation:*** It may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large
 - We plan to have a txt file with proper instructions if the users decide to run the application in their computer system.

10. SUMMARY AND CONCLUSION

We were able to create Sentimeter, an user friendly interface where people with minimal to no understanding can view and review our application. This has primarily been made to target a mentally challenged audience and assist them in their interaction skills that they are bound to face. In this project report, we went over the 3 modules we developed, image emotion, webcam emotion, and webcam emotion to find accuracy.

- We would like to clean up the interface more and make it look more radiant and professional.
- We would like to add emojis for the respective emotions detected.
- We would also like to create a mobile application for our project since it's more widespread and our application can be used by many more.

11. REFERENCES

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