INTELLIGENT HUMAN EXPRESSION RECOGNITION SYSTEM AND CHARACTERIZATION USING FACIAL FEATURES

A PROJECT REPORT

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BONAFIDE CERTIFICATE

Certified that this project report **"INTELLIGENT HUMAN EXPRESSION RECOGNITION SYSTEM AND CHARACTERIZATION USING FACIAL FEATURES"** is the bonafide work of **"MONIKKA R (19CSR061), MADHUNISHA P K (19CSR055), MALAVIKA J (19CSR056)"** who carried out the project work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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ABSTRACT

Understanding emotions of people in a group is an essential facet of learning in today's time. Lot of information about emotional state, feeling and identity of human beings is conveyed via facial expression. Emotion recognition is a striking and demanding problem which in turn can help harness insights about individual and organizational behavior and can add big value to various businesses ranging from education, hospitality, entertainment, eateries, etc. In this project, we have proposed an AI rooted detection and recognition feedback system using mathematical solutions.

One can also save his or her time to text someone with an image as a single image explains many things. Images are also used to identify a person on the social media and in many other webs. For this fact face detection is getting very popular every day. With the help of face detection, it is possible to identify a person very easily. What if one could tell what type of emotional state a person is in? It would help one to approach that person. For example, if a person is sad can do something to make him or her feel happy and so on. In this project it has been searched that is it possible to identify a person, and is it possible to identify a person's emotional state. Then it has been also researched to suggest music on the basis of his or her emotion.

Human Beings express Emotions in Day-to-Day Interactions. Understanding emotions and knowing how to react to people's expressions greatly enriches the interaction. Facial expressions are the facial changes in response to persons. Internal Motion State, Intentions, Social Communication. Facial Detection is based on Image Processing and Computer Vision Techniques. Expression Recognized using face API (Open Source).

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LIST OF ABBREVIATIONS

ABBREVIATION	EXPANSION
FER	Facial Expression Recognition
CSS	Cascading Style Sheet
FRVT	Face Recognition Vendor Test
API	Application Programming Interface
HTML	Hyper Text Markup Language
JS	Java Script
SVM	Support Vector Machine
AI	Artificial Intelligence
CNN	Convolutional Neural Network
IDE	Integrated Development Environment
GUI	Graphical User Interface

CHAPTER 1

INTRODUCTION

A Facial expression is the visible manifestation of the affective state, cognitive activity, intention, personality and psychopathology of a person and plays a communicative role in interpersonal relations. It has been studied for a long period of time and obtaining the progress recent decades. Though much progress has been made, recognizing facial expression with a high accuracy remains to be difficult due to the complexity and varieties of facial expressions. Generally human beings can convey intentions and emotions through nonverbal ways such as gestures, facial expressions and involuntary languages.

This system can be significantly useful, nonverbal way for people to communicate with each other. The important thing is how fluently the system detects or extracts the facial expression from image. The system is growing attention because this could be widely used in many fields like lie detection, medical assessment and human computer interface.

Emotion reveals itself in the form official expressions, vocal expressions, writings, and in movements and actions. Subsequently, scientific research in emotion (sentiments) has been followed along with multiple dimensions and has drawn upon research from several fields. Mainly used in the form of communication on social network as textual form, contributed a platform for computer systems to behave more smartly based on the user's feelings. Enormous amounts of text data are available in the form of blogs, micro blogging sites like Facebook, Twitter, emails, SMS etc. This textual data is beneficial to generate better human interaction system which needs to be able to analyze the text and conclude the emotion of the user. Even though the system can discover the user’s emotional states, intricacy of language makes it hard for researchers to distinguish emotional states from pure textual data.

The system classifies facial expression of the same person into the basic emotions namely anger, disgust, fear, happiness, sadness and surprise. The main purpose of this system is efficient interaction between human beings and machines using eye gaze, facial expressions, cognitive modeling etc. Here, detection and classification of facial 2 expressions can be used as a natural way for the interaction between man and machine. And the system intensity varies from person to person and also varies along with age, gender, size and shape of face, and further, even the expressions of the same person do not remain constant with time. However, the inherent variability of facial images caused by different factors like variations in illumination, pose, alignment, occlusions make expression recognition a challenging task.

Artificial Intelligence presents a wide range of algorithms capable of facial Emotion Recognition. Considering how dynamic and irregular human emotions are, the task of FER has been deemed a huge one and has necessitated much research. This work will review some of the research works on FER, the methods used, their performances and efficiencies, and the possible setbacks to develop some open issues and likely trends for future research in FER.

1.1. MOTIVATION

In today's networked world the need to maintain security of information or physical property is becoming both increasingly important and increasingly difficult. In countries like Nepal the rate of crimes are increasing day by day. No automatic systems are there that can track person's activity. If we will be able to track Facial expressions of persons automatically then we can find the criminal easily since facial expressions changes doing different activities. However, these works do not yield satisfactory results on more challenging and real-time databases consisting of images with greater variations. Thus, there is a need to improve the performance of an FER system.

The performance of an FER system relies on feature engineering. Engineering new features from existing ones can improve the performance of a system. This motivates us to work further in this direction. It is also clear from state of-the-art methods that most of the works related to FER tasks are based on edge information because it varies in individual expression. Important features, such as corners, lines, and curves, can be extracted from the edges of the images. So we decided to make a Facial Expression Recognition System. We are interested in this project after we went through few papers in this area. The papers were published as per their system creation and way of creating the system for accurate and reliable facial expression recognition system. As a result, we are highly motivated to develop a system that recognizes facial expression and trackone person's activity.

1.2 OBJECTIVES

The main objective of this project is,

- To find an emotion detection from the live video.
- Identifying emotions of a human. The emotion can be captured either from face or from verbal communication, psychological characteristics such as heartbeat and blood Pressure, speech, hand gestures, body movements, Facial expressions identify emotions of a person.
- From the Live video we can also detect Age as well as Gender.
- We can implement this project in chat bot inside the car or public malls or Airports to detect the emotion of the people and create a better chatting experience.
- We can implement this in systems which can adapt their responses and behavioural patterns according to the emotions of the humans and make the interaction more natural.

CHAPTER 2

LITERATURE SURVEY

The idea of the project titled "**INTELLIGENT HUMAN EXPRESSION RECOGNITION SYSTEM AND CHARACTERIZATION USING FACIAL FEATURE**S" gathered by analyzing many papers and reports. Below is the brief description of those papers and reports that have analyzed so far.

R. Majid Mehmood R. Du, and H. J. Lee, "Optimal feature selection and deep learning ensembles method for emotion recognition from human brain EEG sensors," 2017. Recent advancements in human-computer interaction research have led to the possibility of emotional communication via brain-computer interface systems for patients with neuropsychiatric disorders or disabilities. In this paper, we efficiently recognize emotional states by analyzing the features of electroencephalography (EEG) signals, which are generated from EEG sensors that noninvasively measure the electrical activity of neurons inside the human brain, and select the optimal combination of these features for recognition. In this paper, the scalp EEG data of 21 healthy subjects (12-14 years old) were recorded using a 14-channel EEG machine while the subject watched images with four types of emotional stimuli (happy, calm, sad, or scared). After preprocessing, the Hjorth parameters (activity, mobility, and complexity) were used to measure the signal activity of the time series data. We selected the optimal EEG features using a balanced one-way ANOVA after calculating the Hjorth parameters for different frequency ranges. Features selected by this statistical method outperformed univariate and multivariate features. The optimal features were further processed for emotion classification using support vector machine, k-nearest neighbor, linear discriminant analysis, Naive Bayes, random forest, deep learning, and four ensemble's methods (bagging, boosting, stacking, and voting). The results show

that the proposed method substantially improves the emotion recognition rate with respect to the commonly used spectral power band method.

A. Christy, S. Vaithyasubramanian, A. Jesudoss, and M. D. A. Praveena, "Multimodal speech emotion recognition and classification using convolutional neural network techniques," International Journal of Speech Technology, 2020. Emotion recognition plays a vital role in dealing with day-to-day interpersonal human interactions. Understanding the feeling of a person from his speech can reveal wonders in shaping social interactions. A person emotion can be identified with the tone and pitch of his voice. The acoustic speech signal is split into short frames, fast Fourier transformation is applied, and relevant features are extracted using Mel-frequency cestrum coefficients (MFCC) and modulation spectral (MS). In this paper, algorithms like linear regression, decision tree, random forest, support vector machine (SVM) and convolutional neural networks (CNN) are used for classification and prediction once relevant features are selected from speech signals. Human emotions like neutral, calm, happy, sad, fearful, disgust and surprise are classified using decision tree, random forest, support vector machine (SVM) and convolutional neural networks (CNN). We have tested our model with RAVDEES dataset and CNN has shown 78.20% accuracy in recognizing emotions compared to decision tree, random forest and SVM.

S.P.Yadav, proposed "Emotion recognition model based on facial expressions," Multimedia Tools and Applications, 2021. Face mining is characterized as the revelation of picture designs in a given congregation of pictures. It is an exertion that generally attracts upon information PC (Personal Computer) vision, picture handling, information mining, AI (Artificial Intelligence), database, and human-made reasoning. Facial acknowledgement breaks down and contemplates the examples from the images of the facial. Facial component extraction is a programmed acknowledgment of human faces by

recognizing its highlights, for example, eyebrows, eyes, and lips. In this paper, we are assessing the execution of PCA (Principal Component Analysis), GMM (Gaussian Mixture Models), GLCM (Gray Level Co-Occurrence Matrix), and SVM (Support Vector Machines) to perceive seven distinctive outward appearances of two people, for example, angry, sad, happy, disgust, neutral, fear, and surprise in database. Our point is to talk about the best systems that work best for facial acknowledgement. The present investigation demonstrates the plausibility of outward appearance acknowledgement for viable applications like surveillance and human PC communication.

P. Babajee, G. Suddul, S. Armoogum, and R. Foogooa, "Identifying human emotions from facial expressions with deep learning," in Proceedings of the 2020 Zooming Innovation in Consumer Technologies Conference (ZINC), May 2020.The identification of facial expressions that reveal human emotions can help computers to better assess the human state of mind, so as to provide a more customized interaction. We explore the recognition of human facial expressions through a deep learning approach using a Convolutional Neural Network (CNN) algorithm. The system uses a labelled data set containing around 32,298 images with multiple facial expressions for training and testing. The pre-training phase involves a face detection subsystem with noise removal, including feature extraction. The generated classification model used for prediction can identify seven emotions of the Facial Action Coding System (FACS). Results of our work in progress demonstrate an accuracy of 79.8% for the recognition of all basic seven human emotions, without the application of optimization techniques.

A. Hassouneh, A. M. Mutawa, and M. Murugappan, "Development of a real-time emotion recognition system using facial expressions and EEG based on machine learning and deep neural network methods," 2020.Real-time emotion recognition has been an active field of research over the past several decades.

This work aims to classify physically disabled people (deaf, dumb, and bedridden) and Autism children's emotional expressions based on facial landmarks and electroencephalograph (EEG) signals using a convolutional neural network (CNN) and long short-term memory (LSTM) classifiers by developing an algorithm for real-time emotion recognition using virtual markers through an optical flow algorithm that works effectively in uneven lightning and subject head rotation (up to 25°), different backgrounds, and various skin tones. Six facial emotions (happiness, sadness, anger, fear, disgust, and surprise) are collected using ten virtual markers. Fifty-five undergraduate students (35 male and 25 female) with a mean age of 22.9 years voluntarily participated in the experiment for facial emotion recognition.

S. Li and W. Deng, "Deep Facial Expression Recognition: A Survey," IEEE Transactions on Affective Computing,2020.In this survey, we provide a comprehensive review of deep FER, including datasets and algorithms that provide insights into these intrinsic problems. First, we introduce the available datasets that are widely used in the literature and provide accepted data selection and evaluation principles for these datasets. We then describe the standard pipeline of a deep FER system with the related background knowledge and suggestions for applicable implementations for each stage .For the state-of-the-art in deep FER, we introduce existing novel deep neural networks and related training strategies that are designed for FER based on both static images and dynamic image sequences and discuss their advantages and limitations.

C. Asaju and H. Vadapalli, "A temporal approach to facial emotion expression recognition," in Proceedings of the Southern African Conference for Artificial Intelligence Research, January 2021.Systems embedded with facial emotion expression recognition models enable the application of emotion-related knowledge to improve human and computer interaction and in doing so, users

have a satisfying experience. Facial expressions exhibited by individuals are mostly used as non-verbal cues of communication. It is envisaged that accurate and real-time estimation of expressions and/or emotional changes will improve existing online platforms. However, further mapping of estimated expressions to emotions is highly useful in many applications such as sentiment analysis, market analysis, student comprehension among others. Feedback based on estimated emotions plays a crucial role in improving the usability of such models. However, there have been no or limited feedback mechanisms incorporated into these models. The proposed work, therefore, investigates the use of deep learning to identify and estimate emotional changes in human faces and further analysis of estimated emotions to provide feedback. The methodology involves a temporal approach including a VGG-19 pre-trained network for feature extraction, a BILSTM architecture for facial emotion expression recognition, and mapping criteria to map estimated expressions and the resultant emotion (positive, negative, neutral). The CNN-BILSTM model achieved an accuracy of 91% on a test set consisting of seven basic emotions of anger, disgust, fear, happy, surprise, sadness and neutral from the Denver Intensity of Spontaneous Facial Action (DISFA) data. The data set for affective States in E-Environment (DAISEE) labeled with boredom, frustration, confusion, and engagement was used to further test the proposed model to estimate the seven basic expressions and re-evaluate the mapping model used for mapping expressions to emotions.

S. Mirsamadi, E. Barsoum, and C. Zhang, “Automatic speech emotion recognition using recurrent neural networks with local attention, March 2017. Automatic emotion recognition from speech is a challenging task which relies heavily on the effectiveness of the speech features used for classification. In this work, we study the use of deep learning to automatically discover emotionally relevant features from speech. It is shown that using a deep recurrent neural network, we can learn both the short-time frame-level acoustic features that are

emotionally relevant, as well as an appropriate temporal aggregation of those features into a compact utterance-level representation. Moreover, we propose a novel strategy for feature pooling over time which uses local attention in order to focus on specific regions of a speech signal that are more emotionally salient. The proposed solution is evaluated on the IEMOCAP corpus, and is shown to provide more accurate predictions compared to existing emotion recognition algorithms.

CHAPTER 3
SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

In the existing system, classification is done through simple image processing to classify images only. Existing work includes the application of feature extraction of facial expressions with the combination of neural networks for the recognition of different facial emotions (happy, sad, angry, fear, surprised, neutral, etc.). Humans are capable of producing thousands of facial actions during communication that varies in complexity, intensity, and meaning. The existing system is capable of analyzing the limitations of the existing system of Emotion recognition using brain activity. Human emotions and intentions are expressed through facial expressions and deriving an efficient and effective feature is the fundamental component of facial expression system.

Facial expressions convey non-verbal cues, which play an important role in interpersonal relations. Automatic recognition of facial expressions can be an important component of natural human-machine interfaces; it may also be used in behavioral science and in clinical practice. An automatic Facial Expression Recognition system needs to solve the following problems: detection and location of faces in a cluttered scene, facial feature extraction, and facial expression classification.

3.1.1 DRAWBACKS OF EXISTING SYSTEM

- The accuracy of emotion recognition is low.
- It focuses on recognizing the peak high-intensity expression and ignore lower-intensity expressions. This leads to inaccurate recognition of emotion.

- Surroundings and body posture can provide the same amount of information on emotions as a face.
- Validation of emotion dataset is a challenge in order to have accurate emotion recognition system.
- There are limitations with different types and versions of the software such as dataset input is only textual data, image, pattern, video and audio inputs are invalid.
- Dynamically cannot produce the result.
- Accuracy of trained dataset is only calculated.

3.2 PROPOSED SYSTEM

Classification of the emotion through face recognition is very important that it can be helpful to know a person's feeling towards a situation. In this regard we are proposing a method to identify the emotion of person in a situation. We propose to classify the type of emotion being expressed by using Face API and its methods. This system will work on detecting emotions from live video footage. We will work on how to make the system more efficient so that it works on bright background or for people with darker skin.

3.2.1 ADVANTAGES OF PROPOSED SYSTEM

- Accuracy is improved up to 90%.
- Easy to use.
- It focuses has definitely shifted from posed expression recognition to spontaneous expression recognition.
- Adding more emotions to detect is one of my future plans as it will only detect four emotions in the existing system.
- The project allows user to interact directly with the system via input devices. It will help to understand one's mind thoughts.

- This project can be accessed from anywhere so it is robust and can work properly.
- Rooms in homes can set the lights, television to a person's taste when they enter the room.
- Doctors can use the system to understand the intensity of pain or illness of a deaf patient.
- It also enables companies to establish deeper emotional connections with their consumers through virtual assistants.

3.3 FEASIBILITY STUDY

The feasibility study deals with all the analysis that takes up in developing the project. Each structure has to be thought of in the developing of the project, as it has to serve the end user in a user-friendly manner. One must know the type of information to be gathered and the system analysis consist of collecting, Organizing and evaluating facts about a system and its environment.

Four considerations involved in feasibility analysis are,

- Economic Feasibility
- Operational Feasibility
- Technical Feasibility
- Schedule Feasibility

3.3.1 ECONOMIC FEASIBILITY

The user has to buy a smart phone with an android version above 8.0.0, this is a direct cost. There are many direct benefits this application which will reduce the cost using fitness centers. The user can be given responses on asking questions of their application queries, which in turn may be expected to provide better user performance.

3.3.2 OPERATIONAL FEASIBILITY

The Proposed system accessing process to solves problems what occurred in existing system. The current day-to-day operations of the organization can be fit into this system. Mainly operational feasibility should include on analysis of how the proposed system will affects the organizational structures and procedures.

The proposed system requires user interaction and anybody who has the basic android device knowledge, can access these exercises and workout on their need. The user can also the report of the exercises. The following points were considered for the project's technical feasibility:

- The system will detect and capture the image of face.
- The captured image is then (identified which category).

3.3.3 TECHNICAL FEASIBILITY

The cost and benefit analysis may be concluded that android operating system is favorable in today's fast-moving world. The assessment of technical feasibility must be based on an outline design of the system requirements in terms of input, output, files, programs and procedure.

The current system aims to overcome the problems of the existing system. The current system is to reduce the technical skill requirements so a greater number of users can access the system.

3.3.4 SCHEDULE FEASIBILITY

Schedule feasibility is a measure of how reasonable the project timetable is. The system is found schedule feasible because the system is designed in such a way that it will finish prescribed time.

3.4 SYSTEM SPECIFICATION

3.4.1 HARDWARE SPECIFICATION

This section gives the details and specification of the hardware on which the system is expected to work.

Processor Type	: Intel i3 or Intel i5
RAM	: 4GB DD2 RAM
Speed	: 3.40GHZ
Hard disk	: 500 GB
Keyboard	: 101/102 Standard Keys
Mouse	: Optical Mouse
Webcam	: Standard Web Cam

3.4.2 SOFTWARE SPECIFICATION

This section gives the details of the software that are used for the development.

Environment	: Visual Studio
Software	: Node JS, Face API
Coding	: CSS, JS
Languages used	: HTML, CSS, JS
Operating System	: Windows 10/ Windows 11

3.5 SOFTWARE DESCRIPTION

VISUAL STUDIO

Visual Studio is an integrated development environment (IDE) from Microsoft. It is used to develop computer programs including websites, web apps, web services and mobile apps. Visual Studio uses Microsoft software development platforms such as Windows API, Windows Forms, Windows Presentation Foundation, Windows Store and Microsoft Silverlight. It can produce both native code and managed code.

Visual Studio includes a code editor supporting IntelliSense (the code completion component) as well as code refactoring. The integrated debugger works as both a source-level debugger and as a machine-level debugger. Other built-in tools include a code profiler, designer for building GUI applications, web designer, class designer, and database schema designer. It accepts plug-ins that expand the functionality at almost every level—including adding support for source control systems (like Subversion and git) and adding new toolsets like editors and visual designers for domain-specific languages or toolsets for other aspects of the software development lifecycle (like the Azure DevOps client: Team Explorer).

FEATURES

- A full-featured programming platform for several operating systems, the web, and the cloud, Visual Studio IDE is available. Users can easily browse the UI so they can write their code quickly and precisely.
- To help developers quickly identify potential errors in the code, Visual Studio offers a robust debugging tool.
- Developers can host their application on the server with confidence because they have eliminated anything that could lead to performance issues.
- No matter what programming language developers are using, users of Visual Studio can get live coding support. For faster development, the Platform offers an autocomplete option. The built-in intelligent system offers descriptions and tips for APIs.
- Through Visual Studio IDE you can easily Collab with your teammates in a same project. This IDE helps the developers to share, push and pull their code with their teammates.

- Every user of Visual Studio has the ability to customize it. They have the option to add features based on their needs. For example, they can download add-ons and install extensions in their IDE. Even programmers can submit their own extensions.

NODE.JS

Node.js is a server-side platform built on Google Chrome's JavaScript Engine (V8 Engine). Node.js was developed by Ryan Dahl in 2009 and its latest version is v0.10.36. Node.js is a platform built on Chrome's JavaScript runtime for easily building fast and scalable network applications. Node.js uses an event-driven, non-blocking I/O model that makes it lightweight and efficient, perfect for data-intensive real-time applications that run across distributed devices.

Node.js is an open source, cross-platform runtime environment for developing server-side and networking applications. Node.js applications are written in JavaScript, and can be run within the Node.js runtime on OS X, Microsoft Windows, and Linux.

Node.js also provides a rich library of various JavaScript modules which simplifies the development of web applications using Node.js to a great extent.

Node.js = Runtime Environment + JavaScript Library

Node.js allows the creation of Web servers and networking tools using JavaScript and a collection of "modules" that handle various core functionalities. Modules are provided for file system I/O, networking (DNS, HTTP, TCP, TLS/SSL, or UDP), binary data (buffers), cryptography functions, data streams, and other core functions. Node.js's modules use an API designed to reduce the complexity of writing server applications.

JavaScript is the only language that Node.js supports natively, but many compile-to-JS languages are available. As a result, Node.js applications can be written in CoffeeScript,Dart, TypeScript, ClojureScript and others.

Node.js is primarily used to build network programs such as Web servers. The most significant difference between Node.js and PHP is that most functions in PHP block until completion (commands execute only after previous commands finish), while Node.js functions are non-blocking (commands execute concurrently or even in parallel, and use callbacks to signal completion or failure).

Node.js is officially supported on Linux, macOS and Microsoft Windows 8.1 and Server 2012 (and later), with tier 2 support for SmartOS and IBM AIX and experimental support for FreeBSD. OpenBSD also works, and LTS versions available for IBM i (AS/400). The provided source code may also be built on similar operating systems to those officially supported or be modified by third parties to support others such as NonStop OS and Unix servers.

Node.js brings event-driven programming to web servers, enabling development of fast web servers in JavaScript. Developers can create scalable servers without using threading, by using a simplified model of event-driven programming that uses callbacks to signal the completion of a task. Node.js connects the ease of a scripting language (JavaScript) with the power of Unix network programming.

Node.js was built on top of Google's V8 JavaScript engine since it was open-sourced under the BSD license. It is proficient with internet fundamentals such as HTTP, DNS, and TCP. JavaScript was also a well-known language, making Node.js accessible to the web development community.

FEATURES

- Asynchronous and Event Driven − All APIs of Node.js library are asynchronous, that is, non-blocking. It essentially means a Node.js based server never waits for an API to return data. The server moves to the next API after calling it and a notification mechanism of Events of Node.js helps the server to get a response from the previous API call.

- Very Fast − Being built on Google Chrome's V8 JavaScript Engine, Node.js library is very fast in code execution.
- Single Threaded but Highly Scalable − Node.js uses a single threaded model with event looping. Event mechanism helps the server to respond in a non-blocking way and makes the server highly scalable as opposed to traditional servers which create limited threads to handle requests. Node.js uses a single threaded program and the same program can provide service to a much larger number of requests than traditional servers like Apache HTTP Server.
- No Buffering − Node.js applications never buffer any data. These applications simply output the data in chunks.
- License − Node.js is released under the MIT license.

JAVASCRIPT

JavaScript is a dynamic computer programming language. It is lightweight and most commonly used as a part of web pages, whose implementations allow client-side script to interact with the user and make dynamic pages. It is an interpreted programming language with object-oriented capabilities.

JavaScript was first known as LiveScript, but Netscape changed its name to JavaScript, possibly because of the excitement being generated by Java. JavaScript made its first appearance in Netscape 2.0 in 1995 with the name LiveScript. The general-purpose core of the language has been embedded in Netscape, Internet Explorer, and other web browsers.

The ECMA-262 Specification defined a standard version of the core JavaScript language.

- JavaScript is a lightweight, interpreted programming language.
- Designed for creating network-centric applications.
- Complementary to and integrated with Java.

- Complementary to and integrated with HTML.
- Open and cross-platform
- Client-Side JavaScript
- Client-side JavaScript is the most common form of the language. The script should be included in or referenced by an HTML document for the code to be interpreted by the browser.

It means that a web page need not be a static HTML, but can include programs that interact with the user, control the browser, and dynamically create HTML content.

The JavaScript client-side mechanism provides many advantages over traditional CGI server-side scripts. For example, you might use JavaScript to check if the user has entered a valid e-mail address in a form field.

The JavaScript code is executed when the user submits the form, and only if all the entries are valid, they would be submitted to the Web Server.JavaScript can be used to trap user-initiated events such as button clicks, link navigation, and other actions that the user initiates explicitly or implicitly.

ADVANTAGES OF JAVASCRIPT

The merits of using JavaScript are −

- Less server interaction − You can validate user input before sending the page off to the server. This saves server traffic, which means less load on your server.
- Immediate feedback to the visitors − They don't have to wait for a page reload to see if they have forgotten to enter something.

- Increased interactivity − You can create interfaces that react when the user hovers over them with a mouse or activates them via the keyboard.
- Richer interfaces − You can use JavaScript to include such items as drag-and-drop components and sliders to give a Rich Interface to your site visitors.

LIMITATIONS OF JAVASCRIPT

- We cannot treat JavaScript as a full-fledged programming language. It lacks the following important features −
- Client-side JavaScript does not allow the reading or writing of files. This has been kept for security reason.
- JavaScript cannot be used for networking applications because there is no such support available.
- JavaScript doesn't have any multi-threading or multiprocessor capabilities.
- Once again, JavaScript is a lightweight, interpreted programming language that allows you to build interactivity into otherwise static HTML pages.

FACE API

FACE API.js is a library that enables developers to use face detection in their apps without requiring a background in machine learning.

Face-ape is a JavaScript library created by Vincent Mahler., to detect faces via browser. It is built over tensorflow.js core API. It supports Face Detection, Face Recognition, Face Expression, Age, and Gender Detection. Detecting objects, like a face, is quite complex. Think about it: perhaps we could write a program that scans pixels to find the eyes, nose, and mouth. It can be done, but to

make it totally reliable is practically unachievable, given the many factors to account for. Think of lighting conditions, facial hair, the vast variety of shapes and colors, makeup, angles, face masks, and so much more.

HTML AND CSS

The Hyper Text mark-up Language or HTML is the standard mark-up language for documents designed to be displayed in a web browser. It can be assisted by technologies such as Cascading Style Sheets (CSS) and scripting languages such as JavaScript.

Web browsers receive HTML documents from a web server or from local storage and render the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

In a 2001 discussion of the Semantic Web, Tim Berners-Lee and others gave examples of ways in which intelligent software "agents" may one day automatically crawl the web and find, filter, and correlate previously unrelated, published facts for the benefit of human users.[86] Such agents are not commonplace even now, but some of the ideas of Web 2.0, mashups and price comparison websites may be coming close. The main difference between these web application hybrids and Berners-Lee's semantic agents lies in the fact that the current aggregation and hybridization of information is usually designed by web developers, who already know the web locations and the API semantics of the specific data they wish to mash, compare and combine.

HTML elements are the building blocks of HTML pages. With HTML constructs, images and other objects such as interactive forms may be embedded into the rendered page. HTML provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. HTML elements are delineated by tags, written using angle brackets. Tags such as <img /> and <input /> directly introduce content into

the page. Other tags such as <p> surround and provide information about document text and may include other tags as sub-elements. Browsers do not display the HTML tags but use them to interpret the content of the page.

CSS stands for Cascading Style Sheets. It is a style sheet language which is used to describe the look and formatting of a document written in mark-up language. It provides an additional feature to HTML. It is generally used with HTML to change the style of web pages and user interfaces. It can also be used with any kind of XML documents including plain XML, SVG and XUL.CSS is used along with HTML and JavaScript in most websites to create user interfaces for web applications and user interfaces for many mobile applications.

CSS is designed to enable the separation of content and presentation, including layout, colours, and fonts. This separation can improve content accessibility; provide more flexibility and control in the specification of presentation characteristics; enable multiple web pages to share formatting by specifying the relevant CSS in a separate .css file, which reduces complexity and repetition in the structural content; and enable the .css file to be cached to improve the page load speed between the pages that share the file and its formatting.

Separation of formatting and content also makes it feasible to present the same mark-up page in different styles for different rendering methods, such as on-screen, in print, by voice (via speech-based browser or screen reader), and on Braille-based tactile devices. CSS also has rules for alternate formatting if the content is accessed on a mobile device.

The name cascading comes from the specified priority scheme to determine which style rule applies if more than one rule matches a particular element. This cascading priority scheme is predictable.

Semantic HTML is a way of writing HTML that emphasizes the meaning of the encoded information over its presentation (look). HTML has included semantic markup from its inception,[84] but has also included presentational markup, such as <font>, <i> and tags.

CHAPTER 4

PROJECT DESCRIPTION

4.1 OVERVIEW OF THE PROJECT

In se cases, speech or high-level scene context can also be useful to infer emotion. Most of the time there is a considerable overlap between emotion classes making it a challenging classification task. In this paper we present Artificial Intelligence approach to modeling different input modalities and to combining them in order to infer emotion labels from a given video sequence. The Emotion recognition in the wild (Emoti W 2015) challenge is an extension of a similar challenge held in 2014. The task is to predict one of seven emotion labels: angry, disgust, fear, happy, sad, surprise and neutral.

The dataset used in the challenge is the Acted Facial Expressions in the Wild (AFEW) 5.0 dataset, which contains short video clips extracted from Hollywood movies. The video clips present emotions with a high degree of variation, e.g., actor identity, age, pose and lighting conditions. The dataset contains 723 videos for training, 383 for validation and 539 test clips. Traditional approaches to emotion recognition were based on hand-engineered features. With the availability of big datasets, deep learning has emerged as a general approach to machine learning yielding state-of-the-art results in many computers vision and natural language processing tasks. The basic principle of deep learning is to learn hierarchical representations of input data such that the learned representations improve classification performance.

Previous work has achieved state-of-the-art results in the emotion recognition challenge using deep learning techniques which includes our work that won the 2013 Emotion challenge. In contrast to, which use an averaging-based aggregation method for visual features in video, here we employ an RNN to model the temporal evolution of facial features in video. We also explore

feature level fusion of our modality-specific models and show that this increases performance. Emotional aspects have huge impact on social intelligence like communication understanding, decision making and also helps in understanding behavioral aspect of human. Emotion plays pivotal role during communication. Emotion recognition is carried out in diverse way, it may be verbal or non-verbal. Voice (Audible) is verbal form of communication & Facial expression, action, body postures and gesture is non-verbal form of communication. While communicating only 7% effect of message is contributes by verbal part as a whole, 38% by vocal part and 55% effect of the speaker's message is contributed by facial expression. For that reason, automated & real time facial expression would play important role in human and machine interaction.

Facial expression recognition would be useful from human facilities to clinical practices. Analysis of facial expression plays fundamental roles for applications which are based on emotion recognition like Human Computer Interaction (HCI), Social Robot, Animation, Alert System & Pain monitoring for patients. This paper presents brief introduction of facial expression in section Facial expression presents key mechanism to describe human emotion. From starting to end of the day human changes plenty of emotions, it may be because of their mental or physical circumstances.

Although humans are filled with various emotions, modern psychology defines six basic facial expressions: Happiness, Sadness, Surprise, Fear, Disgust, and Anger as universal emotions. Facial muscles movements help to identify human emotions. Basic facial features are eyebrow, mouth, nose & eyes. In AI, design acknowledgment and in picture handling, highlight extraction begins from an underlying arrangement of estimated information and manufactures inferred values (highlights) planned to be enlightening and non-excess, encouraging the consequent learning and speculation steps, and now and again prompting better human elucidations. Highlight extraction is identified with dimensionality decrease. At the point when the information to a calculation is too enormous to

possibly be prepared and it is suspected to be excess (for example a similar estimation in the two feet and meters, or the tedium of pictures displayed as pixels), at that point it tends to be changed into a decreased arrangement of highlights (additionally named an element vector). Deciding a subset of the underlying highlights is called include selection. The chose highlights are relied upon to contain the pertinent data from the info information, so the ideal errand can be performed by utilizing this decreased portrayal rather than the total introductory information.

Highlight extraction includes decreasing the quantity of assets required to portray a huge arrangement of information. When performing examination of complex information one of the serious issues comes from the quantity of factors included. Examination with countless factors for the most part requires a lot of memory and calculation control, likewise it might make a characterization calculation over fit to preparing tests and sum up inadequately to new examples.

4.2 MODULE DESCRIPTION

The knowledge about a user's facial expression can be used, e.g., to recognize that a helpless user needs some help or to adapt presented information in case of confusion. The systems dealing with classification of facial images, which were developed over the past years, can be differentiated according to the following characteristics:

i. Preprocessing.
ii. Face registration.
iii. Facial feature extraction.
iv. Emotion classification.

I. PREPROCESSING

Preprocessing is a common name for operations with images at the lowest level of abstraction both input and output are intensity images. Most preprocessing steps that are implemented are

a. Reduce the noise.

b. Convert the Image to Binary/Grayscale.

c. Pixel Brightness Transformation.

d. Geometric Transformation.

II. FACE REGISTRATION

Face Registration is a computer technology being used in a variety of applications that identifies human faces in digital images. In this face registration step, faces are first located in the image using some set of landmark points called “face localization” or “face detection”. These detected faces are then geometrically normalized to match some template image in a process called “face registration”.

III. FACIAL FEATURE EXTRACTION

Facial Features extraction is an important step in face recognition and is defined as the process of locating specific regions, points, landmarks, or curves/contours in a given 2-D image or a 3D range image. In this feature extraction step, a numerical feature vector is generated from the resulting registered image. Common features that can be extracted area.

a. Lips.

b. Eyes.

c. Eyebrows.

d. Nose tip.

IV. EMOTION CLASSIFICATION

In the third step, of classification, the algorithm attempts to classify the given faces portraying one of the seven basic emotions. Paul Ekman (born February 15, 1934) is an American psychologist and professor emeritus at the University of California, San Francisco who is a pioneer in the study of emotions and their relation to facial expressions. He has created an "atlas of emotions" with more than ten thousand facial expressions.

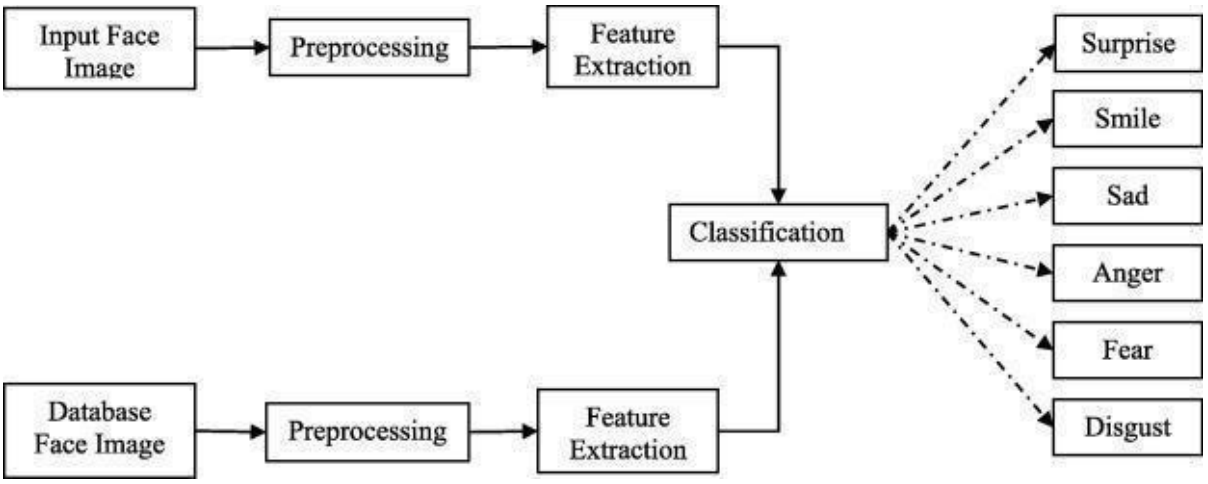

Fig: 4.1 Classification of Emotion

4.2.1 ACCURACY FOR TRAINED DATASET

In this study, the proposed model considered those standard benchmarked and publicly available datasets that work efficiently in real-time scenarios. This data set is one of the largest datasets for face detection having 32,203 colored images and 393,703 labelled faces. The factors that affect the accuracy of facial recognition are poor lighting, fast and sharp movements, poses and angles,and facial expressions, including those that reflect a person's emotional state.It is quite easy to accurately recognize a frontal image that is evenly lit and

also taken on a neutral background. But not everything is so simple in real- life situations.

The success of recognition can be complicated by any changes in appearance, for example, hairstyle and hair color, the use of cosmetics and makeup, and the consequences of plastic surgery. The presence in images of such items as hats, headbands, etc., also plays a role. Key to correct recognition is an AI face recognition model that has an efficient architectureand must be trained on as large a dataset as possible. This allows you to level the influence of extraneous factors on the results of image analysis. Advanced automated systems can already correctly assess the appearance regardless of, for instance, the mood of the recognized person, closed eyes, hair color change, etc.

Face recognition accuracy can be considered in two planes. First of all, we are talking about the embedding matching level set for specific software, which is sufficient for a conclusion about identification. Secondly, an indicator of the accuracy of AI face recognition systems is the probability of their obtaining a correct result.

Let's consider both aspects in turn. We noted above that the comparison of images is based on checking the coincidence of facial embedding. A complete match is possible only when comparing exactly the same images.In all other cases, the calculation of the distance between the same points ofthe images allows for obtaining a similarity score. The fact is that most automated face recognition systems are probabilistic and make predictions. The essence of these predictions is to determine the level of probability thatthe two compared images belong to the same person.

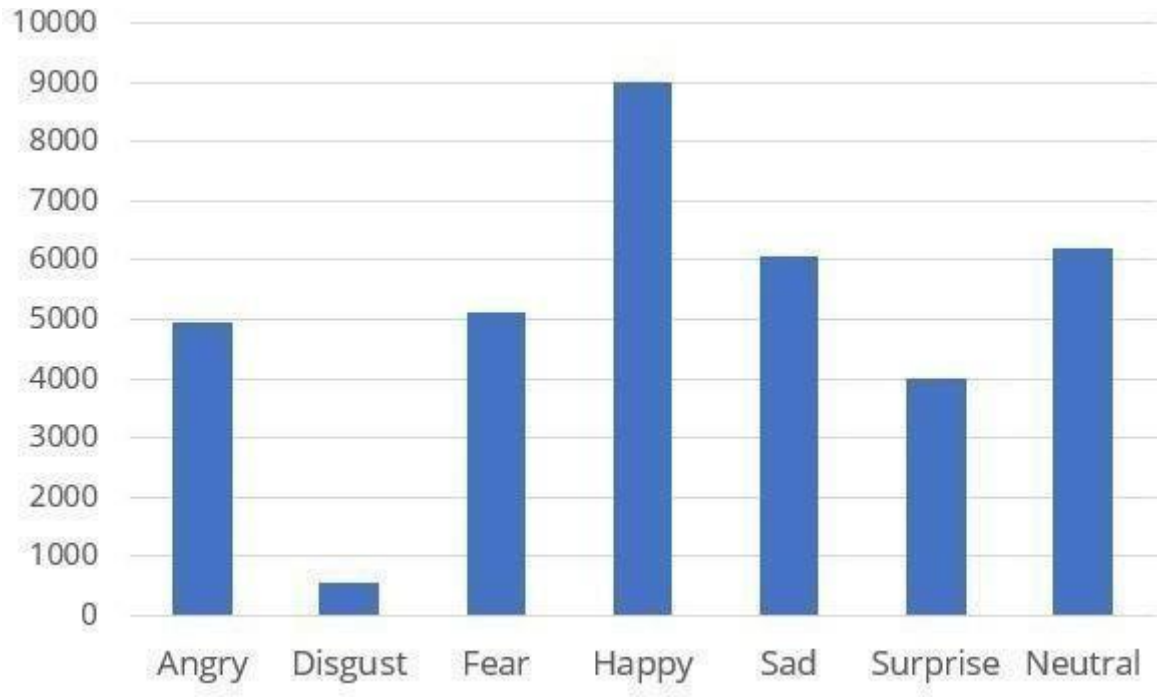

Fig: 4.2 Frequency chart of datasets

The choice of the threshold is usually left to the software development customer. A high threshold may be accompanied by certain inconveniencesfor users. Lowering the similarity threshold will reduce the number of misunderstandings and delays, but will increase the likelihood of a false conclusion. The customer chooses according to priorities, specifics of the industry, and scenarios of using the automated system.

Let's move on to the accuracy of AI face recognition in terms of the proportion of correct and incorrect identifications. First of all, we should note that the results of many studies show that AI facial recognition technology copes with its tasks at least no worse, and often better than a human does. As for the level of recognition accuracy, the National Institute of Standards and Technology provides convincing up-to-date data in the Face Recognition Vendor Test (FRVT). According to reports from this source, face recognition accuracy can be over 99%, thus significantly exceeding the capabilities of an average person.

4.4.2 HOME PAGE

Home Module contains a small tab where we can preview the web camera and ask permissions for camera. First things first, load in the model that you saved. Next, use OpenCV to start capturing a live video feed from a webcam. Alternatively, if you don't have a webcam, you can use a video file as input.

They capture the image and classify the facial images. In the image processing stage, we use the proposed image processing algorithm developed in previous study. To extract more effective feature, we proposed the new feature extraction method in facial feature extraction stage.

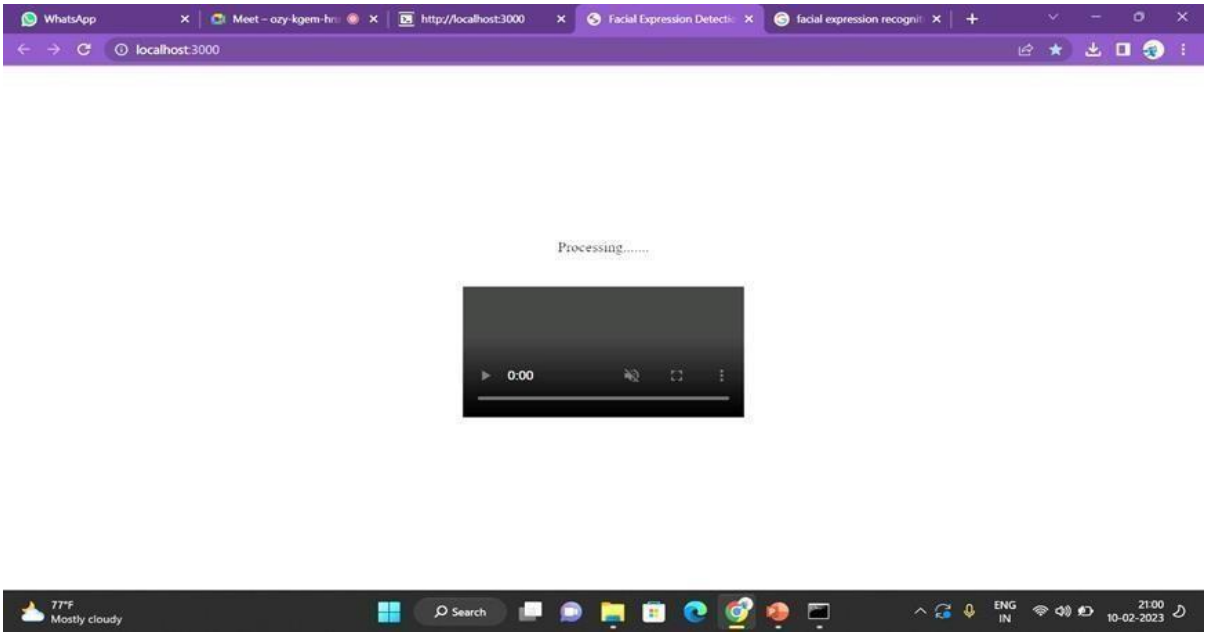

Fig: 4.3 Home Page

4.2.3 BASIC INFORMATION PAGE

After the face has been located in the image or video frame, it can be analyzed in terms of facial action occurrence. There are two types of features that are usually used to describe facial expression: geometric features and appearance features. Geometric features measure the displacements of certain parts of the face such as brows or mouth corners, while appearance features describe the

change in face texture when particular action is performed. Apart from feature type, FER systems can be divided by the input which could be static images or image sequences.

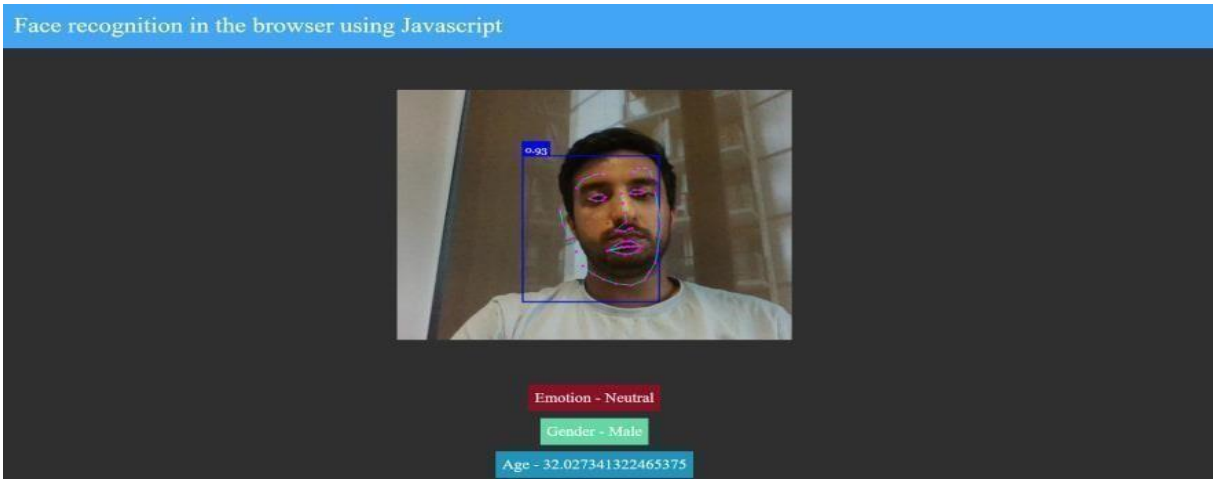

Fig: 4.4 Occurrence of facial actions

The task of geometric feature measurement is usually connected with face region analysis, especially finding and tracking crucial points in the face region. Possible problems that arise in face decomposition task could be occlusions and occurrences of facial hair or glasses. Furthermore, defining the feature set is difficult, because features should be descriptive and possibly not correlated.

4.2.4 PREDICTION PAGE

The proposed feature extraction method consists of three features regions: eye region, mouth region, and auxiliary region. In each face region, we extract feature by comparing geometric and shape information. Generally, there are only vague patterns are given as the input of system in emotion recognition problem. In the first stage, system takes input image and performs some image processing techniques on it in order to find the face region. System can operate on static images, where this procedure is called face localization or videos where we are dealing with face tracking. Major problems which can be encountered at this stage are different scales and orientations of face.

They are usually caused by subject movements or changes in distance from camera. Significant body movements can also cause drastic changes in position of face in consecutive frames what makes tracking harder. What is more, complexity of background and variety of lightning conditions can be also quite confusing in tracking. For instance, when there is more than one face in the image, system should be able to distinguish which one is being tracked. Last but not least, occlusions which usually appear in spontaneous reactions need to be handled as well.

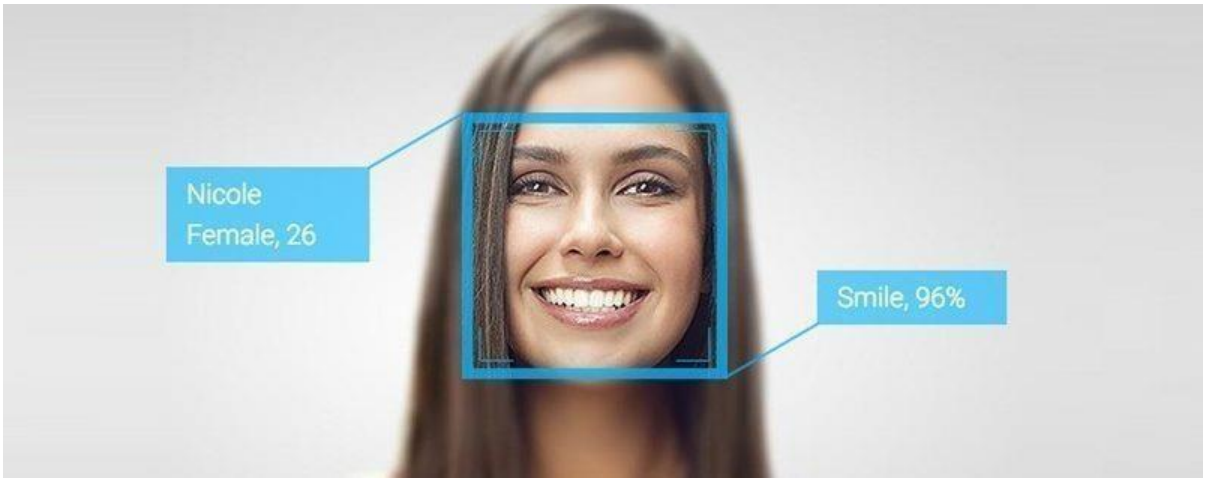

Fig: 4.5 Prediction of facial emotions

4.2.5 RESULT PAGE

The aim of this thesis was to explore the area of facial expression recognition. Beginning with the psychological motivation for facial behavior analysis, this field of science has been extensively studied in terms of application and automation. Manual face analysis used by psychologists was quickly replaced by suitable computer software. A wide variety of image processing techniques was developed to meet the facial expression recognition systemrequirements. However, there are still many challenges and problems to solve insuch systems, especially in the area of their performance and applicabilityimprovement. Apart from theoretical background, this work provides the design and implementation of Facial Expression Recognition System. Proposed system

was developed to process the video of facial behavior and recognize displayed actions in terms of six basic emotions. Major strengths of the system are full automation as well as user and environment independence. Even though the system cannot handle occlusions and significant head rotations, the head shifts are allowed. Additionally, the recognition results are quite promising with regard to the fact that only appearance features were used to encode the facial expression.

4.3 FLOW CHART

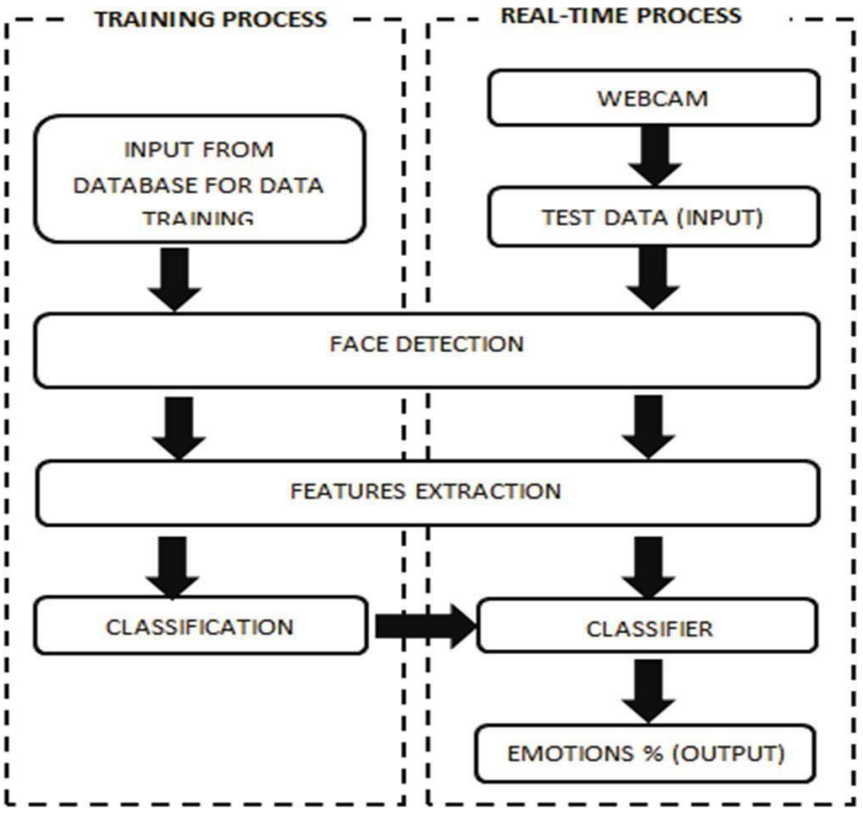

Fig: 4.6 Flow diagram of emotion recognition system

4.4 SYSTEM TESTING

Testing is vital to the success of the system. System testing makes a logical assumption that if all parts of the system are correct, the goal will be successfully achieved. In the testing process we test the actual system in an organization and

gather errors from the new system operates in full efficiency as stated. System testing is the stage of implementation, which is aimed to ensuring that the system works accurately and efficiently.

In the testing process we test the actual system in an organization and gather errors from the new system and take initiatives to correct the same. All the front-end and back-end connectivity are tested to be sure that the new system operates in full efficiency as stated. System testing is the stage of implementation, which is aimed at ensuring that the system works accurately and efficiently. The main objective of testing is to uncover errors from the system. For the uncovering process we have to give proper input data to the system. So, we should have more conscious to give input data. It is important to give correct inputs to efficient testing. Testing is done for each module. After testing all the modules, the modules are integrated and testing of the final system is done with the test data, specially designed to show that the system will operate successfully in all its aspects conditions. Thus, the system testing is a confirmation that all is correct and an opportunity to show the user that the system works.

Inadequate testing or non-testing leads to errors that may appear few months later. This will create two problems,

- Time delay between the cause and appearance of the problem.
- The effect of the system errors on files and records within the system.

The purpose of the system testing is to consider all the likely variations to which it will be suggested and push the system to its limits. The testing process focuses on logical intervals of the software ensuring that all the statements have been tested and on the function intervals (i.e.,) conducting tests to uncover errors and ensure that defined inputs will produce actual results that agree with the required results.

UNIT TESTING

Unit testing, also known as component testing refers to tests that verify the functionality of a specific section of code, usually at the function level. In an object-oriented environment, this is usually at the class level, and the minimal unit tests include the constructors and destructors. These types of tests are usually written by developers as they work on code (white-box style), to ensure that the specific function is working as expected. One function might have multiple tests, to catch corner cases or other branches in the code. Unit testing alone cannot verify the functionality of a piece of software, but rather is used to assure that the building blocks the software uses work independently of each other.

INTEGRATION TESTING

Integration testing is any type of software testing that seeks to verify the interfaces between components against a software design. Software components may be integrated in an iterative way or altogether. Normally the former is considered a better practice since it allows interface issues to be localized more quickly and fixed. Integration testing works to expose defects in the interfaces and interaction between integrated components (modules). Progressively larger groups of tested software components corresponding to elements of the architectural design are integrated and tested until the software works as a system.

USER ACCEPTANCE TESTING

In these testing procedures the project is given to the customer to test whether all requirements have been fulfilled and after the user is fully satisfied. The project is perfectly ready. If the user makes request for any change and if they found any errors those all errors have to be taken into consideration and to be correct it to make a project a perfect project. Once a program or module has been unit tested, the programmer can then work with integration it with other programs.

Integration testing is a systematic technique for constructing tests to uncover error associated within the interface. In this project, all the modules are combined and then the entire programming is tested as a whole. In the integration-testing step, all the error uncovered is corrected for the next testing steps. Integration testing is any type of software testing that seeks to verify the interfaces between components against a software design. Software components may be integrated in an iterative way or all together ("big bang").

4.5 SYSTEM IMPLEMENTATION

When the initial design was done for the system, the client was consulted for the acceptance of the design so that further proceedings of the system development can be carried on. After the development of the system a demonstration was given to them about the working of the system. The aim of the system illustration was to identify any malfunction of the system. Implementation is the process of converting a new or revised system design into an operational one.

After the management of the system was approved the system implemented in the concern, initially the system was run parallel with existing manual system.The system has been tested with live data and has proved to be error free and user friendly.

This process is used to verify and identify any logical mess working of the system by feeding various combinations of test data. After the approval of the system by both end user and management the system was implemented. System implementation is made up of many activities. The six major activities are as follows.

CODING

Coding is the process of whereby the physical design specifications created by the analysis team turned into working computer code by the programming team.

TESTING

Once the coding process is beginning and proceed in parallel, as each program module can be tested.

INSTALLATION

Installation is the process during which the current system is replaced by the new system. This includes conversion of existing data, software, and documentation and work procedures to those consistent with the new system.

DOCUMENTATION

It is result from the installation process, user guides provide the information of how the use the system and its flow.

TRAINING AND SUPPORT

Training plan is a strategy for training user so they quickly learn to the new system. The development of the training plan probably began earlier in the project.

4.6 SYSTEM MAINTENANCE

The objectives of this maintenance work are to make sure that the system gets into work all time without any bug. Provision must be for environmental changes which may affect the computer or software system. This is called the maintenance of the system. Nowadays there is the rapid change in the software world. Due to this rapid change, the system should be capable of adapting these

changes. In this project the process can be added without affecting other parts of the system.

Maintenance plays a vital role. The system is liable to accept any modification after its implementation. This system has been designed to favor all new changes. Doing this will not affect the systems performance or its accuracy. Maintenance is necessary to eliminate errors in the system during its working life and to tune the system to any variations in its working environment. It has been seen that there are always some errors found in the system that must be noted and corrected. It also means the review of the system from time to time. The review of the system is done for

- Knowing the full capabilities of the system
- Knowing the required changes or the additional requirements
- Studying the performance

Types of Maintenance:

- Corrective maintenance
- Adaptive maintenance
- Perfective maintenance
- Preventive maintenance

Corrective Maintenance

Changes made to a system to repair flows in its design coding or implementation. The design of the software will be changed. The corrective maintenance is applied to correct the errors that occur during that operation time. The user may enter invalid file type while submitting the information in the particular field, then the corrective maintenance will display the error message to the user in order to rectify the error.

Maintenance is a major income source. Nevertheless, even today many organizations assign maintenance to unsupervised beginners, and less competent programmers.

Adaptive Maintenance

It means changes made to system to evolve its functionalities to change business needs or technologies. If any modification in the modules the software will adopt those modifications. If the user changes the server, then the project will adapt those changes. The modification server work as the existing is performed.

Perfective Maintenance

Perfective maintenance means made to a system to add new features or improve performance. The perfective maintenance is done to take some perfect measures to maintain the special features. It means enhancing the performance or modifying the programs to respond to the users need or changing needs. This proposed system could be added with additional functionalities easily. In this project, if the user wants to improve the performance further then this software can be easily upgraded.

Preventive Maintenance

Preventive maintenance involves changes made to a system to reduce the changes of features system failure. The possible occurrence of error that might occur are forecasted and prevented with suitable preventive problems. If the user wants to improve the performance of any process, then the new features can be added to the system for this project.

CHAPTER 5
CONCLUSION AND FUTURE WORK

5.1 CONCLUSION

The main aim of this project was to design and implement Facial Prediction Using Artificial Intelligence Methods and Performance Analysis of that methods and it has been achieved successfully. The proposed approach uses Face API software. And 90% classification accuracy has been achieved. The computer-based face recognition industry has made much useful advancement in the past decade, however, the need for higher accuracy system remains. Through the determination and commitment of industry, government evolutions, and organized standards bodies, growth and progress will continue, raising the bar for face recognition system. Computer based face recognition system is very useful for the police, industries, and for government for various security regions. This project gives a more accuracy than other traditional way of recognize the face and less time consuming.

5.2 FUTURE WORK

The below enhancements can be made in future.

- It can implement this project in chatbot inside the car or public malls or Airports to detect the emotion of the people and create a better chatting experience.
- It can also be implemented in Google meet to recognize the expression of the students to make the class much more interesting.
- In future it will be used for payments, security, healthcare, advertising, criminal identification etc.

APPENDIX 1

SOURCE CODE:

```
var express = require('express');
var path = require('path');
var favicon = require('serve-favicon'); var cookieParser = require('cookie-
parser');
var bodyParser = require('body-parser');
var hbs=require('express-handlebars');
var index = require('./routes/index');
var app = express();
app.engine('hbs', hbs({extname:'hbs', defaultLayout:'layout',
layoutDir:__dirname+'/views/layouts/'}));
app.set('views', path.join(__dirname, 'views'));
app.use(bodyParser.json());
app.use(bodyParser.urlencoded({ extended: false }));
app.use(cookieParser());
app.use(express.static(path.join(__dirname, 'public')));
app.use(express.static('public/images'));
app.use('/facedetection',express.static('public'));
app.use('/ageandgender',express.static('public'));
app.use('/', index);
app.use(function(req, res, next) {
  var err = new Error('Not Found');
  err.status = 404;
  next(err);
});
app.use(function(err, req, res, next) {
  res.locals.message = err.message;
  res.locals.error = req.app.get('env') === 'development' ? err : {};
  res.status(err.status || 500);
  res.render('error');
});
module.exports = app;
```

```
var express=require('express');

var app=express();

app.use(express.static('public/images'));
```

```
app.get('/',function(req,res){
res.sendfile('index.html');
});
app.listen(5000,function(){
console.log("Server is Running On localhost:5000");
});
{
  "name": "webtemplate",
  "version": "0.0.0",
  "private":  true,
  "scripts": {
    "start": "node ./bin/www"
  },
  "dependencies": {
    "body-parser": "~1.17.1",
    "cookie-parser": "~1.4.3",
    "debug": "~2.6.3",
    "ejs": "^2.5.7",
    "express": "~4.15.2",
    "express-handlebars": "^3.0.0",
    "morgan": "~1.8.1",
    "serve-favicon": "~2.4.2"
  }
}
{
  "name": "webtemplate",
```

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"version": "0.0.0",
"lockfileVersion": 1,
"requires": true,
"dependencies": {
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   "version": "1.3.4",
   "resolved": "https://registry.npmjs.org/accepts/-/accepts-1.3.4.tgz",
   "integrity": "sha1-hiRnWMfdbSGmR0/whKR0DsBesh8=",
   "requires": {
     "mime-types": "2.1.16",
     "negotiator": "0.6.1"
   }
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   "resolved": "https://registry.npmjs.org/align-text/-/align-text-0.1.4.tgz",
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   "requires": {
     "kind-of": "3.2.2",
     "longest": "1.0.1",
     "repeat-string": "1.6.1"
   }
 },
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   "version": "1.0.1",
   "resolved": "https://registry.npmjs.org/amdefine/-/amdefine-1.0.1.tgz",
   "integrity": "sha1-SlKCrBZHKek2Gbz9OtFR+BfOkfU="
```

```
  },
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    "resolved": "https://registry.npmjs.org/array-flatten/-/array-flatten-1.1.1.tgz",
    "integrity": "sha1-ml9pkFGx5wczKPKgCJaLZOopVdI="
  },
  "asap":  {
    "version": "2.0.6",
    "resolved": "https://registry.npmjs.org/asap/-/asap-2.0.6.tgz",
    "integrity": "sha1-5QNHYR1+aQlDIIu9r+vLwvuGbUY="
  },
  "async": {
    "version": "1.5.2",
    "resolved": "https://registry.npmjs.org/async/-/async-1.5.2.tgz",
    "integrity": "sha1-7GphrlZIDAw8skHJVhjiCJL5Zyo="
  },
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    "resolved":       "https://registry.npmjs.org/balanced-match/-/balanced-match-
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    "integrity": "sha1-ibTRmasr7kneFk6gK4nORi1xt2c="
  },
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    "resolved": "https://registry.npmjs.org/basic-auth/-/basic-auth-1.1.0.tgz",
    "integrity": "sha1-RSIe5Cn37h5QNb4/UVM/HN/SmIQ="
  },
```

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  "body-parser": {
    "version": "1.17.2",
    "resolved": "https://registry.npmjs.org/body-parser/-/body-parser-1.17.2.tgz",
    "integrity": "sha1-+IkqvI+eYn1Crtr7yma/WrmRBO4=",
    "requires": {
      "bytes": "2.4.0",
      "content-type": "1.0.2",
      "debug": "2.6.7",
      "depd": "1.1.1",
      "http-errors": "1.6.2",
      "iconv-lite": "0.4.15",
      "on-finished": "2.3.0",
      "qs": "6.4.0",
      "raw-body": "2.2.0",
      "type-is": "1.6.15"
    },
    "dependencies": {
      "debug": {
      "version": "2.6.7",
        "resolved": "https://registry.npmjs.org/debug/-/debug-2.6.7.tgz",
        "integrity": "sha1-krrR9tBbu2u6Isyoi80OyJTChh4=",
        "requires": {
          "ms": "2.0.0"
        }
      }
    }
```
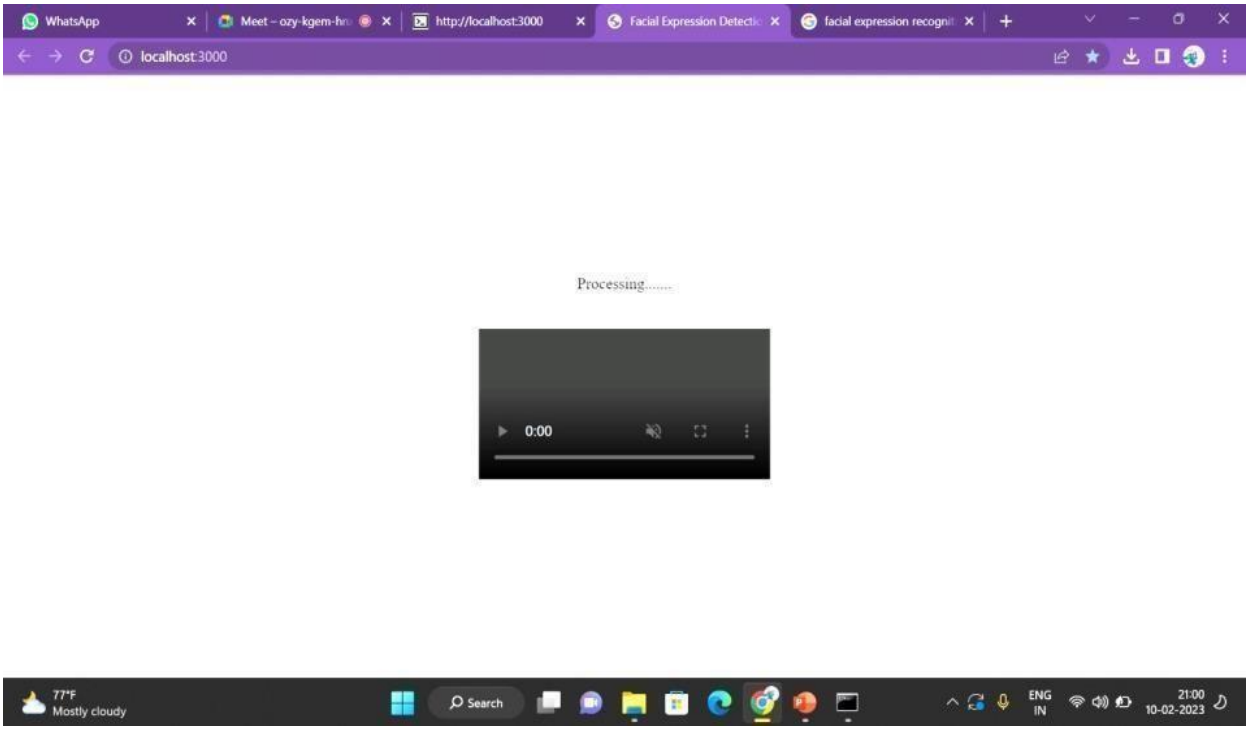
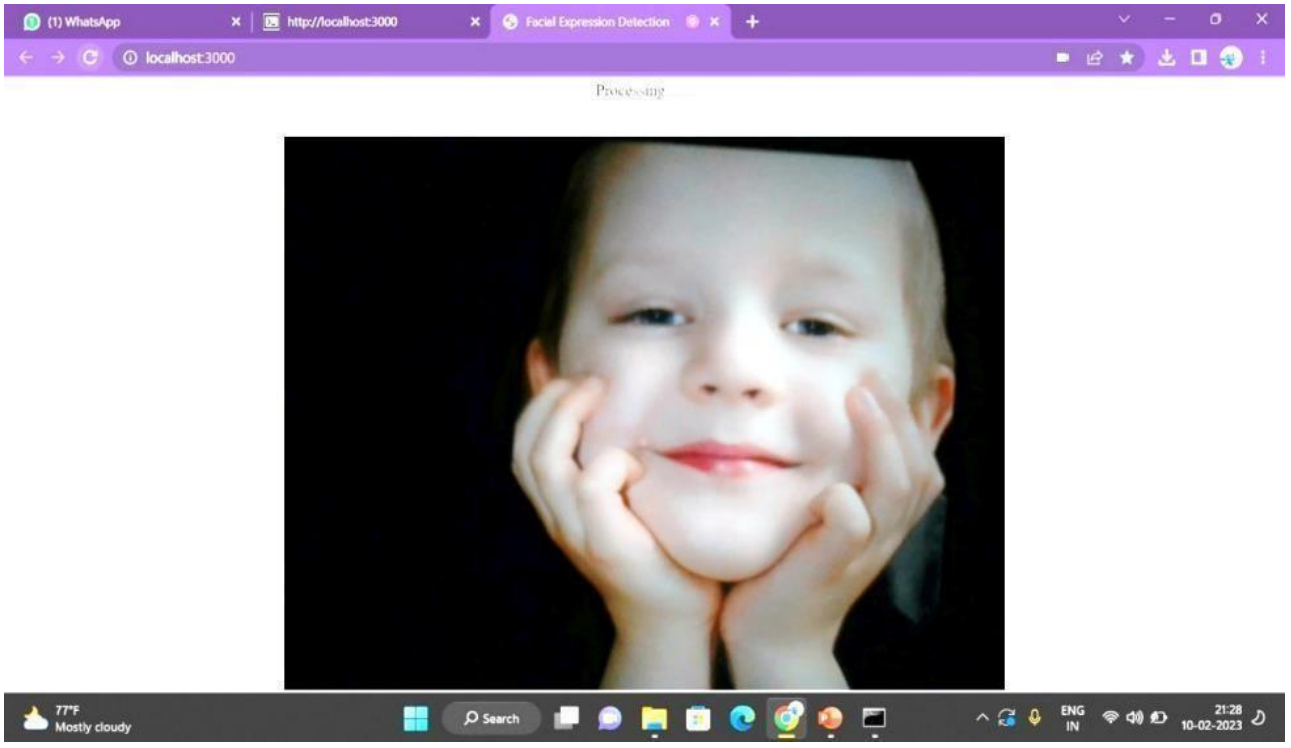

```
    },
“brace-expansion": {
      "version": "1.1.8",
      "resolved":     "https://registry.npmjs.org/brace-expansion/-/brace-expansion-
1.1.8.tgz",
      "integrity": "sha1-wHshHHyVLsH479Uad+8NHTmQopI=",
      "requires": {
        "balanced-match": "1.0.0",
        "concat-map": "0.0.1"
      }
    },
    "bytes": {
      "version": "2.4.0",
      "resolved": "https://registry.npmjs.org/bytes/-/bytes-2.4.0.tgz",
      "integrity": "sha1-fZcZb51br39pNeJZhVSe3SpsIzk="
    },
    "camelcase": {
      "version": "1.2.1",
      "resolved": "https://registry.npmjs.org/camelcase/-/camelcase-1.2.1.tgz",
      "integrity": "sha1-m7UwTS4LVmmLLHWLCKPqqdqlijk=",
      "optional": true
    },…
```

APPENDIX 2

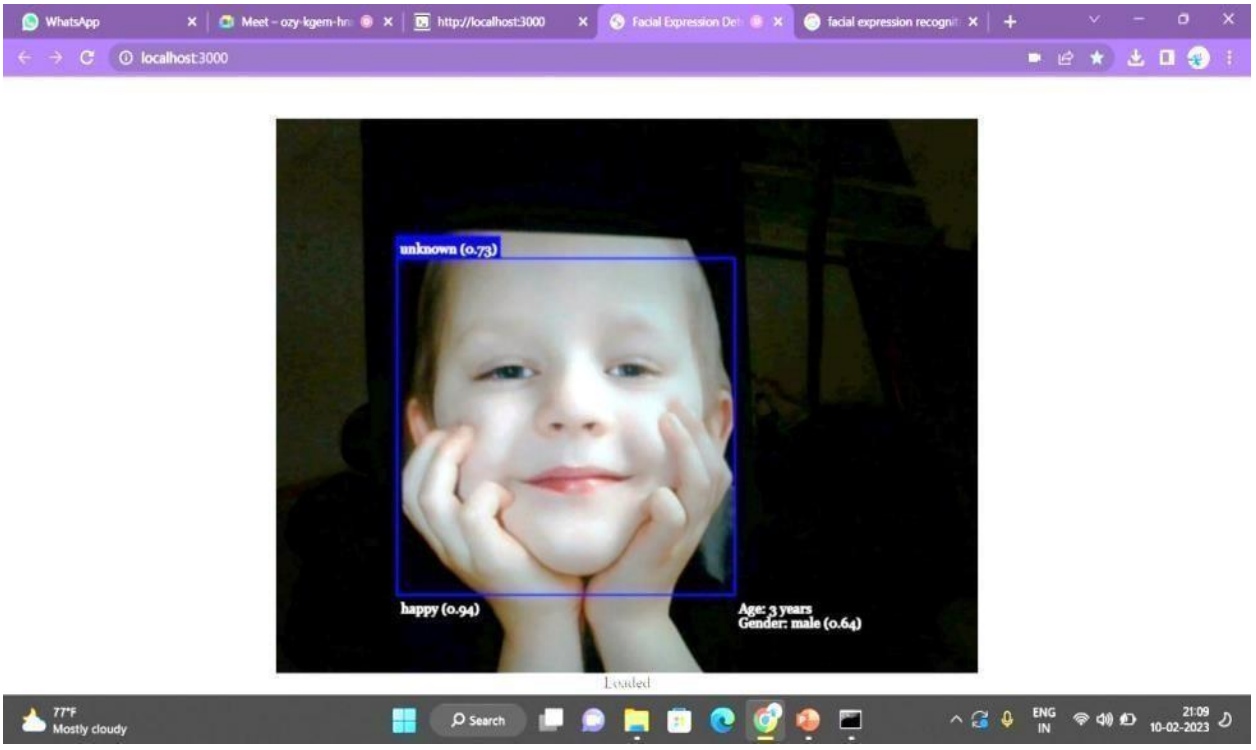
SCREENSHOTS:



Screenshot 1:Home Page



Screenshot 1:Processing Page



Screenshot 1: Prediction Page

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