Emotion Base Product Recommendation System

Project Id:23-267

Final Proposal Report

Fathima Firdowsiya A.L - IT20011734

Supervisor: Mr. Uditha Dharmakeerthi

Co Supervisor: Mr. Didula Chamara

B.Sc. (Hons) Degree in Information Technology

(Specializing in Information Technology)

Department of Information Technology

Sri Lanka Institute of Information Technology

Sri Lanka

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Declaration

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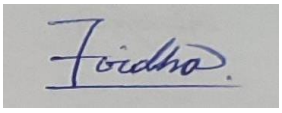
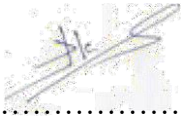
Student Name	Student ID	Signature
Fathima Firdowsiya A. L	**IT20011734**	

The above candidate is carrying out research for the undergraduate Dissertation under my supervision.



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Signature of the Co-supervisor Date

Abstract

Facial emotion detection has become a key technology for developing personalized product recommendation systems in various industries, including e-commerce. For people with disabilities, buying products using an e-commerce website can be a challenging experience. For that, This project proposes a product recommendation system that utilizes facial emotion detection to provide customized recommendations to both disabled and normal individuals on an e-commerce website. The proposed system captures the user's facial expressions using a camera or webcam and applies facial emotion detection algorithms and sentiment analysis to determine the user's emotional state. Based on the user's emotional state, the system recommends products that align with the user's preferences and purchase history. If the user is feeling happy, the system may recommend a fun and entertaining product, such as a comedy product or a video game. Conversely, if the user is feeling sad, the system may recommend a more calming product. The proposed system is designed to be user-friendly and accessible, with features such as voice commands and large text options for users with visual or auditory impairments. Moreover, the system can be personalized to recognize different facial expressions and adapt to the user's emotional state for accurate and relevant recommendations. This product recommendation system has the potential to enhance the online shopping experience for both disabled and normal individuals by providing personalized and empathetic product recommendations based on their emotional state. The system can also be integrated into various industries beyond e-commerce, including entertainment and healthcare. The use of CNN and sentiment analysis technology makes the system robust and accurate in recognizing emotions and providing personalized recommendations.

Keywords: CNN, Fast-paced, Physiological, Machine-learning

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1. Introduction

The technology that detects facial expressions of emotion has found widespread application in a variety of industries, including the entertainment industry, the military, and healthcare. On the other hand, its applicability to people with impairments has not been investigated to a sufficient degree. Assisting disabled people in their day-to-day activities is one application of face emotion recognition technology that has the potential to be used. Specifically, disabled individuals who have difficulty communicating through traditional means, such as those who are nonverbal or have limited speech abilities, may find assistance through the use of technology that recognizes facial expressions of emotion. This technology can help impaired people communicate their feelings, wants, and desires more effectively by detecting and interpreting the facial expressions they use.

Autism spectrum disorder (ASD) is a form of disability that may be helped by the development of face emotion detection technologies. Autism Spectrum Disorder (ASD) patients frequently have difficulties with social interaction and communication. As a consequence of this, individuals could have trouble expressing themselves, recognizing the feelings that others are experiencing, and comprehending the clues that society gives them. These people might benefit from having access to technology that recognizes facial expressions because it would give them a tool that would help them communicate their feelings and requirements more clearly. If a person with autism spectrum disorder (ASD) is feeling agitated, the technology could analyze their facial expression and translate it into a message that a support worker or caregiver could comprehend.

One additional area where the technology of recognizing facial expressions could be useful is in the realm of assistive technology for those who have physical limitations. Traditional input devices, such as keyboards or touchscreens, might be challenging to use for people who have physical limitations. These people might benefit from an alternative input method provided by technology that recognizes facial expressions of emotion. Individuals could be able to control a wheelchair or another type of assistance technology by using facial expressions. With the help of FER technology, marketers can analyze a consumer's facial expressions in real-time while they browse through products or services. By analyzing the emotions displayed by the consumer, FER technology can determine their level of interest, engagement, and overall satisfaction with the products or services being offered.

By using FER technology, marketers can gain a better understanding of their customers' preferences and needs and make more accurate product recommendations that are tailored to their individual tastes. This can result in a more personalized shopping experience for the customer and ultimately lead to increased sales and customer loyalty. Moreover, FER technology can also help in predicting customer behaviors by analyzing their emotions and providing insights into how they might react to different marketing strategies. This can help marketers in creating more effective and targeted marketing campaigns that are designed to resonate with their customers on an emotional level.

To address these concerns, it is essential that FER technology is developed and implemented in an ethical and responsible manner. This includes ensuring that the technology is trained on diverse datasets and regularly tested for accuracy and bias. It is also important to establish clear guidelines for the collection and storage of facial images and data, and to ensure that users are fully informed about how their data will be used and protected.

Facial Expression Recognition (FER) technology has the potential to revolutionize the shopping experience for people with disabilities in the e-commerce industry. Individuals with disabilities often face challenges in accessing and navigating e-commerce websites, which can make it difficult for them to find the products they need. By incorporating FER technology into e-commerce platforms, it is possible to create a more accessible and user-friendly shopping experience for individuals with disabilities. People with visual impairments can use FER technology to navigate e-commerce websites and receive personalized product recommendations based on their emotions and preferences.

In addition, the development of technology that can recognize facial expressions has the potential to completely transform the ways in which people with disabilities communicate and engage with the world around them. Individuals who are disabled have the potential to improve their overall quality of life and their level of independence if they are given the means to better communicate their feelings and requirements.

The proposed product recommendation system utilizing facial emotion detection technology has significant potential for improving the online shopping experience for people with disabilities, empowering them to participate more fully in the digital economy.

1.1 Background

Facial emotion recognition technology has been a topic of interest in the field of computer vision and artificial intelligence for several decades. The ability to detect and interpret facial expressions has numerous potential applications, including security, marketing, and healthcare. However, its use for individuals with disabilities is a relatively new area of research.

To design a product recommendation system based on emotions for differently abled people, it is important to first understand the needs and challenges faced by this community. Differently abled individuals have varying physical, sensory, and cognitive abilities that may impact their daily lives. This can lead to difficulties in accessing and using products, which can result in frustration and a negative emotional experience. Studies have shown that emotions play a crucial role in the design and adoption of products. Emotional design aims to create products that elicit positive emotions, which can increase user satisfaction and loyalty. However, designing emotions is particularly challenging for differently-abled individuals due to the diversity of their needs and experiences.

One of the earliest studies on facial emotion recognition was conducted by [1]. They identified six universal facial expressions that can be recognized across different cultures and languages: anger, disgust, fear, happiness, sadness, and surprise. Since then, researchers have developed various algorithms and techniques to detect and classify facial expressions. In recent years, there has been growing interest in the use of facial emotion recognition technology to assist individuals with disabilities.

Research Finding

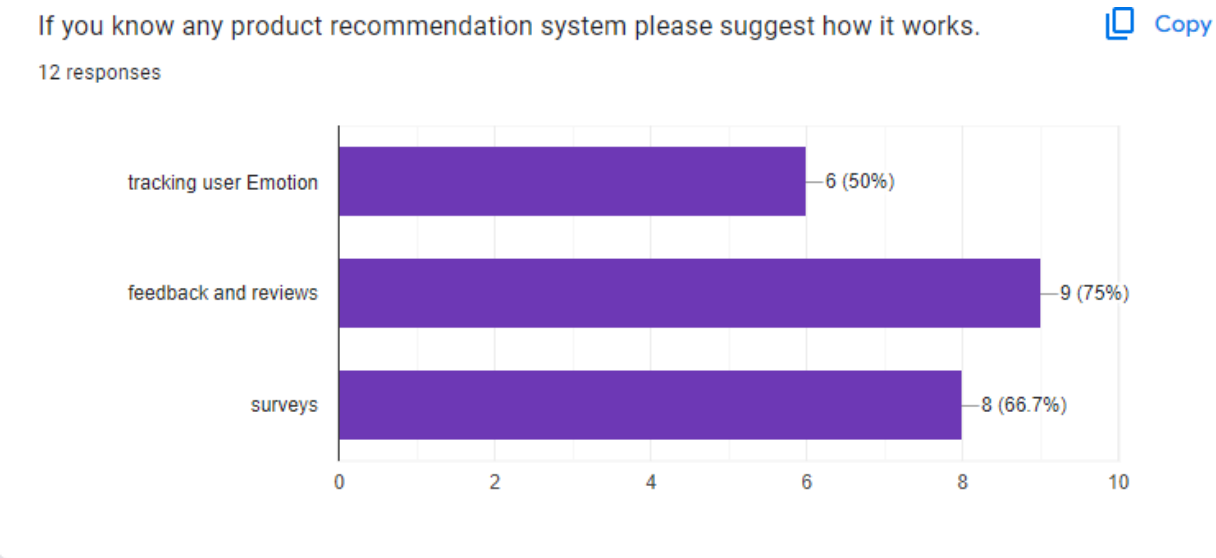


Figure 2:Questionnaire

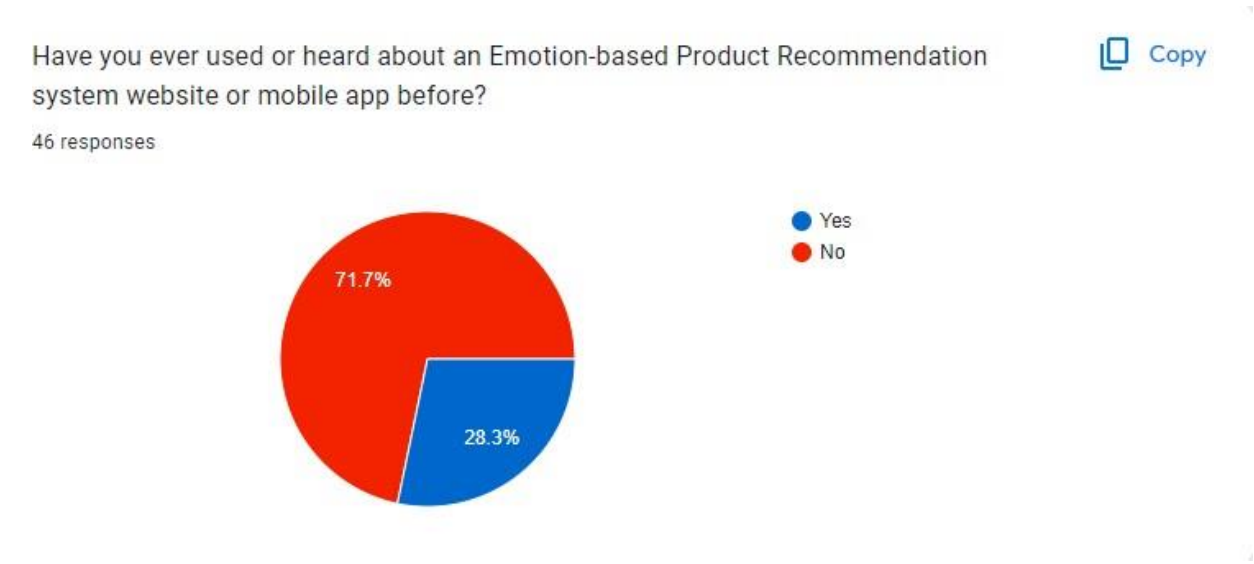


Figure 1:Responces

1.2 Literature survey

A study by [2] explored the use of facial expression recognition to assist individuals with autism spectrum disorder (ASD) in social communication. The study involved analyzing the facial expressions of individuals with ASD and developing a system that translates their facial expressions into text or speech. The results showed that the system had a high accuracy rate in detecting facial expressions, and it was well-received by participants and their families. Another study by [3] investigated the use of facial emotion recognition technology for individuals with physical disabilities. The study involved developing a system that allows individuals with physical disabilities to control a robotic arm using facial expressions. The system was tested on participants with different levels of physical disabilities, and the results showed that it was effective in controlling the robotic arm. In addition to assisting individuals with disabilities, facial emotion recognition technology can also be used to improve the quality of life for seniors. A study by [4] explored the use of facial emotion recognition technology to assist seniors with cognitive decline. The study involved developing a system that detects and analyzes facial expressions to infer the emotional state of seniors. The system was tested on a group of seniors, and the results showed that it was effective in detecting emotional states and providing appropriate responses. Furthermore, facial emotion recognition technology has the potential to revolutionize the way that individuals with disabilities communicate and interact with the world around them. While there are still challenges to be addressed, such as accuracy and privacy concerns, the research conducted so far has demonstrated promising results and highlights the potential benefits of this technology.

Paper [5] that has recently gained attention is the Reveal Facial Expression Training (FET) system developed by Altran, a global engineering and technology services company. The Reveal FET system uses FER technology to teach individuals with autism how to recognize facial expressions accurately. The system utilizes a camera that captures images of the user's face and translates them into an avatar that displays the corresponding emotion. The user is then taught to match the emotion to a specific facial expression and rewarded for successful identification. The Reveal FET system has been shown to improve social communication skills and facial recognition abilities in individuals with autism.

This research, [6] that utilizes FER technology is the Brain Robotics prosthetic hand. The Brain Robotics prosthetic hand uses FER technology to detect the user's emotions and adjust the hand's

grip accordingly. The hand can detect emotions such as stress, anxiety, and fatigue and adjust its grip to accommodate the user's needs. The prosthetic hand has been shown to improve the user's dexterity and overall quality of life.

FER technology has also been used to develop applications for individuals with mental health conditions. One such application[7] is the Mood fit application, which uses FER technology to detect and respond to the user's emotional state. The application offers customized exercises, meditation, and mood-boosting activities based on the user's emotional state. The Mood fit application has been shown to improve the user's emotional well-being and overall mental health.

FER technology has also been used to develop products for individuals with visual impairments. The [7], VizLens system developed by Carnegie Mellon University uses FER technology to enable individuals with visual impairments to interact with their environment better. The VizLens system utilizes a smartphone camera to capture images of the user's surroundings and translate them into audio descriptions. The system can also detect and describe the emotions of the people in the user's environment. The VizLens system has been shown to improve the user's ability to navigate their environment and interact with others.

This paper [12], proposes a movie recommendation system that incorporates fuzzy emotion features to suggest movies based on the user's current emotional state. Also, the paper presents a review of the current state-of-the-art emotion-based recommendation systems, as well as the use of fuzzy logic in recommendation systems. Moreover, the authors begin by discussing the importance of emotion in decision-making and the potential of emotion-based recommendation systems. They review various methods for emotion recognition, including facial expression analysis, speech analysis, and physiological measures. The authors also highlight the limitations of these methods, such as the need for specialized equipment and the lack of reliability in real-world scenarios. Next, the authors review existing emotion-based recommendation systems, which typically use a user's historical preferences and ratings to generate recommendations. This approach to recommendation systems incorporates fuzzy emotion features to suggest movies based on the user's current emotional state. The experimental results indicate that the proposed system achieves higher accuracy in terms of precision and recall than the two baseline approaches. Specifically, the system achieves a precision of 71.65% and a recall of 82.64%, while the content-based and collaborative filtering approaches achieve precisions of 62.19% and 57.53% and recalls

of 78.14% and 67.91%, respectively. The mainly proposed system uses a dataset of movie ratings and emotional expressions. They compare the performance of their system with existing emotion-based recommendation systems and show that their system outperforms these systems in terms of accuracy and coverage.

The authors [13], then introduce the concept of emotion-based recommender systems, which aim to personalize recommendations based on the user's emotional state. They propose a system that uses facial expression analysis and speech analysis to capture the user's emotional state and then maps it to a set of emotion-based features to generate personalized recommendations. The paper presents an experimental evaluation of the proposed system using a dataset of 1,000 movies and 300 users. The results indicate that the proposed emotion-based recommender system outperforms traditional content-based and collaborative filtering approaches in terms of accuracy, precision, and recall. Moreover, the paper presents an innovative approach to overcoming the problem of information overload in recommender systems by incorporating user emotions in the recommendation process. The proposed system is shown to outperform traditional content-based and collaborative filtering approaches, and the user study indicates that it is effective in reducing the cognitive load on users.

The authors [14], propose a system that uses a webcam to capture the user's facial expressions and maps them to a set of emotional states using a support vector machine (SVM) classifier. The emotional states are then used to generate music recommendations based on a pre-defined mapping of emotions to music genres.T he paper presents an experimental evaluation of the proposed system using a dataset of 60 music tracks and 30 users. The results indicate that the proposed system achieves high accuracy in recognizing the user's emotional state, with an accuracy rate of 92%. The user study results indicate that the proposed system is effective in providing personalized music recommendations based on the user's emotional state, with a user satisfaction rate of 84%. Moreover, the paper presents an innovative approach to music recommendation based on facial emotion recognition. The proposed system achieves high accuracy in recognizing the user's emotional state and provides personalized music recommendations based on the user's emotional state. However, the proposed system is evaluated on a relatively small dataset, and further research is needed to investigate the scalability and generalizability of the proposed system to larger datasets and real-world scenarios.

The authors propose [15], a system that uses a hybrid approach combining collaborative filtering and content-based filtering to generate initial recommendations. User feedback is then analyzed using sentiment analysis to determine the user's emotional state, and the emotional analysis results are used to adjust the initial recommendations to provide personalized recommendations. The paper presents an experimental evaluation of the proposed system using a dataset of 500 users and 1,000 clothing items. The results indicate that the proposed system achieves high accuracy in recommending clothing items that match the user's emotional state, with an accuracy rate of 87.5%. The user study results indicate that the proposed system is effective in providing personalized clothing recommendations based on the user's emotional state, with a user satisfaction rate of 85%.The proposed system achieves a high accuracy in recommending clothing items that match the user's emotional state and provides personalized recommendations that improve user satisfaction. However, the proposed system is evaluated on a relatively small dataset, and further research is needed to investigate the scalability and generalizability of the proposed system to larger datasets and real-world scenarios.

1.3 Research Gap

There are systems highlight the unique approach of a business that utilizes advanced algorithms and machine learning techniques to accurately identify and interpret a wide range of emotions of all customers, irrespective of their abilities. While this approach appears promising and innovative, there is a research gap in understanding the effectiveness and reliability of these algorithms and techniques in identifying and interpreting emotions accurately. This system evaluate the performance of some algorithms in identifying emotions across a diverse range of customers and contexts specially for disability individuals. Additionally, there is a need to examine the impact of emotions on the purchasing behavior of customers and the extent to which personalized recommendations based on emotions influence their purchase decisions. Understanding these factors can help businesses optimize their personalized services and improve customer satisfaction, leading to a competitive advantage in the market.

Products	Detection of faces	For Disability people	Product recommendation	Emotion detection	Used in online shopping websites
[1]	✓	✗	✓	✓	✗
[2]	✓	✗	✓	✓	✓
[3]	✗	✗	✓	✗	✓
[4]	✓	✗	✗	✓	✗
Current system	✓	✓	✓	✓	✓

1.4 Research Problem

Developing a product recommendation system based on emotions for differently abled people poses several challenges and potential problems. Emotions are highly subjective and can vary greatly from person to person, making it difficult to accurately capture and interpret them. Additionally, different types of disabilities can impact emotions differently, further complicating the task. Limited availability of data on the emotions of differently abled people, especially for smaller sub-groups, can also make it challenging to train machine learning models. Moreover, differently abled people are a diverse group with emotions that can vary depending on factors such as age, gender, race, and cultural background. Therefore, there is a risk of bias in the recommendation system if there is limited data available on specific sub-groups. To avoid exploitation, it is crucial to develop a product recommendation system that respects the privacy

and autonomy of differently abled people since emotions are highly personal. Implementing such a system requires advanced machine learning algorithms and significant computational resources, making it technically challenging and resource-intensive.

1.5 Commercialization

Introducing our revolutionary e-commerce digital voice assistant with a chatbot that identifies the emotions of all customers, including those with disabilities. Our system is powered by advanced machine learning techniques, including a CNN model trained on a diverse dataset of images representing a range of emotions. This technology sets our business apart from competitors by putting the needs of all customers first, providing a personalized and empathetic shopping experience. This system has the potential to impact customer satisfaction and loyalty, particularly for customers with disabilities who may not have access to or reliable facial expressions, vocal cues, or physiological signals to identify emotions. Moreover, It can can predict emotions expressed in each image based on visual cues, making it accessible and reliable for all customers.

2. Objectives

2.1 Main Objectives:

- Develop an Emotion Identification Component that can accurately identify the emotions of both normal people and those with different abilities.
- Use the Emotion Identification Component to provide personalized and empathetic product recommendation service to all customers, including those with disabilities.
- Showcase the company's commitment to serving all members of the community by providing products and services tailored to the emotional needs of different groups.

2.2 Sub Objectives:

- Conduct research to understand how differently abled people express their emotions and identify the specific challenges in accurately identifying their emotions.
- Collaborate with experts in the field of disability studies to ensure that the Emotion Identification Component is inclusive and considers the diverse needs of the disability community.
- Train customer service representatives to use the Emotion Identification Component and respond empathetically to customers with different emotional needs.
- Monitor customer feedback and adjust the Emotion Identification Component and customer service protocols as necessary to continually improve the customer experience.

3. Methodology

To achieve our goals, we have developed an Emotion Identification Component that is capable of accurately identifying the emotions of all our customers, regardless of their abilities. This component is the result of extensive research and collaboration with experts in the field of disability studies. We have also trained our customer service representatives to use this component effectively and respond empathetically to customers with different emotional needs.

Our research has revealed that people with disabilities face significant challenges when it comes to expressing their emotions. These challenges can result from a range of factors, including the nature of the disability, the level of support available, and social stigmatization. As a result, we have implemented a range of strategies to ensure that our Emotion Identification Component is inclusive and takes into account the diverse needs of the disability community. Our component uses a combination of advanced algorithms and machine learning to identify the emotions of our customers. It is designed to recognize a range of emotional expressions, including facial expressions, tone of voice, and body language. We have also developed a range of strategies to ensure that our component is sensitive to the unique emotional needs of different disability groups.

One of the key challenges we faced in developing this component was training our customer service representatives to use it effectively. We recognized that this was critical to ensuring that our customers receive a personalized and empathetic service. As a result, we invested heavily in training our representatives to use the component effectively and respond empathetically to customers with different emotional needs. We also recognize the importance of monitoring customer feedback and adjusting our Emotion Identification Component and customer service protocols as necessary to continually improve the customer experience. We will implement a range of strategies to monitor customer feedback, including surveys and social media monitoring. This feedback is then will use to improve our component and customer service protocols, ensuring that our customers receive the best possible service.

3.1 System Architecture

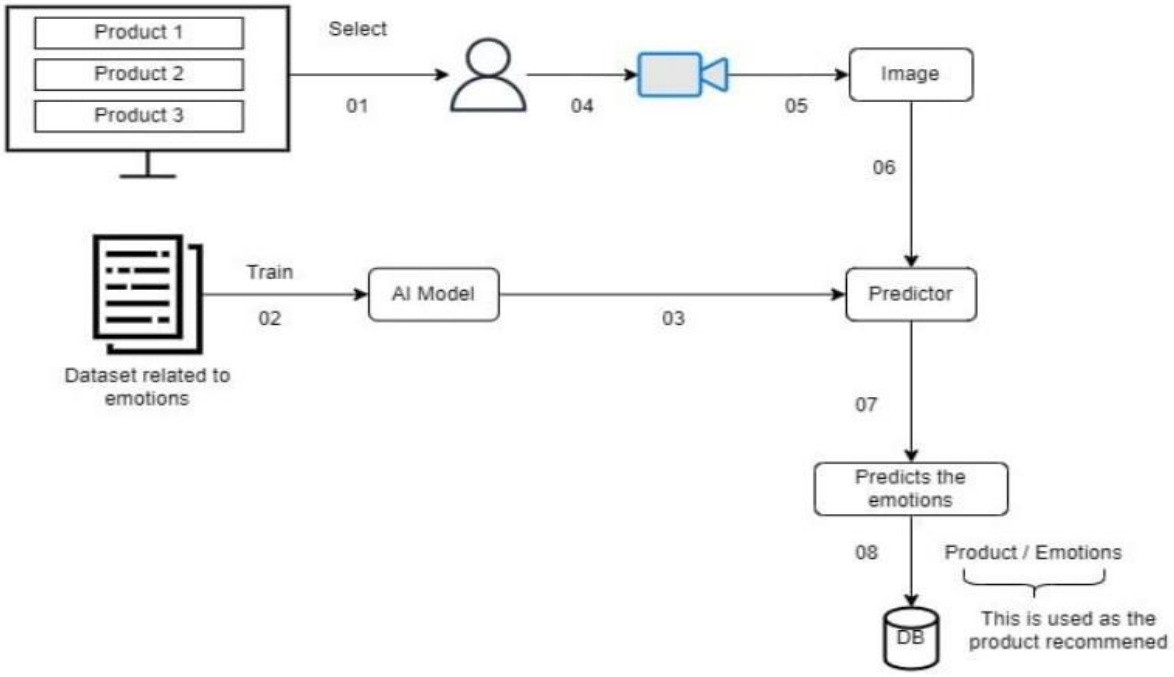


Figure 3:System Architecture

3.1.1 CNN Architecture

To develop an Emotion Identification Component that accurately recognizes and classifies emotions expressed by both normal and differently abled individuals, we need to follow a series of steps.

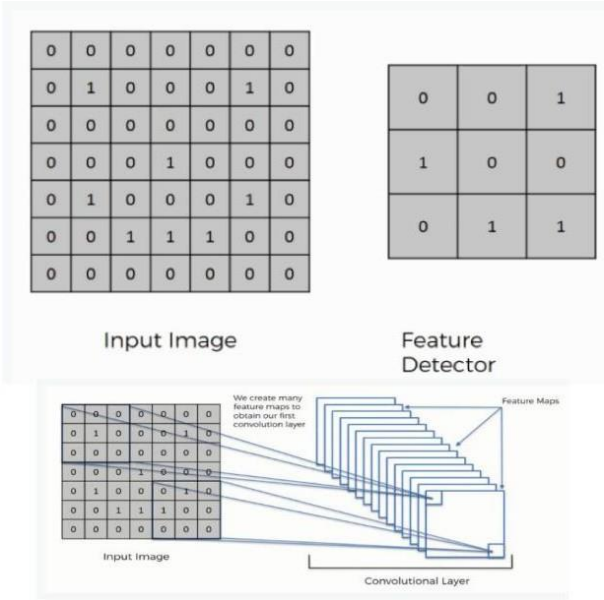


Figure 4:CNN Architectrue [4]

The first step is to collect a diverse dataset of images that represent a range of emotions expressed by individuals with different abilities. This dataset will be used to train a Convolutional Neural Network (CNN) model, which will learn to recognize and classify emotions based on the visual cues in the images. It is important to include a range of emotions and expressions, as well as individuals with different abilities, to ensure that the model is able to recognize and classify emotions accurately across a diverse population.

Once we have collected the dataset, we will use it to train the CNN model. Training the model involves feeding the images into the model and adjusting the weights of the model's layers to improve the model's ability to recognize and classify emotions. The model will learn to recognize patterns in the images that are associated with specific emotions. This training process can take a significant amount of time and requires a powerful computing environment.

After training the CNN model, we will fine-tune it using transfer learning techniques. Transfer learning involves using a pre-trained model as a starting point and then adapting it to our specific dataset by re-training the model with our own images. This approach saves time and resources compared to training a model from scratch. By fine-tuning the pre-trained model, we can improve the model's accuracy and efficiency in recognizing and classifying emotions in our specific dataset.

Once the CNN model is trained and fine-tuned, it can be used to predict the emotion expressed in each image. This prediction will be based on the visual cues and patterns learned by the model during training. The predicted emotion label can then be passed to the chatbot system or other components of the business to provide a more personalized and empathetic service to customers, particularly those with different abilities who may express emotions differently.

The benefits of this Emotion Identification Component are significant. By accurately recognizing and classifying emotions expressed by customers, we can provide more personalized and empathetic service, leading to increased customer loyalty and satisfaction. Additionally, by including individuals with different abilities in our dataset, we can ensure that the component is inclusive and considers the diverse needs of our customer base.

Developing an Emotion Identification Component that accurately recognizes and classifies emotions expressed by both normal and differently abled individuals requires collecting a diverse dataset, training and fine-tuning a CNN model, and using the model to predict emotions expressed

in images. This component has the potential to provide more personalized and empathetic service to customers, particularly those with different abilities, leading to increased customer loyalty and satisfaction.

Dataset: From Kaggle both normal user's emotions and differently abled user's emotions- https://dataverse.harvard.edu/dataverse/harvard

3.1.2 Sentiment analysis

Sentiment analysis is the process of using natural language processing (NLP) and machine learning techniques to identify, extract, and quantify subjective information from text data. The goal of sentiment analysis is to determine the attitude, opinion, or emotional tone expressed in a piece of text, such as a review, social media post, or customer feedback. The process of sentiment analysis involves several steps. First, the text data is preprocessed to remove stop words, punctuation, and other irrelevant information. Then, the text is analyzed using NLP techniques to extract features such as sentiment words, phrases, and emotions. The sentiment of the text is then classified as positive, negative, or neutral using machine learning algorithms.

Sentiment analysis has many applications in various industries, such as customer service, marketing, and product development. In customer service, sentiment analysis can be used to identify customer complaints and negative feedback in real-time, allowing companies to respond and address issues more quickly. In marketing, sentiment analysis can be used to understand consumer opinions and preferences, and to tailor advertising campaigns to specific target audiences. In product development, sentiment analysis can be used to identify areas for improvement and to gauge customer satisfaction with new products or features.

However, sentiment analysis has its limitations. It may not accurately capture the nuances and complexities of human language and emotions, and it may struggle with sarcasm, irony, and other forms of figurative language. Additionally, the accuracy of sentiment analysis models may vary depending on the quality and diversity of the training data and the specific context in which the text data is being analyzed. Moreover, sentiment analysis is a powerful tool for understanding and analyzing large volumes of text data and can provide valuable insights for businesses and organizations. However, it is important to use it in conjunction with other data analysis techniques and to interpret the results with caution, taking into account the limitations and potential biases of the models.

4. Project Requirements

4.1 Project Plan

Define Project Scope and Objectives

- Clearly define the scope of the project, including the specific emotions that the component will identify and the target audience.
- Set objectives for the project, such as accuracy levels, performance targets, and integration with other business components.

Collect Diverse Dataset of Images

- Research and collect a diverse dataset of images that represent a range of emotions expressed by both normal and differently abled individuals.
- Ensure that the dataset is representative of the target audience and that it includes images from different cultures and backgrounds.

Train CNN Model

- Train a Convolutional Neural Network (CNN) model using the collected images as input.
- Use techniques such as data augmentation to increase the size of the dataset and improve model accuracy.

Fine-tune CNN Model

- Use transfer learning techniques to fine-tune the pre-trained CNN model to the specific emotion identification task.
- Use the collected images to re-train the model and adapt it to the specific dataset.

Test and Validate Model

- Test the trained and fine-tuned model using a separate validation dataset to ensure that it is accurate and reliable.
- Use metrics such as precision, recall, and F1 score to evaluate the model's performance.

Integrate Component with Business

- Integrate the emotion identification component with other components of the business, such as the chatbot system, to provide a more personalized and empathetic service to customers.
- Ensure that the component is scalable and able to handle large volumes of data and users.

Implement Security Measures

- Implement strong security measures to protect customer data and ensure data privacy.
- Comply with all relevant laws and regulations related to data privacy and security.

User Testing and Feedback

- Conduct user testing and gather feedback from users to ensure that the component is user-friendly and easy to navigate.
- Use feedback to make any necessary

4.2 Project Management

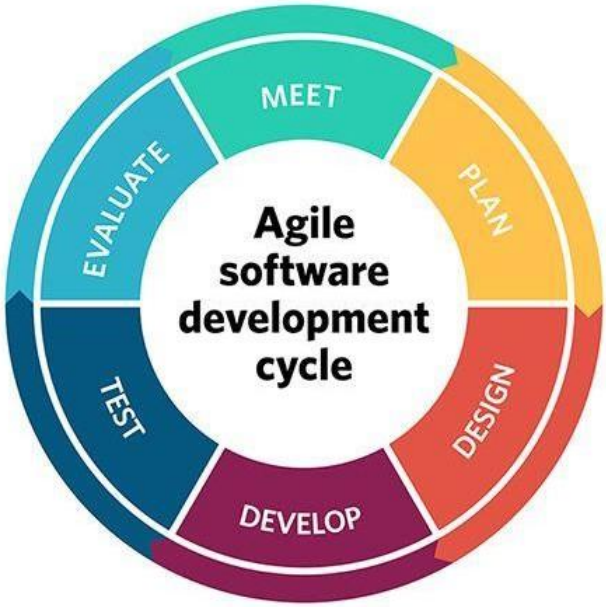


Figure 5:Agile Method [11]

Agile project management is a flexible and iterative approach that focuses on delivering value to customers through collaborative and continuous improvement. Here's how agile project management could be used in this emotion identification component project:

Sprint Planning

Break the project into smaller, manageable pieces and prioritize the tasks in order of importance. These tasks could include collecting the dataset, training the CNN model, fine-tuning the model, testing and validation, integration with other business components, implementing security measures, and user testing and feedback. Each of these tasks should be planned for in each sprint.

Daily Stand-Ups

Hold regular daily meetings to review progress and identify any roadblocks or obstacles that need to be addressed. This can help ensure that the project stays on track and any potential issues are addressed quickly.

Sprint Reviews

Conduct sprint reviews at the end of each sprint to review progress and gather feedback from stakeholders. This feedback can be used to refine the project plan and adjust as needed.

Continuous Improvement

Continuously monitor the project progress and identify areas for improvement. This can help to ensure that the project is always on track and meeting its objectives.

Collaborative Approach

Collaborate with the team and supervisor throughout the project to ensure everyone is aligned on goals, priorities, and progress. This can help to ensure that everyone is on the same page and working towards a common objective.

4.3 Functional Requirements:

- The emotion identification component should be able to identify a range of emotions expressed by both normal and differently abled individuals.
- The component should be able to differentiate between similar emotions, such as frustration and anger, or sadness and disappointment.
- The component should be able to adapt to different languages and dialects, allowing for global use.
- The component should be integrated with other components of the business, such as the chatbot system, to provide a more personalized and empathetic service to customers.
- The component should be scalable to handle large volumes of data and users.

4.4 Non-Functional Requirements:

1. Accuracy: The emotion identification component should have a high level of accuracy in identifying and classifying emotions.

2. Performance: Should be able to process data and provide predictions in real-time, with minimal latency.

3. Security: Should have strong security measures in place to protect customer data and ensure data privacy.

4. Reliability: Should be reliable and robust, with minimal downtime or system failures.

5. Usability: Should be user-friendly and easy to navigate, with clear instructions and feedback for users.

6. Accessibility: Should be accessible to users with different abilities, including those with visual or auditory impairments.

4.5 Software Requirements

- ***IDE***: PyCharm, Visual Studio Code, IntelliJ

- ***Languages***: Python, Java, HTML, CSS, JS, jQuery
- ***Frameworks***: Bootstrap, Springboot, Jinja
- ***AI/ML toolkits & Algorithms***: CNN
- ***AI/ML Libraries***: OpenCV-python
- ***DB***: MySQL

4.6 Hardware Requirements

- Windows 10
- A smartphone (Android 7.0)
- Intel® Core™ i7-8250U Processor
- 8 GB RAM

7. Diagrams

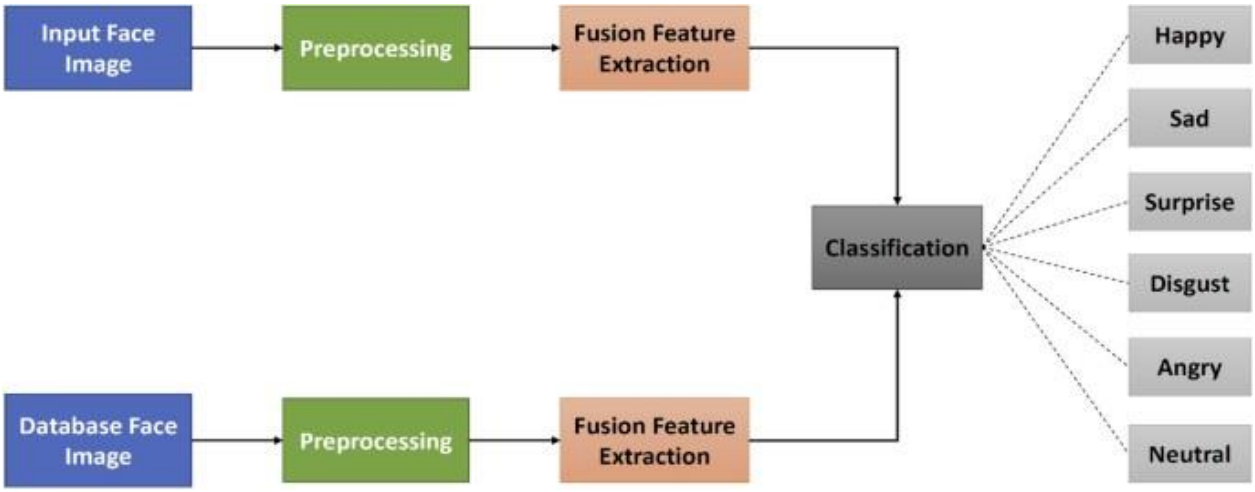


Figure 6:Block Diagram

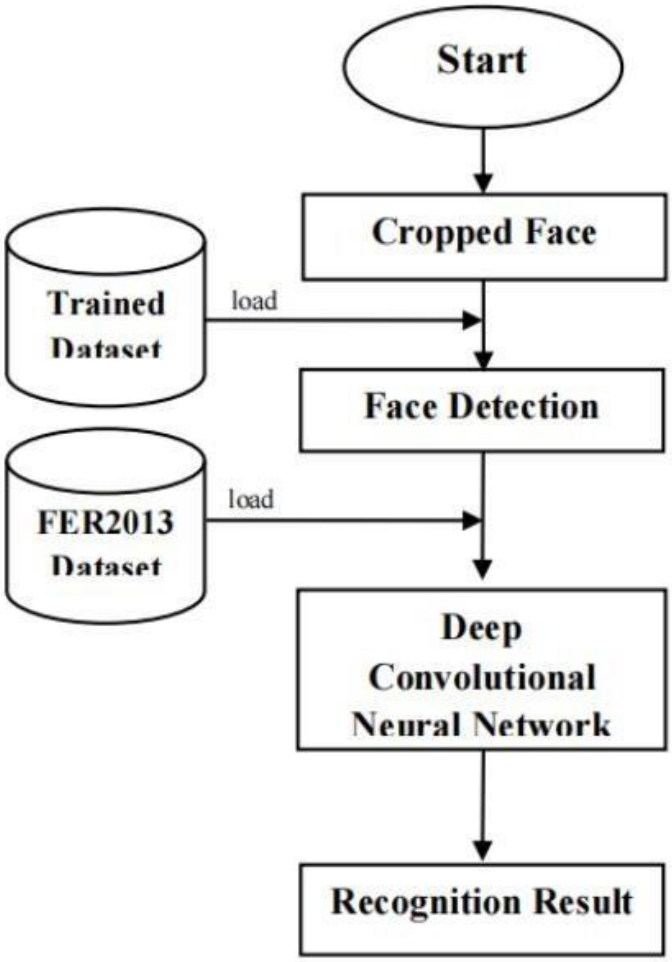


Figure 7:Flow Diagram

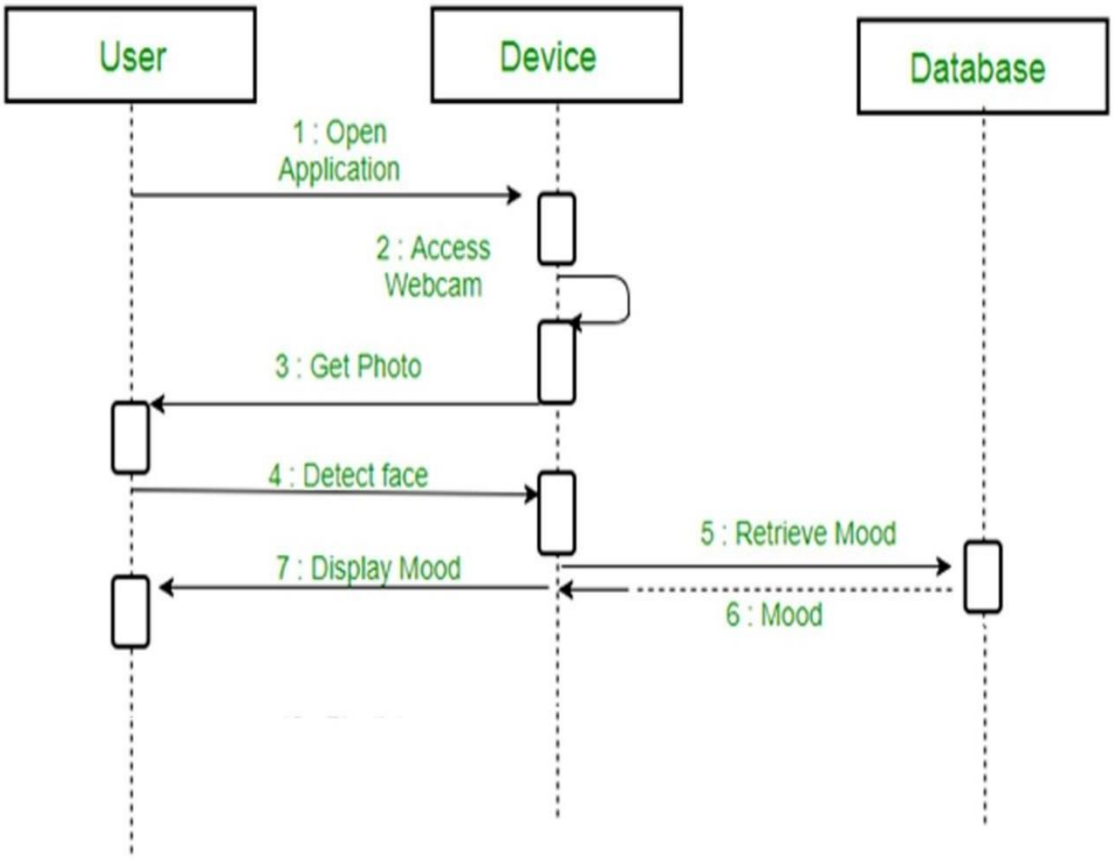


Figure 8:Sequence Diagram

5. Description of personal and facilities

Personnel:

- Responsible for overseeing the project and ensuring that it is completed on time and within budget.
- Responsible for collecting the dataset of images and training the CNN model using machine learning techniques. And building the chatbot system and integrating it with the emotion identification component.
- Responsible for testing and validating the system to ensure that it meets the project objectives and requirements.

Facilities:

- High-performance computing resources: required to train the CNN model and perform the necessary machine learning computations.
- Image and data storage: required to store the dataset of images and the trained CNN model.
- Collaboration and communication tools: required to facilitate communication and collaboration among team members, stakeholders, and customers.
- Accessibility tools and software: required to ensure that the chatbot and emotion identification component are accessible and usable by all customers, including those with disabilities.

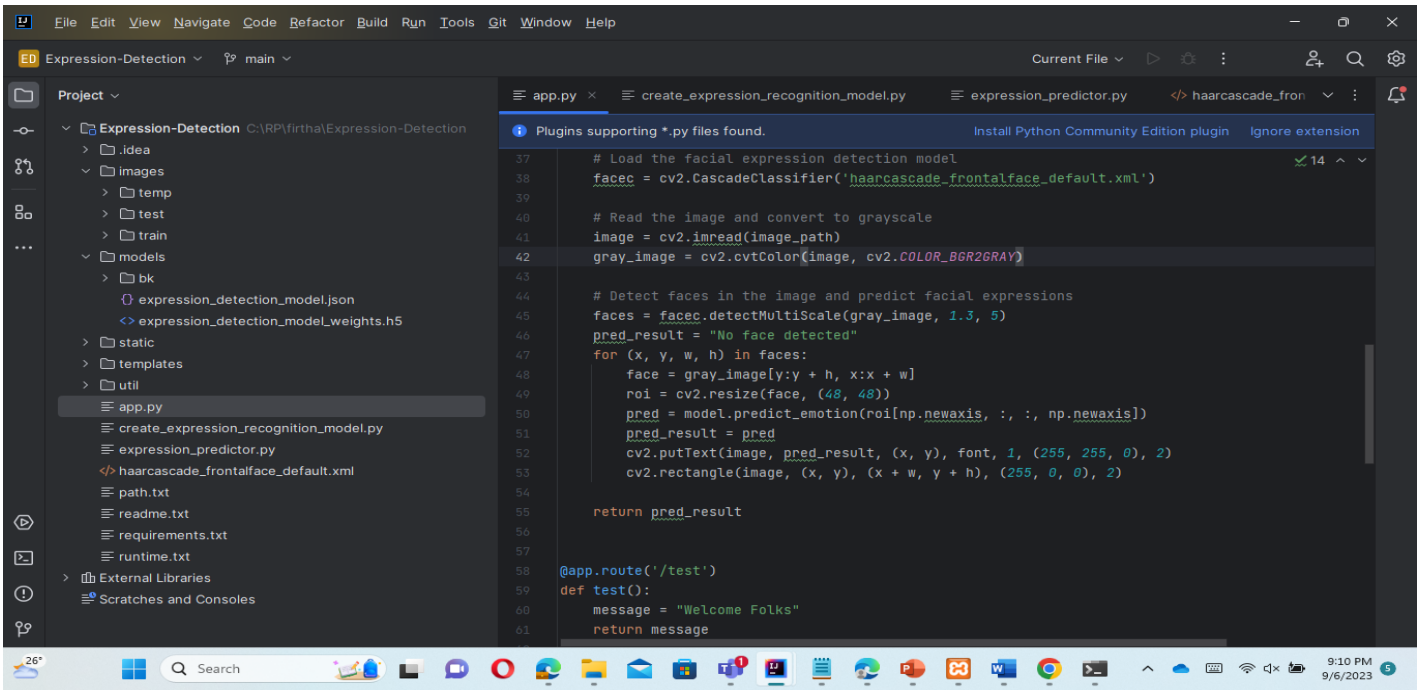
6. Budget and Budget Justification

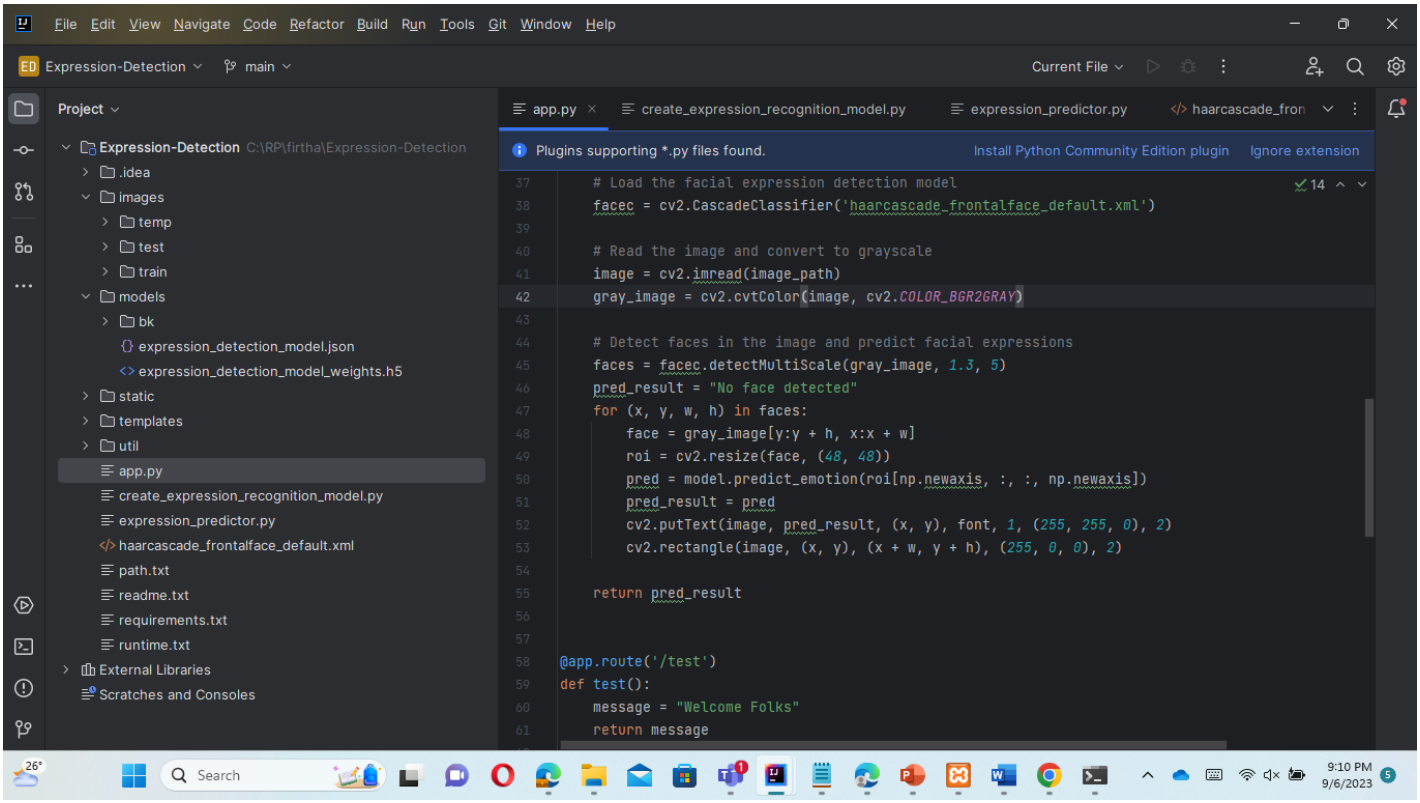
Laptop	***Rs 160000***
Documentation	***Rs 4000***
Others	***Rs 7000***
Total	***Rs 55000***

Conclusion

In conclusion, incorporating an emotion identification component into a product recommendation system can greatly benefit differently abled people and improve their overall shopping experience. By recognizing and responding to the unique expressions of emotions in differently abled individuals, we can provide a more personalized and empathetic service that meets their specific needs. This can ultimately lead to increased customer loyalty and satisfaction, as well as showcase our commitment to serving all members of our community. However, it is important to carefully consider ethical implications and potential biases when using such technology. By prioritizing inclusivity and accessibility, we can create a more equitable and inclusive shopping experience for all.

Implementation





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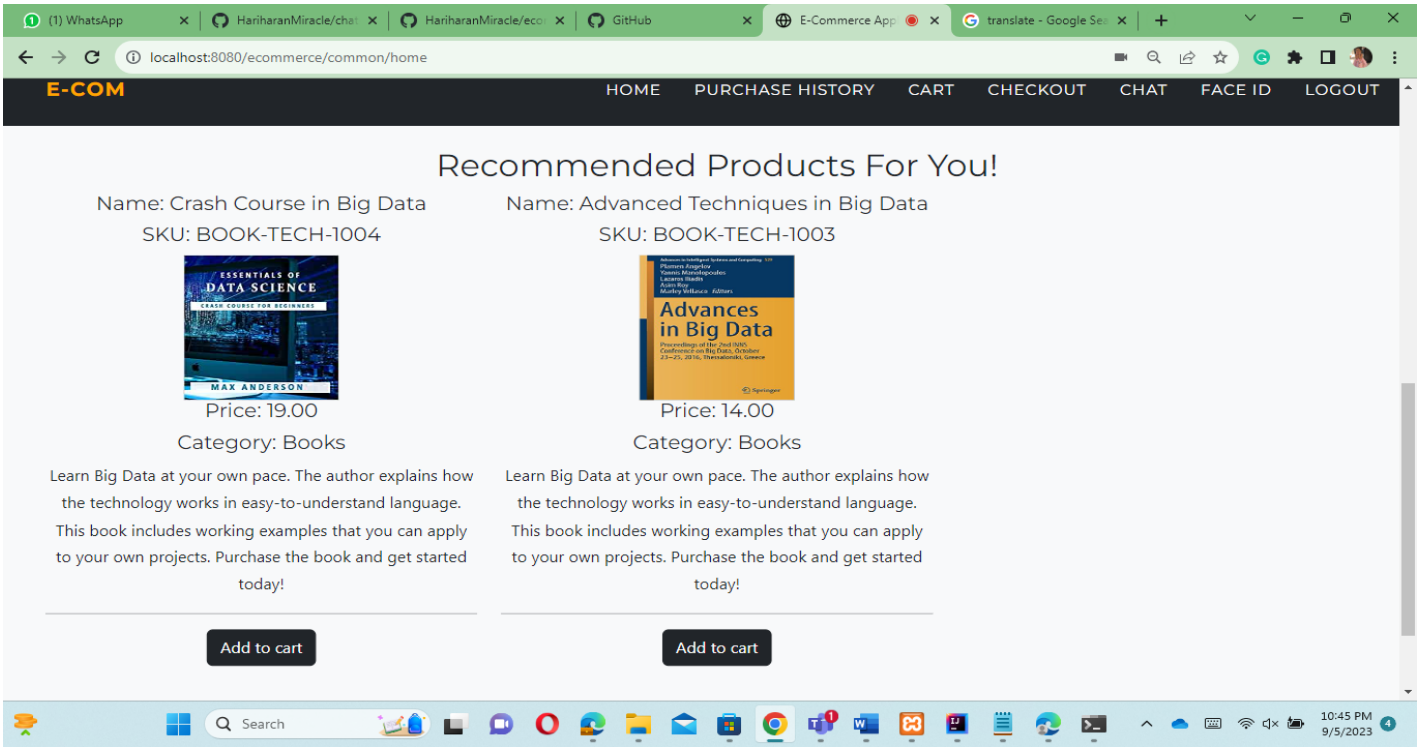
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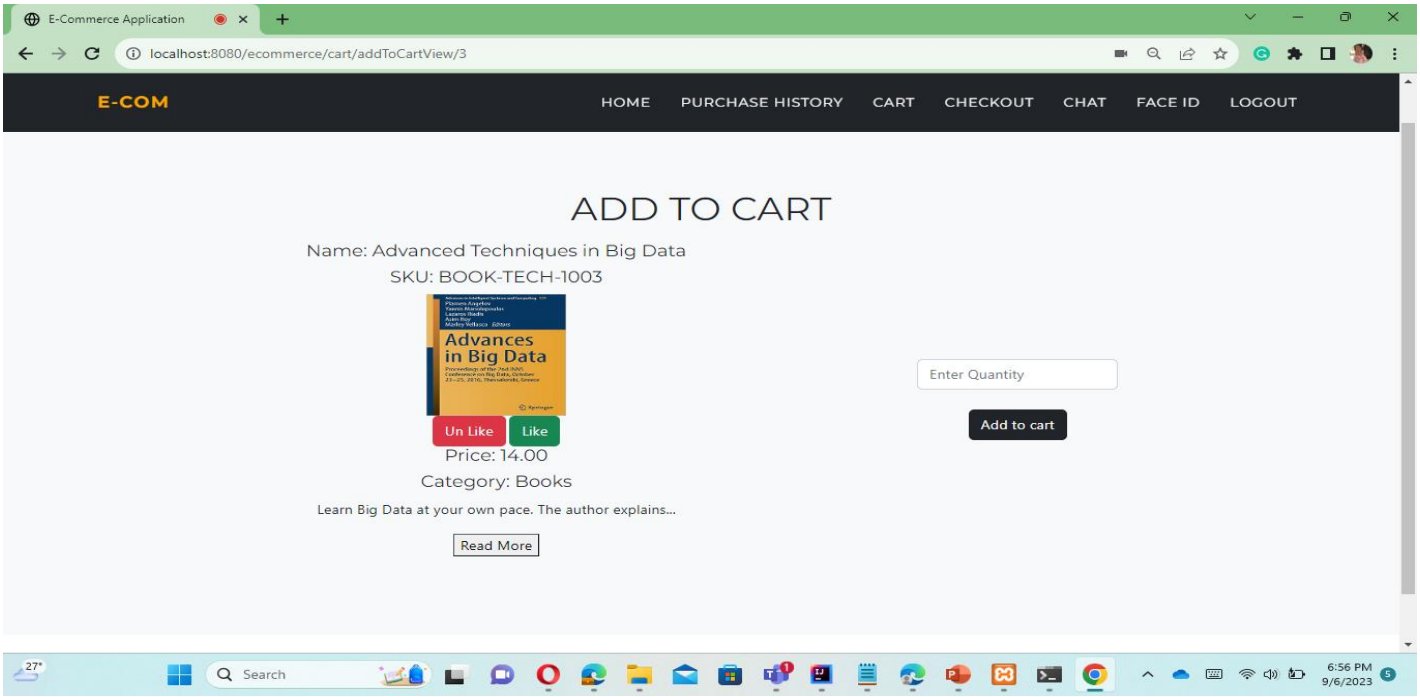
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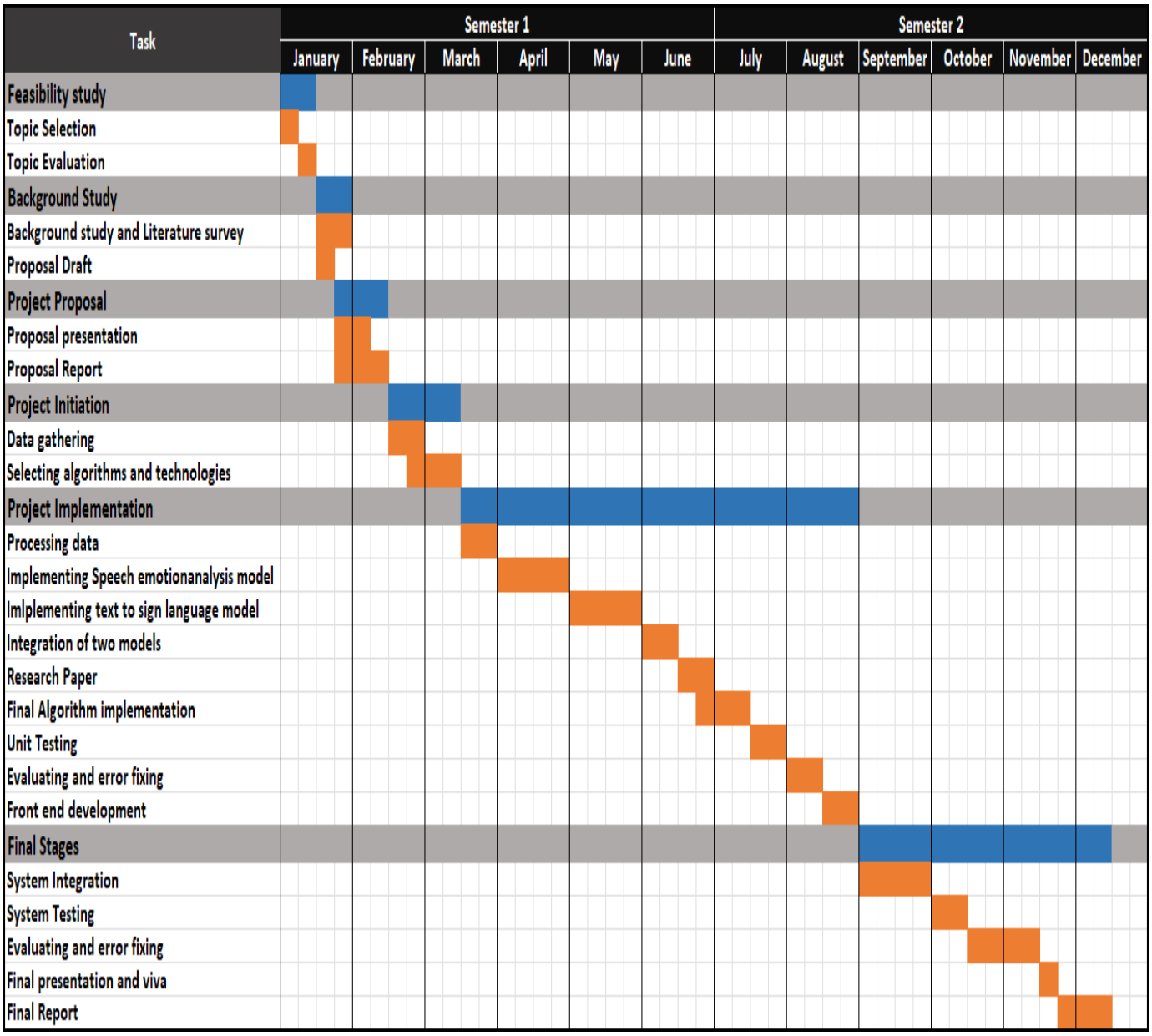
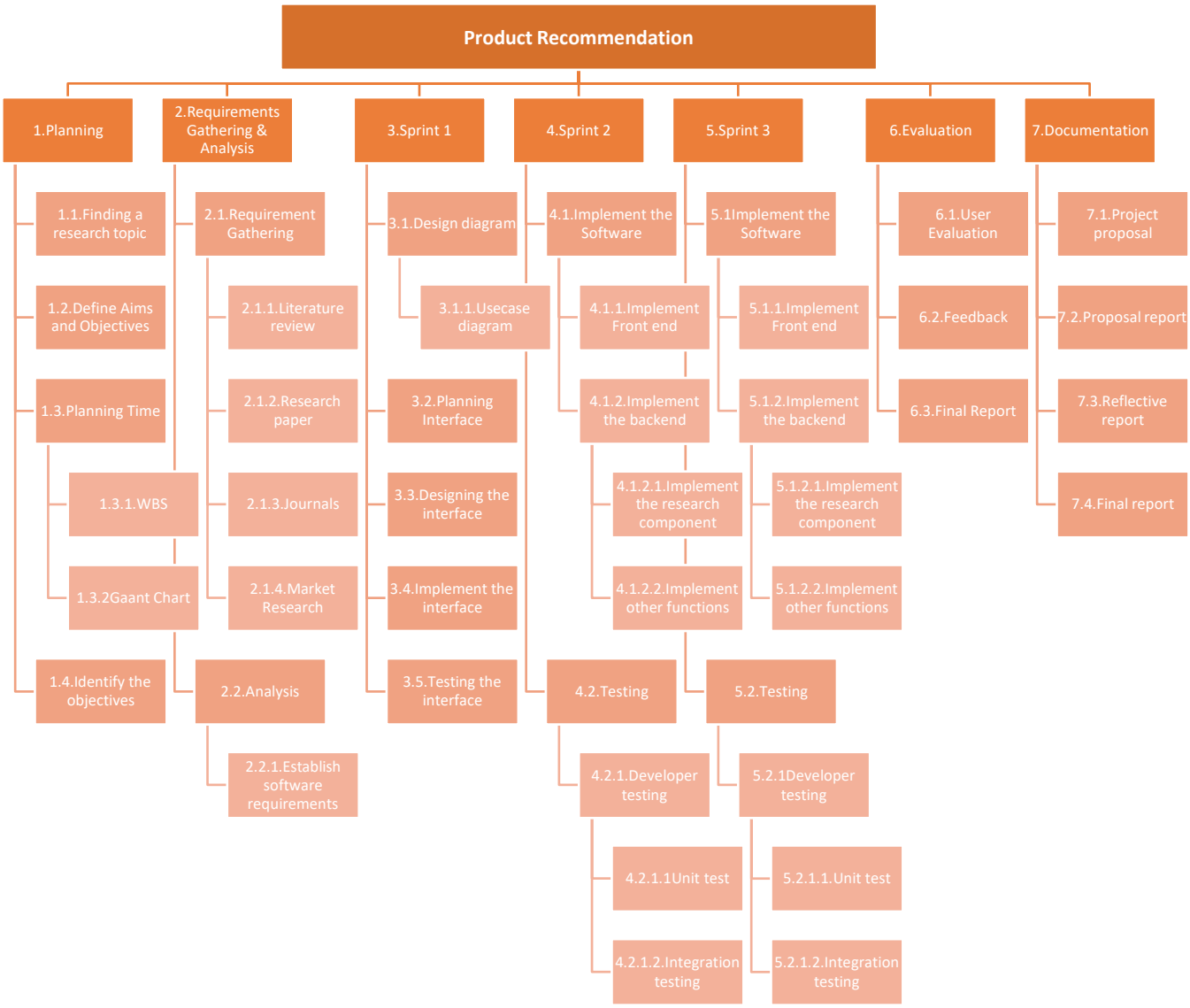
Gannt Chart


Task
Semester 1
Semester 2
January
February
March
April
May
June
July
August
September
October
November
December
Feasibility study
Topic Selection
Topic Evaluation
Background Study
Background study and Literature survey
Proposal Draft
Project Proposal
Proposal presentation
Proposal Report
Project Initiation
Data gathering
Selecting algorithms and technologies
Project Implementation
Processing data
Implementing Speech emotionanalysis model
Imlplementing text to sign language model
Integration of two models
Research Paper
Final Algorithm implementation
Unit Testing
Evaluating and error fixing
Front end development
Final Stages
System Integration
System Testing
Evaluating and error fixing
Final presentation and viva
Final Report

Work Bench Chart



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