AI Image Editing Platform

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Declaration

The project submitted herewith is a result of my own efforts in totality and in every aspect of the project works. All information that has been obtained from other sources has been fully acknowledged. I understand that any plagiarism, cheating or collusion or any sorts constitutes a breach of TAR University rules and regulations and would be subjected to disciplinary actions.

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Abstract

This project aims to develop an AI-driven image editing platform designed to meet the growing demand for sophisticated yet user-friendly image enhancement tools. The platform offers advanced features such as image upscaling, gap filling, object removal, color replacement, and background removal, all powered by AI technology. Key modules of the platform include User Management, Image Editing, Image Source Integration, Public Edits, and Profile Management. These modules cover user account management, image editing capabilities, integration with various image sources, viewing and downloading shared edits, and profile management. The project utilizes agile methodology, which involves iterative development and frequent reassessment. This approach allows the project to adapt quickly to user feedback and evolving needs, ensuring continuous improvement and timely updates. Agile practices guide the development process, emphasizing flexibility and responsiveness. The platform is built with modern technologies to ensure security, high performance, and compliance with data protection regulations like GDPR. Testing is carried out to verify functionality, performance, and usability, ensuring that the platform meets its objectives effectively. The results showcase the platform's strengths, including its intuitive interface and effective AI-driven features. Future enhancements will address any identified weaknesses and introduce new functionalities, reflecting the agile methodology's focus on iterative refinement and user-centered development. This approach ensures that the platform remains adaptable and aligned with user needs, offering a top-tier solution for image editing.

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Chapter 1

Introduction

1. Introduction

The AI Image Editing Platform is a web-based application platform that is intended for editing images. It provides a way for users to produce high quality, edited images quickly and easily with no prior experience required. Today there are many applications that assist in various activities, yet image editing can be quite challenging and will still require significant time. These problems are resolved by this platform through the application of complex technologies that improve and facilitate the editing process. Some of the main functions within the platform include enhancing the image quality, image filling using AI, and erasing objects identified by the AI. The platform also enables the users to recover, modify colors and erase background to only leave the main objects. Some of the features include inserting natural language commands to make it easy for the users to navigate and perform complex editing tasks. Profile management and image source integration are also included since they are important in assisting users managing their work and images from different sources. In other words, the AI Image Editing Platform is a great utility for creating professional media content and achieving the best results with little to no effort.

1.1 Objectives

The primary goal of the AI Image Editing Platform project is to design a web application that can create impressive images easily using AI algorithms. Specifically, the elements of the platform will rely on machine learning algorithms, particularly GANs and deep learning for generating images from scratch as well as for image transformation. The goal of this project is to make real and intuitive image manipulation for the amateur and professional users such as social media influencers, Youtubers, and photographers while providing the power and flexibility for enhancing, retouching, and restoring the images as efficiently as possible without mandatory professional skills. By using the proposed platform, users will be able to obtain a professional outcome of image editing within a short time.

1.2 Background

As we enter the new era where the presence of the internet and photography is in almost every individual and even in organizational activities, image editing has become an important need. Whether people are enhancing their own photographs or building eye-catching and memorable advertising texts, the need for high quality images is only increasing. However, traditional software such as Adobe Photoshop which has very many features in the software, can be very hard to master . This is because knowledge in these tools is demanding and time consuming hence many users are discouraged.

Thus, to increase the popularity of image editing, new solutions are being developed. Unlike standard photo editing applications, these platforms rely on artificial intelligence, particularly machine learning for operations of editing, specifically generative adversarial networks(GANs) and deep learning (Yang et al., 2023). This makes it possible for the novice and the advanced users to get professional work at the click of a button within the shortest time possible (PSD Vault, 2023). These innovations are intended to break down the complicated methods of editing so that a lot of the required work is dealing with those interfaces and applying artificial intelligence. Luckily, in the present generation, advanced editing tools can enhance the work to such a level that it cannot be distinguished from that done by a professional by a beginner. This simplifies the process of editing for those who are still learning and acts as a plus for those who work fast (Shotkit, 2024; Creative Bloq, 2023).

In comparison, Adobe Photoshop's editing and some of its tools and options can be quite inconvenient, which results in longer time spent on editing. Adobe Photoshop still remains as a choice for professionals who need features that are more advanced and control for their editing process (PSD Vault, 2023). However, AI platforms are increasingly being used to perform simple tasks more efficiently, allowing users to focus on more creative aspects of their work. On the other hand, AI platforms have an ease of use interface and there is no need to hire a specialist to perform simple operations like improving the image quality or erasing the object or the background. This means that there is a shift of

technology from one that has complex features and ultimately focuses on user friendliness. In conclusion, these platforms are changing how users and organizations develop and modify images and are creating opportunities for new creations and effectiveness in the context of contemporary societies.

1.3 Advantages and Contributions

- **Effortless Editing**

  From a user perspective, the platform enables easy editing of images for all manner of users ranging from beginners to the more advanced users. With the help of simple and easy to understand tools such as the notion of real-time editing, even the least IT literate person can create professional-looking edits in the shortest time possible. It not only helps save time but also makes users be able to improve their photos easily if it is for enjoyment or for business.

- **Image Restoration**

  Using powerful machine learning algorithms, this platform can proficiently repair blurred, deteriorated, or otherwise spoiled images. It is worth stating that these algorithms study and deconstruct existing images, as well as attempt to reassemble them in the best possible manner. It is useful for those who want to restore severed photos or enhance the quality of the shot which can be distorted by factors such as low light or compression. The platform enables users to regain their photos and video's vivid appearance and explains how the tool allows for the revival and enhancement of important personal memories and stunning content creation.

- **Pay-per-Use Model**

  The operating model of the platform is based on the pay-as-you-go model that provides a convenient and relatively cheap experience of the platform for the users. This model of editing enables the users to only pay for selected editing tools or options used while they do not subscribe to an annual or other forms of a subscription. It brings the sophistication of superior image editing within the reach of the common person and any business because of no financial barriers. Besides improving the financial accessibility it also allows users to be more experimental and inventive when it comes to designing and perfecting the final look of a digital image as they can practice until they reach their goal on their own.

1.4 System Development Methodology

For this project, I have decided to adopt Agile Methodology as the project management model. Agile development is development that is characterized by responsiveness and early and continuous delivery of the product. It divides them into smaller sub-phases known as sprints, usually of a few weeks' duration. Every sprint is aimed at providing working software, creating the opportunity to fine-tune the feedback from business representatives at definite stages of development. This makes it possible for teams to correct a number of issues in the required system and technology requirements by incorporating the best features in the system to enhance it progressively; this is in accordance with the user feedback provided in the real user conditions.

Therefore, the agile methodology is suitable as it will allow to quickly implement the changes in the requirements and feedback from the end-users due to short development cycles which will be important for improvements of AI algorithms and new features. Breaking the project into more parts (sprints) means that it gradually produces features that are useful to the end-users, which ensures continuous improvement based on real-life experience with the system. This approach also engages other stakeholders in the making of small changes for better usability. Besides, risk management of Agile methodology identifies and solves issues during their development and keeps improving the application by implementing new methods of AI and improving features step by step. In general, Agile makes the communication transparent and encourages steady work which would be rather useful in establishing an enhanced platform to address the changing user demands on image editing in the digital space.

1.5 Project Plan

1.5.1 Project Scope

The main modules included in the project are:

AI Image Upscaler

This is meant to enhance the quality of an image by either eliminating or reducing the impact of the degradation that may have been shown at the time of image capture, during transmission or even storage. Users can use this tool to make a low quality image to a high quality image by simply using AI. Super resolution is one of its complex algorithms. It also covers other problems that are present in digital images such as either noise or blurriness or even missing parts. Thus, the images turn out to be much clearer and visually appealing.

AI generated filling (with aspect ratio selection)

This feature allows the user to artificially enlarge the image with AI algorithms. For example, the user can convert a horizontal image into a portrait image and generated AI images will fill the gap of the horizontal image. It automatically repairs missing or damaged areas in images by intelligently recreating content based on surrounding information, resulting in seamless and complete visuals.

Object Selection and Removal

This function enables the user to remove any object in the image with the search prompt. For example, to remove a stranger getting in the background of the photo, type "remove person in the
background." in the prompt bar. It eliminates unwanted elements from images while preserving the background, creating cleaner and more focused visuals without manual editing.

Object Selection & Color Replacement

This feature will allow users to automatically restore or enhance the color of objects within an image. Users will just have to type in the name of the object and color for it to work. It enhances or restores faded or degraded colors in objects within images, bringing them back to life with vibrant and accurate hues for a more vivid representation. This process is particularly useful in scenarios where the color information of objects in images has been degraded, faded, or lost over time.

Background Removal

This feature utilizes artificial intelligence algorithms to automatically remove the background from an image while preserving the foreground objects. This process is

particularly useful for creating visually appealing images with transparent backgrounds or isolating objects for various applications such as graphic design, product photography, or image editing.

Profile Management

This module shows the available tokens the user has. Tokens are required to purchase in order to use the AI tools. This module also shows the recent edits made by the user from using the AI tools.

Log In/ Sign Up

Users can login the system with their created account or register a new account with their user information. After registering and login, users can then interact with the service.

Payment

Users can securely purchase credits through the Stripe payment system which includes the credit and debit cards payment method.

Image source integration (Google drive, Dropbox, Shutterstock, gettyimages, Istock, Unsplash)

This allows users to get images from different image hosting platforms like Shutterstock and cloud storage platforms.

Home/Public Edits

Allow users to select their preferred image editing function or view and download the recently transformed images made by users in the platform.

1.5.2 Project Milestone

Name	Start	Finish	Duration
Project Planning and Proposal	1/29/2024	2/22/2024	25 day
Research Project TItle	1/29/2024	2/11/2024	14 day
Submission of Project Proposal Report	2/12/2024	2/22/2024	11 day
Project I	6/17/2024	9/20/2024	96 day
Chapter 1: Introduction	6/17/2024	6/21/2024	5 day
Literature Review and Researching	6/22/2024	6/25/2024	4 day
Chapter 2: Literature Review	6/26/2024	6/29/2024	4 day
System Analysis	6/30/2024	7/4/2024	5 day
Chapter 3: Methodology and Requirement Analysis	7/5/2024	7/19/2024	15 day
Chapter 4: System Design	7/20/2024	7/27/2024	8 day
Submission of Project 1 Portfolio	7/28/2024	8/2/2024	6 day
Initial System Design	8/12/2024	8/30/2024	19 day
Initial System Preview with Supervisor	9/2/2024	9/20/2024	19 day
Project II	11/18/2024	12/27/2024	40 day
Implementation/Coding	11/18/2024	11/25/2024	8 day
Test Case Planning	11/25/2024	11/29/2024	5 day
System Preview With Supervisor II	11/25/2024	11/29/2024	5 day
Final System Testing with Supervisor and Moderator	12/2/2024	12/6/2024	5 day
Submission of Draft FYP Report	12/14/2024	12/20/2024	7 day
Submission of Final FYP Report	12/21/2024	12/27/2024	7 day

Table 1.5.1: Project Plan

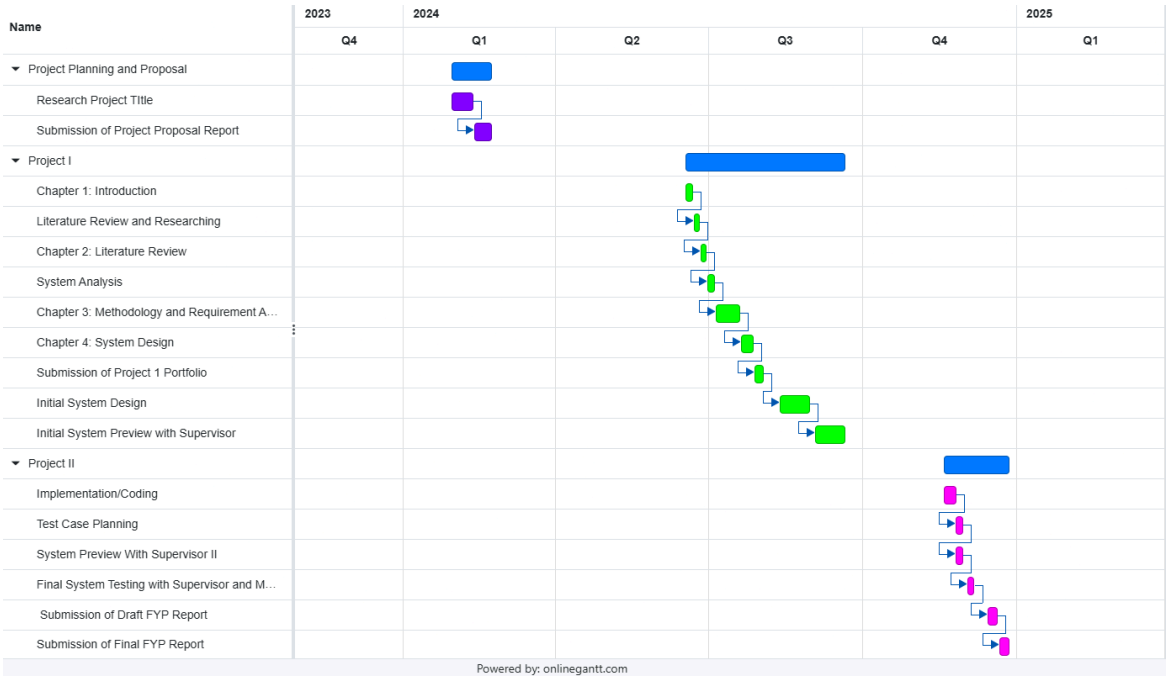

Table 1.5.2: Gantt Chart

1.6 Project Team and Organisation

This project is solely done by the author of the paper, who will develop and manage the project aspects independently, including all modules and components.

1.7 Chapter Summary and Evaluation

This chapter focused on the proposals and the way the AI Image Editing Platform has been set up and used. The paper started with the background of the project, discussing the purpose of the project with the need for an image editor that is easy to use with strong recommendations for the design of the project. In the case of Adobe Photoshop and other apps traditionally used for image editing, such methods were described as too complicated and time-consuming. The solution proposed is in the form of the AI Image Editing Platform which provides a function that is easy to use, image restoration through artificial intelligence, and the ability to offer pay-as-you-go services.

As for the analysis of the platform's benefits and contributions, they were discussed in more detail. In the section, it is explained that efficiency in editing images can be done with little time and skills, repair of images that have been corrupted through using artificial intelligence, and the payment plan that incorporates the use of images on an as needed basis. Agile methodology was introduced as the selected development approach because it is flexible, proceeds in sprints, and is oriented toward customers, which meets the requirements of the project.

Chapter 2

Literature Review

2 Literature Review

Introduction

This literature review explores two research papers that talks about the role of AI in image editing platforms and how they compare to a hypothetical AI Image Editing Platform project. Besides, feasibility studies are also included to ensure that the project is viable to be developed.

2.1 Literature Review

Adaptive History for Image Editing

The first paper is titled "Data-driven adaptive history for image editing" by Chen et al.(Chen et al., 2016) This paper introduces a different approach, which works with the image editing history and acts adaptively to the user's behavior. It guesses what the user's next operation will be based on their previous actions in order to optimize undo/redo and history selection. According to the authors, action-based models define the history of edits, however, they are frequently coupled with undo/redo operations which are known as detrimental to the editing process. (Chen et al., 2016)

The adaptive history approach's primary goal is to minimize the number of iterations required to achieve the desired outcome by predicting the next user action. The system categorizes related operations in ways that minimize the user's work and the ways include initial classifications and groupings to higher levels like sequence level. This way, editing patterns (Chen et al., 2016) of the user can be incorporated, and the adaptive history is more beneficial for the user in terms of the ease with which she can go through the history of her recent edits.

As for the adaptive history, the authors did user studies to measure the usability of the approach they proposed. The final outcome of the study demonstrated that subjects achieved better results employing the adaptive history than the undo/redo mechanism (Chen et al., 2016) in target tasks' accomplishment with fewer mistakes in less time. This implies that the integration of adaptive history in the image editing applications would go a long way to enhance the results and the effectiveness or efficiency of the applications.

Reinforcement-Learning-Controlled Image Editing Software

The second paper, titled "Unpaired Image Enhancement Featuring Reinforcement-Learning-Controlled Image Editing Software" discussed by Kosugi and Yamasaki (Kosugi and Yamasaki, 2019), provides an efficient method for unpaired image enhancement using reinforcement learning and image editing software. The authors introduce a method for learning image improvements through training, which does not rely on paired data, which is usually scarce.

The system includes an RL agent that communicates with a tool for image processing with an aim of improving the input images (Kosugi and Yamasaki, 2019). The agent acquires the capability to make a sequence of editing operations in the form of setting desirable values for the brightness, contrast, and color palettes in order to enhance the quality of the output image. The authors adopt the novel reward function to make the agent improve images while preserving their properties.

The authors test their system based on various image enhancement tasks and compare it with other approaches in the literature. The results demonstrate the usefulness of their method for improving images without the need for a corresponding image set for training and its ability to exceed the considered approach to the given user-perceived quality.

Comparison to AI Image Editing Platform

Comparing the information from these research papers to the hypothetical AI image editing platform project reveals several key considerations:

Based on the first paper, potentially, adaptive history and prediction would be helpful to implement into the platform. Predicting how the user will edit after a certain amount of time will allow the platform to minimize the number of steps needed for editing, therefore making the process less mentally taxing. Some of the important features discussed in the second paper include upscaling, denoising as well as background removal Among these, it will be crucial for the platform to offer similar tools in AI to perform efficient and high quality of the edits. Still, it should also have manual adjusting tools for situations that need an editor's input due to creativity and separate judgment. One of the goals that should be discussed further is enabling creativity by eliminating routine and helping editors embrace art, as mentioned in the second paper. The platform should allow a user to test and explore the borders of his/her ideas and simultaneously include an AI twist to the user's working process.

The second research paper describes a new method of AI image enhancement which is quite different from a hypothetical AI image editing platform. The major difference is the way that the paper uses reinforcement learning to improve images without comparing them with their pairs, which is often problematic to collect. This enables the system to learn from several other input images and the preference of the users, a crucial property for an image editing solution. Also, the enhancement of the original image characteristics besides the use of a reward function also enhances the integrity of the authors' work. I also find that the authors' evaluation of the platform from the perceptual quality perspective alongside the online user preferences is effective to ascertain the additional feature improvement efficiency of AI. But here the problem of automation vs. creative input has to be solved, as users must have an option to manually tweak edited images. It is also essential to attend to the possible biases and constraints in the AI models to get rid of

prejudices in its results too. With the help of these experiences, the hypothetical platform can implement the reinforcement learning to provide the effective and user-oriented tools for image editing that will enable the creators to develop their skills and create the amazing works.

Conclusion

Both of the papers that have been analyzed in the present paper describe a number of pros of applying AI in image editing, such as the efficiency of work, increased inspiration, and the quality of the result. These are useful perspectives that may be applied to the creation of a hypothetical AI image editing service which should take advantage of the AI algorithms coupled with non-automatic editing instruments for the purpose of offering a comprehensive and effective editing solution to the consumers.

Therefore, it is necessary to admit that AI features should be balanced by machine-learning limitations, particularly in terms of complex editing. Other features that the platform must have include ease of use, scalability, and the ability to consider customers' welfare and privacy.

In the future, the use of AI in image editing platforms is set to increase as AI progresses, and offer more features. To sum up, the points discussed in the examined research papers can be implemented when developing the AI image editing platform and together with the considerations of the requirements of the platform project so that the developers may provide users with the tools which will allow improving the outcomes of the creative process without simultaneously compromising the results of their own work.

2.2 Feasibility Study

Technical Feasibility

Technical feasibility focuses on the technology considerations that will be used to produce our product or application to determine the possibility of successful application development. AI Image Editing Platform is a web-based application, and can be worked on all devices that support web functionality which may include but not limited to Microsoft Windows devices, Android phones, IOS devices, etc. The resources used to develop the project are Nextjs (React), Tailwind CSS, Shadcn for frontend and back-end will use TypeScript while APIs will be utilized which includes Media Uploader API, Google Auto Tagging, Cloudinary API, Clerk API and Stripe API. For the database, MongoDB is selected as the preferred database to store users' information securely. An Integrated Development Environment (IDE) named Visual Studio will be used as a supporting tool for us to build this Web application. Visual Studio has all the features that are required to build a running web application for web devices. However, there are several requirements as the developer to run this particular IDE on hardware to work well.

All the requirement details regarding hardware components are listed below:

Component	Requirement
Operating System	Windows 10 version 1909 or higher
Processor	Quad-core processor or better
RAM	8 GB or more
Hard Disk	HDD or SSD with at least 50 GB of available space
Graphics	DirectX 11 capable GPU
Display	1920 x 1080 resolution or higher
Network	Broadband internet connection for updates and downloads
Additional Software	.NET Framework 4.8 or later

Economic Feasibility

Economic feasibility is an analysis process which allows the developers to identify whether the plans that have been proposed will generate enough income and profits to make them viable. It is important therefore to determine if the application is worth putting much effort in terms of the costs and time required to create it. The development cost of this AI Image Processing Platform will be relatively low in amount, this is due to the development tool used which is Visual Studio Community Edition, which is a free open-source tool for software development building purposes. Thus, the only expense used will be time utilization on software development and the amount of power consumed to run hardware during the development process is also included.

Operational Feasibility

Operational feasibility refers to the measure of how well a proposed system solves the problems and takes advantage of the opportunities identified during scope definition and how it satisfies the requirements identified in the requirements analysis phase of system development. The target audience for this project are entry level photographers and social media influencers. Therefore, the proposed project is built with them in mind with the purpose to ease and improve their work process. The project streamlines workflows by utilizing AI which helps to save time for such routine operations as setting the right balance of brightness, contrast and/or sharpness of the picture. This results in the improvement of editing cycles, something that saves photographers a lot of time to shoot as opposed to editing. By streamlining workflows and reducing the time spent on manual editing tasks, the platform can significantly boost productivity. This allows users to process more images in less time, increasing their output and revenue potential. Besides, it is designed to be user-friendly, even for non-experts. It provides powerful features that were previously only accessible to skilled editors, making professional-looking edits achievable with minimal training.

2.3 Chapter Summary and Evaluation

This chapter contains the literature review followed by the feasibility studies. During this chapter, I have gathered some information regarding other existing software or applications to learn more about how their software works and the features they are having the components in their application that could increase the usability of the users. From the feasibility studies, I could understand that with all the sources provided online together with the modern technologies nowadays, individuals can easily build software with different open-source development tools technically. While in terms of other perspectives, operational, technical as well as economical feasibility studies helped to support this development of web application and thus the project is able to be conducted smoothly.

Chapter 3

Methodology and Requirements Analysis

3. Methodology and Requirements Analysis

This chapter includes the software development methodology which is part of the software development life cycle of the project. In addition, it includes the requirements gathering techniques which are used to gather the facts such as questionnaires. Moreover, It discussed the requirements, such as development, and operational environment. Finally is the functional and non-functional requirements

3.1. Methodology

Agile can be defined as a management technique of project implementation that occurs in cycles with progressive values being added each time. It is most suited to AI image editing because it makes development of an application much faster, fosters teamwork and also makes an application very relevant to the market. Some of the key principles of Agile are: breaking a project into smaller parts, continuously improving and altering the solutions throughout the development process, encouraging the communication among the staff and enhancing the extent of freedom of the teams to implement changes for finding new opportunities in the market and customers demand, which perfectly suit the case of AI image editing tools. Therefore, applying these principles, only AI image editing solutions can introduce the new features systematically in a short period and be conformable to the new advancements.

The following are some of the advantages which can be accrued out of implementing Agile methodology in the process of AI image editing. First of all, a faster time to market allows the tools to present new solutions faster, and that is a competitive advantage for AI image editing tools. Second is the cyclical nature of being Agile; whereby the process results in constant improvement of the AI image editing tools that in essence are bound to

result in better outputs. Thirdly, the idea that AI image editing tools can be easily adapted to the situation allows offering a quick reaction to the alterations on the market and the shifts in the consumers' requirements. Finally, Agile improves the processes, as well as stimulates the appearance of new, better solutions caused by better cooperation and information sharing. Thus, in using applications like Bing AI Image Generator, applications and models can always update the parameters from the feedback and apply it for better generation of images. Since Agile methodology is much less rigid as, for example, the Waterfall model, the AI image editing tools are able to adapt to the market needs or customers' preferences significantly faster and, thus, more efficiently.

3.2. Requirements Gathering Techniques

The requirements gathering techniques selected for this project are questionnaires.

Questionnaires are a quite suitable fact gathering method when it comes to AI image editing platform projects, mainly because it helps to gather more or less direct feedback from the clients, which have the essential information that is necessary in order to create and improve these AI tools. Based on the structured data set from the responses, developers can gain a clearer perspective of the users' needs, challenges, and preferences to design better AI image editing platforms. Moreover, since questionnaires can be generated in dozens of copies, it is possible to obtain a large number of responses that would give an insight into the opinion of many users. The results obtained from the structured data gathered through questionnaires can be easily processed to identify significant trends.

In particular, Google Forms has certain advantages when applied to the AI image editing platform projects. Being free and easy to use, Google Forms makes it easy to collect user feedback and is suitable for teams of any scale. By choosing Google Forms, the probability of the participant's recognition of the interface and the completion of the questionnaire is higher, as well as the opportunities for the distribution of the questionnaire make it easy for the participants to get to it. Through the use of Google Forms for feedback gathering, it can efficiently improve AI image editing platforms based on the received user feedback, developing it to be more user-oriented and effective.

3.2.1 Questions for Questionaire

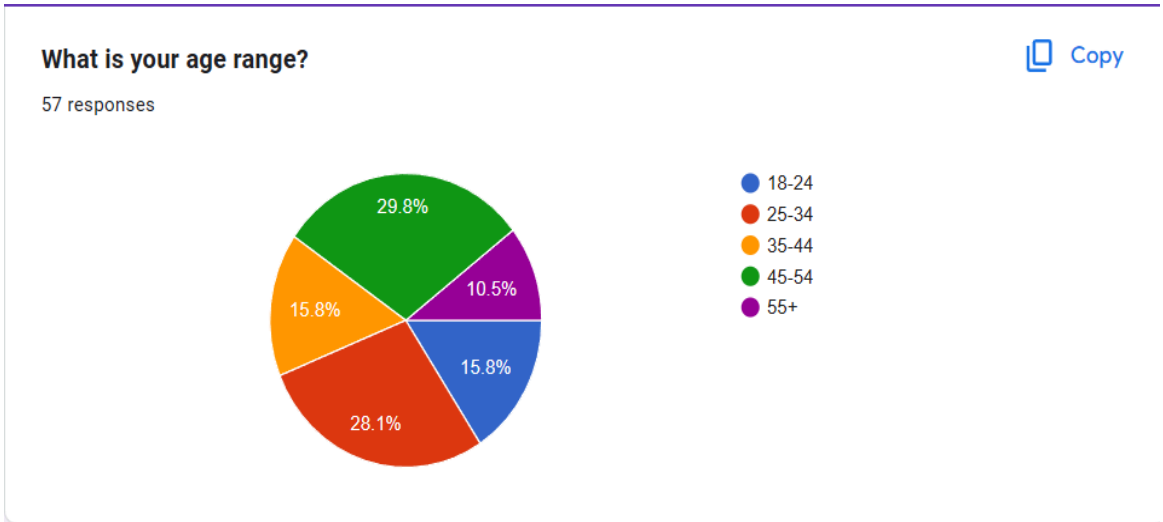

Figure 3.2.1 shows the age range of participants

Purpose: Understanding the age range helps in identifying the target demographic. Different age groups might have different preferences and needs regarding image editing tools and social media usage.

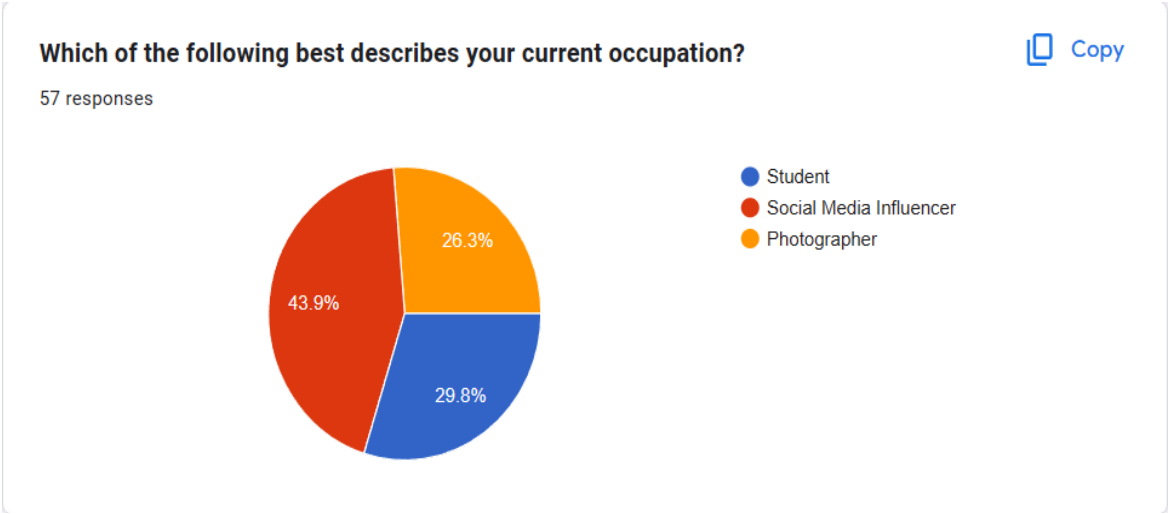

Figure 3.2.2 shows the occupations of participants

Purpose: This helps to understand the professional background of the users, which can influence how and why they use image editing tools. For example, students, photographers, and influencers might use these tools differently compared to casual users.

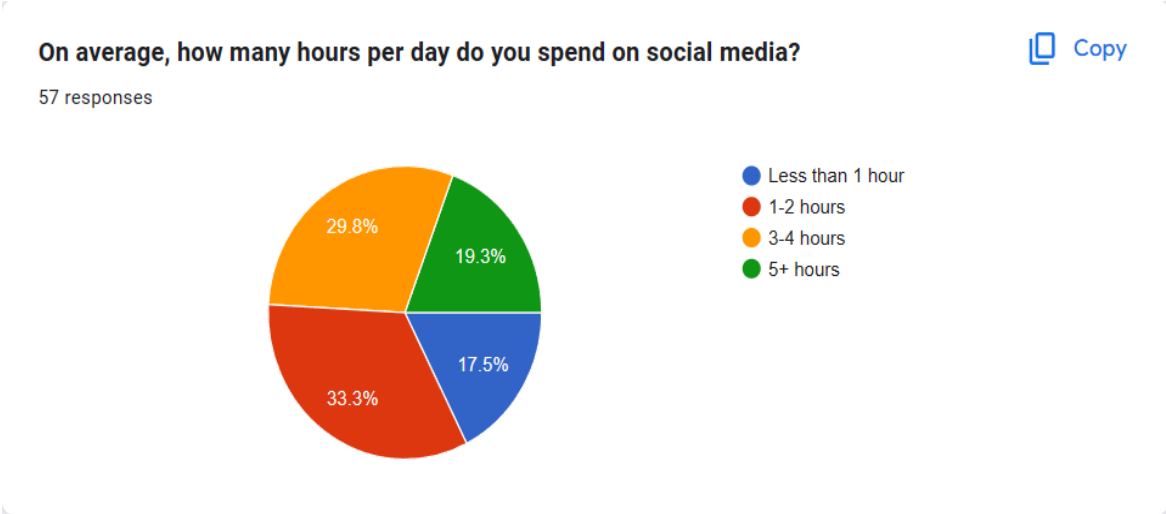

Figure 3.2.3 shows the social media hour usage of participants

Purpose: This gauges the level of engagement with social media. Higher engagement might indicate a higher need for advanced image editing tools and features.

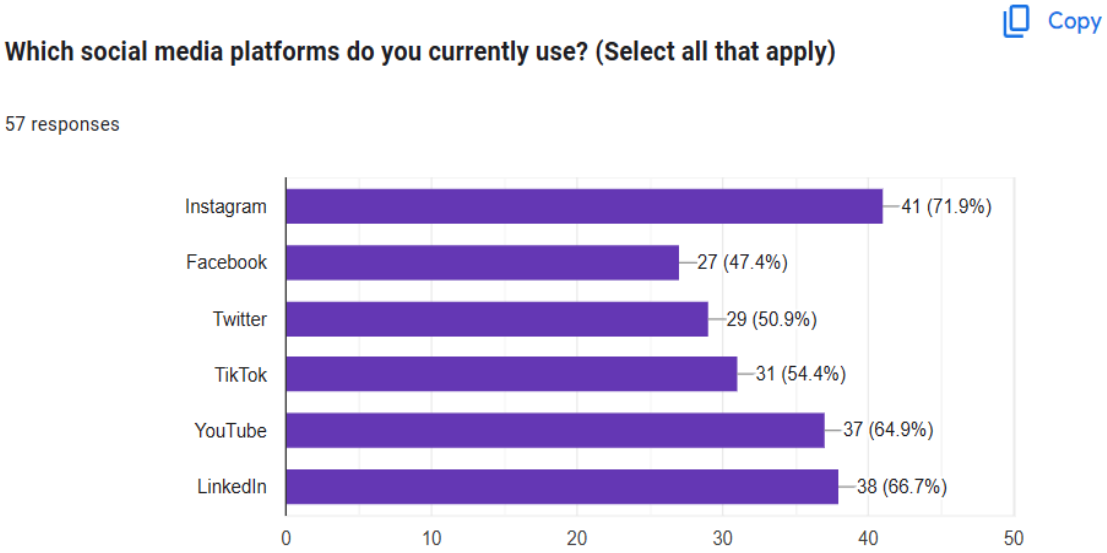

Figure 3.2.4 shows the social media usage types of participants

Purpose: Knowing which platforms users are active on helps to design the features and integrations of the AI editing platform to suit the requirements of those specific platforms.

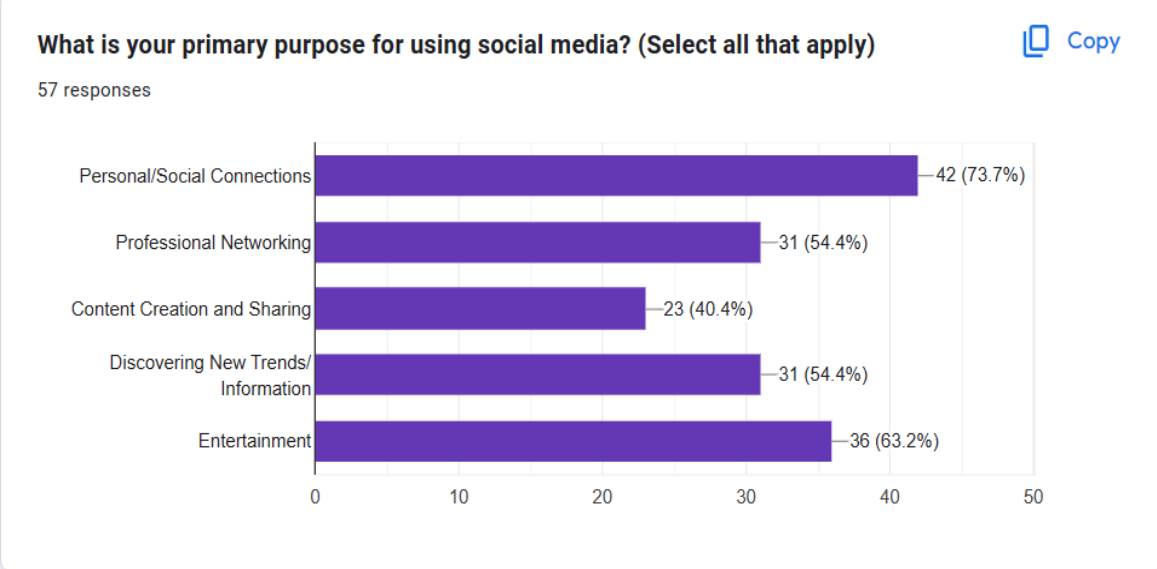

Figure 3.2.5 shows the purpose of participants using social media

Purpose: Understanding the primary purpose of user helps in customizing the tool's functionalities to better meet those needs.

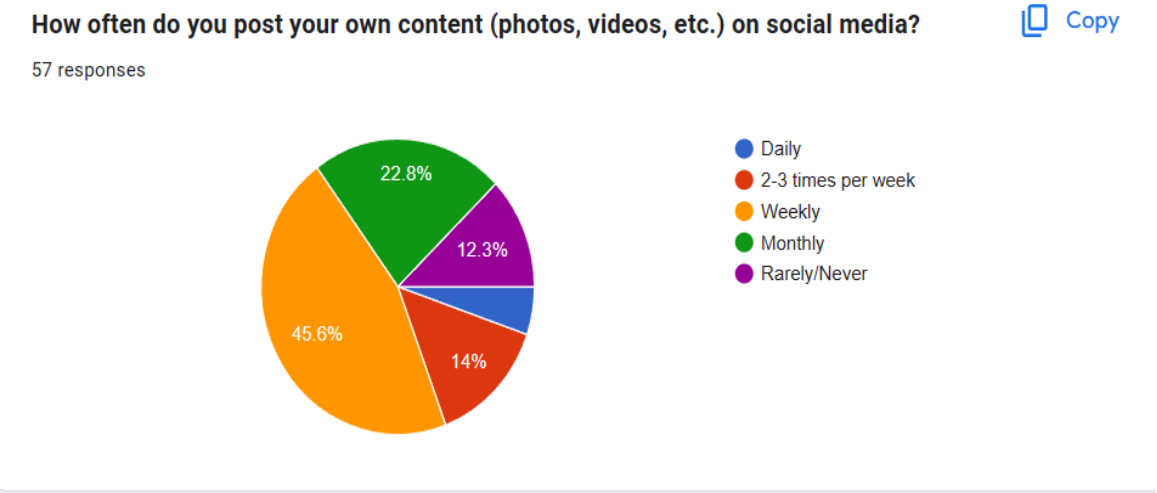

Figure 3.2.6 shows the rate of participants posting on social media

Purpose: Frequent content creators might need more advanced and user-friendly editing tools compared to those who post less frequently.

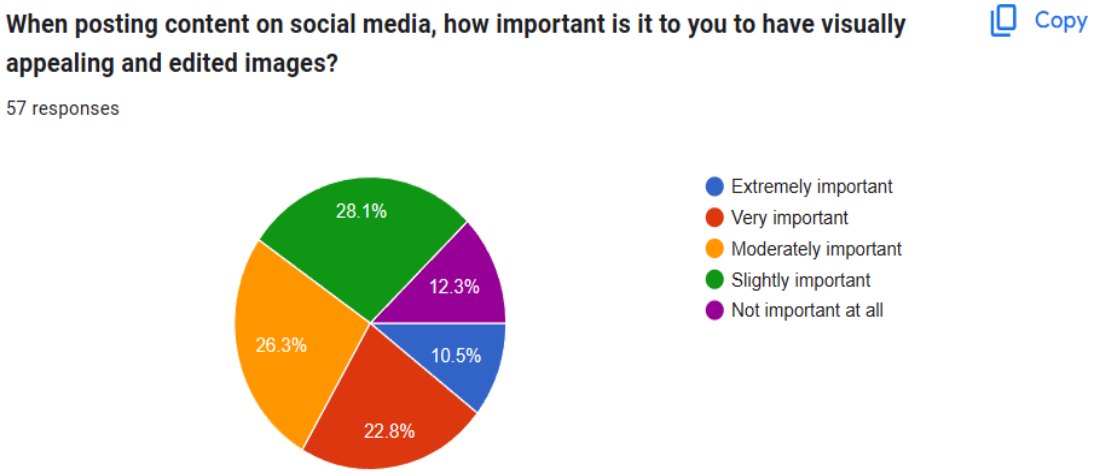

Figure 3.2.7 shows the importance of participants posting appealing images on social media

Purpose: This determines the value users place on high-quality, edited images, which can guide the development and marketing of the editing platform.

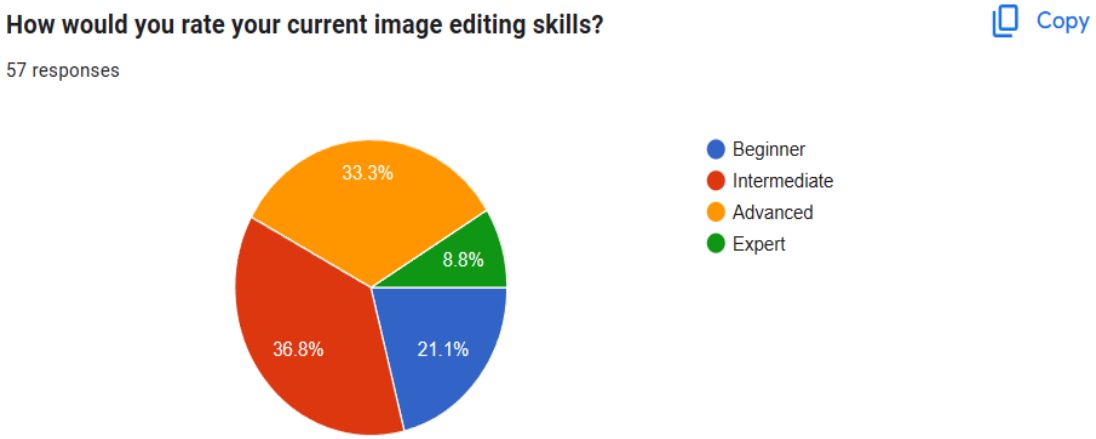

Figure 3.2.8 shows the editing skills of participants

Purpose: Assessing users' editing skills helps in understanding the level of complexity and user-friendliness required in the editing platform.

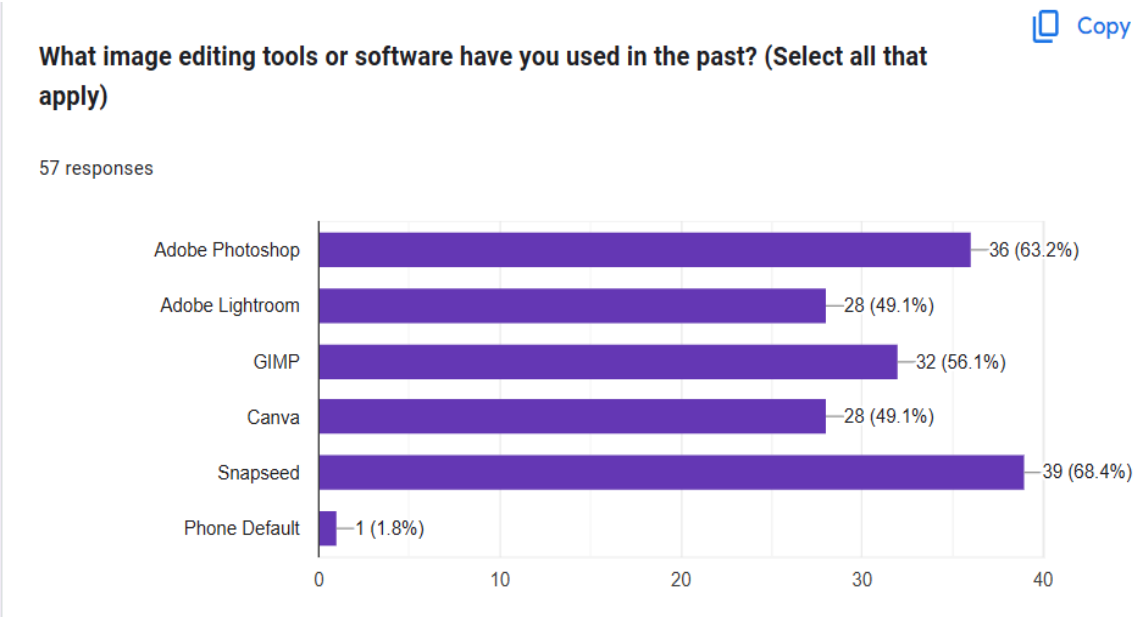

Figure 3.2.9 shows the type of editing tools used by participants

Purpose: Identifying previously used tools helps to understand what users are familiar with and what features they might expect or desire in a new platform.

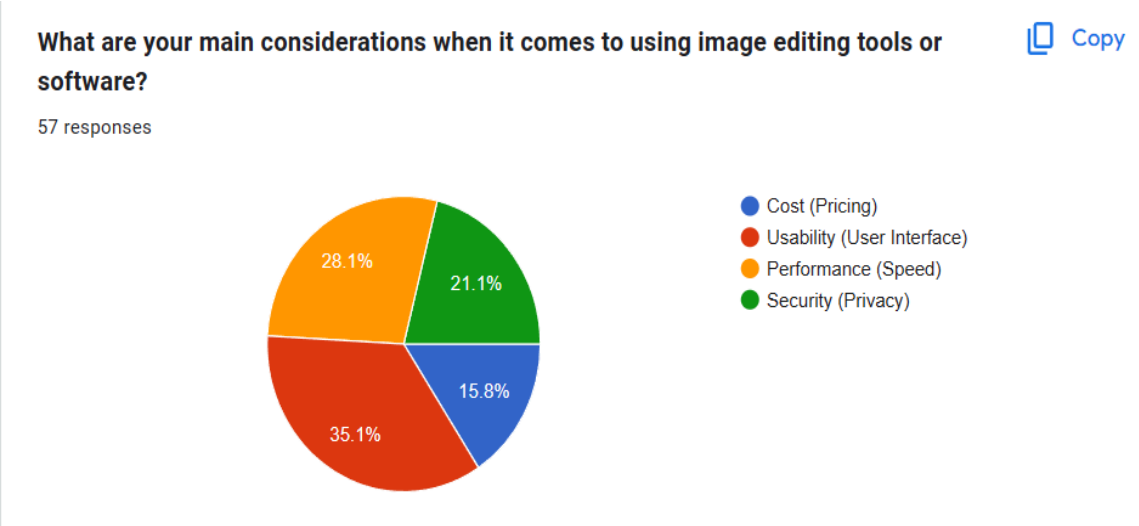

Figure 3.2.10 shows the main considerations of participants using image editing tools

Purpose: This helps in understanding the key factors that influence the choice of editing tools, such as ease of use, cost, features, etc.

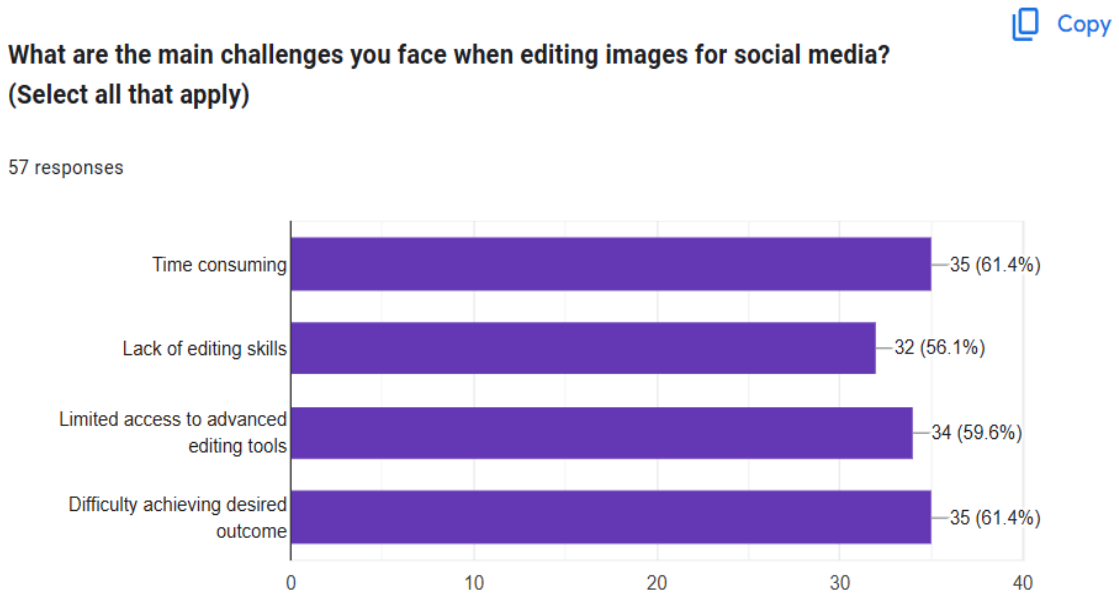

Figure 3.2.11 shows the main challenges of participants editing images on social media

Purpose: Identifying main challenges helps in developing solutions that directly address user pain points.

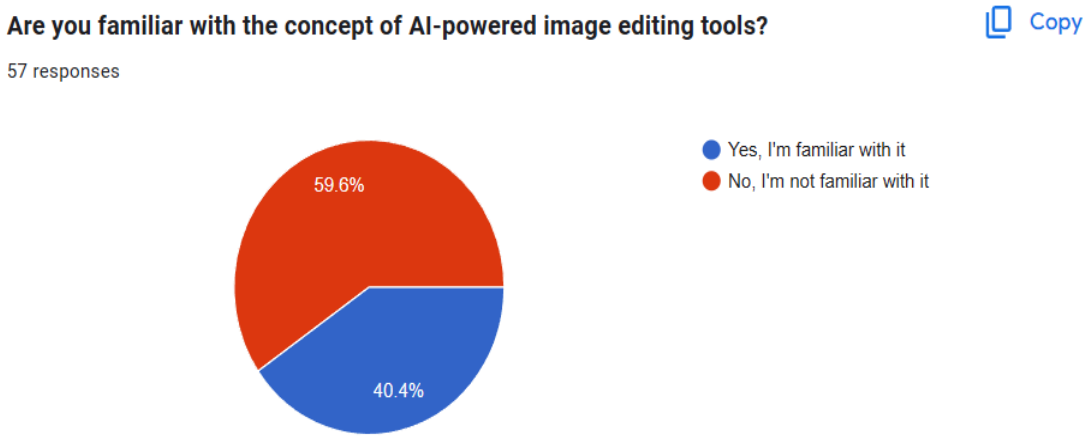

Figure 3.2.12 shows the familiarity of participants on AI image editing tools

Purpose: Identifying awareness of AI-powered tools helps to determine the level of education or marketing needed to promote the new platform.

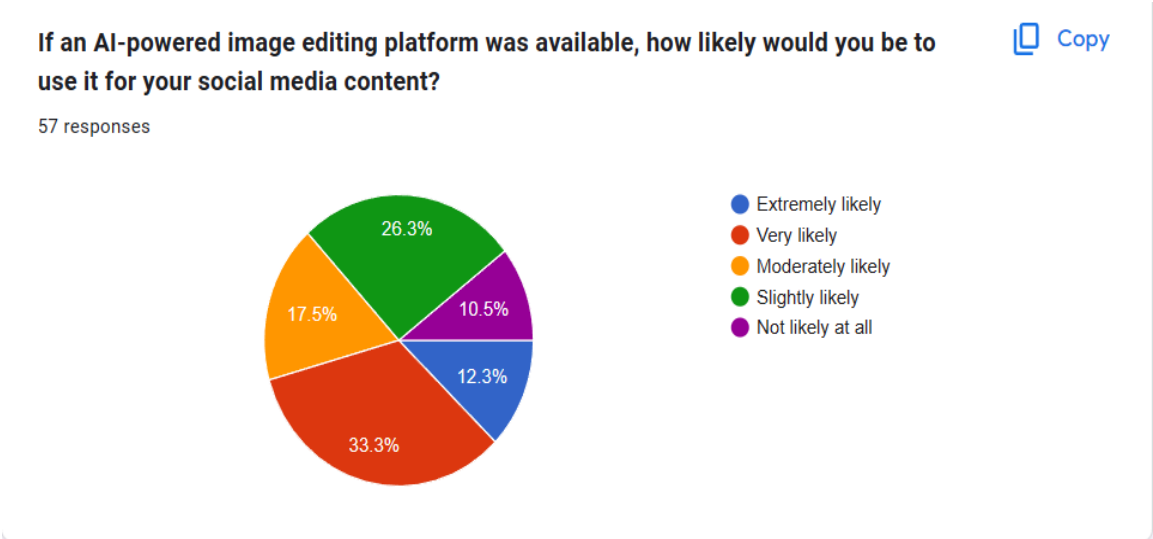

Figure 3.2.13 shows the acceptance rate of participants using AI image editing tools

Purpose: Assessing interest levels in an AI-powered tool helps to predict potential market acceptance and user adoption rates.

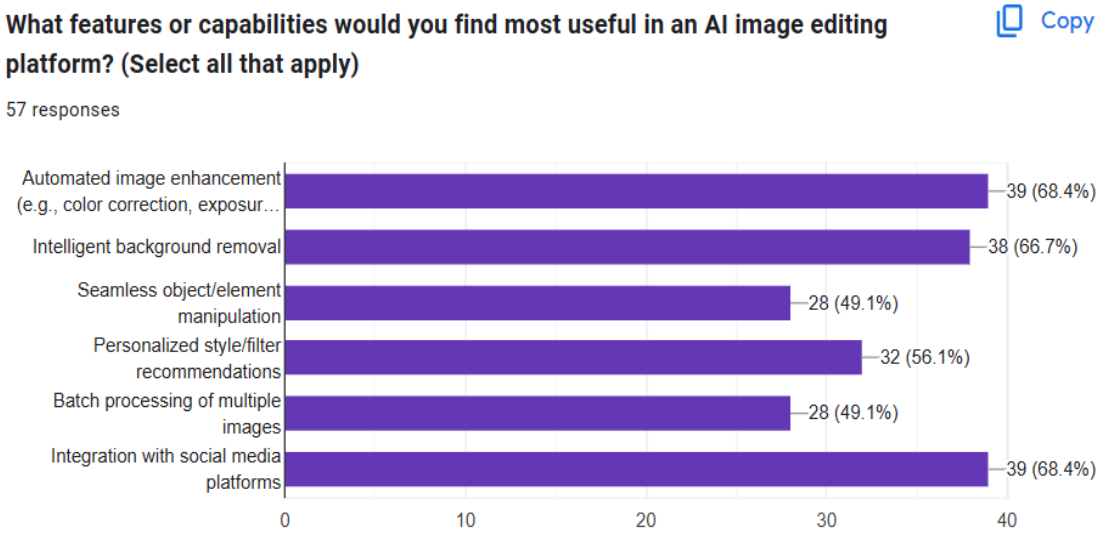

Figure 3.2.14 shows the type of features participants require in an AI image editing tool

Purpose: Understanding desired features helps prioritize development efforts to include functionalities that users find most valuable.

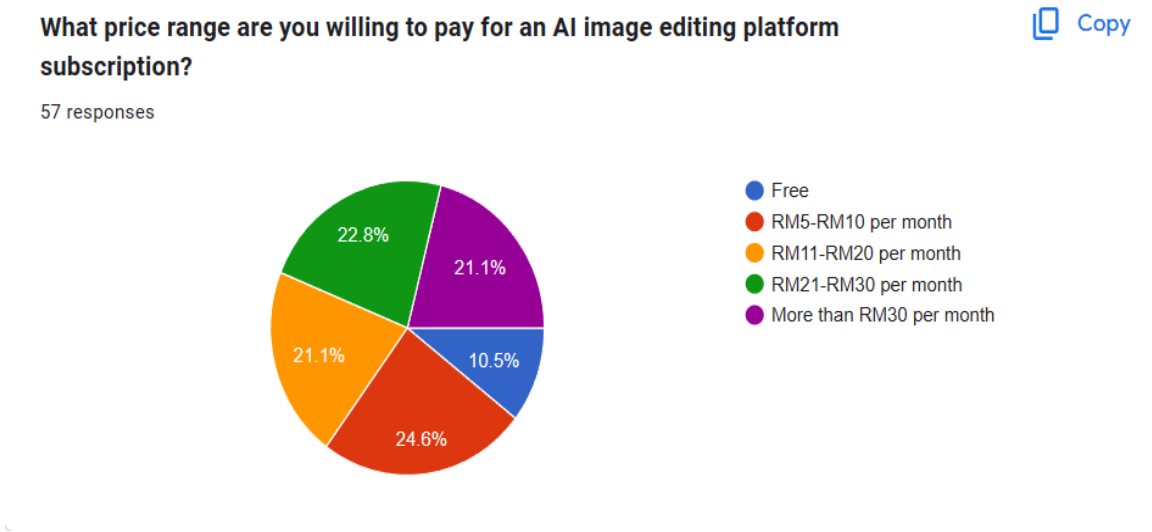

Figure 3.2.15 shows the price range of participants willing to provide for platform subscription

Purpose: Determining the acceptable price range helps in setting a competitive and attractive pricing strategy.

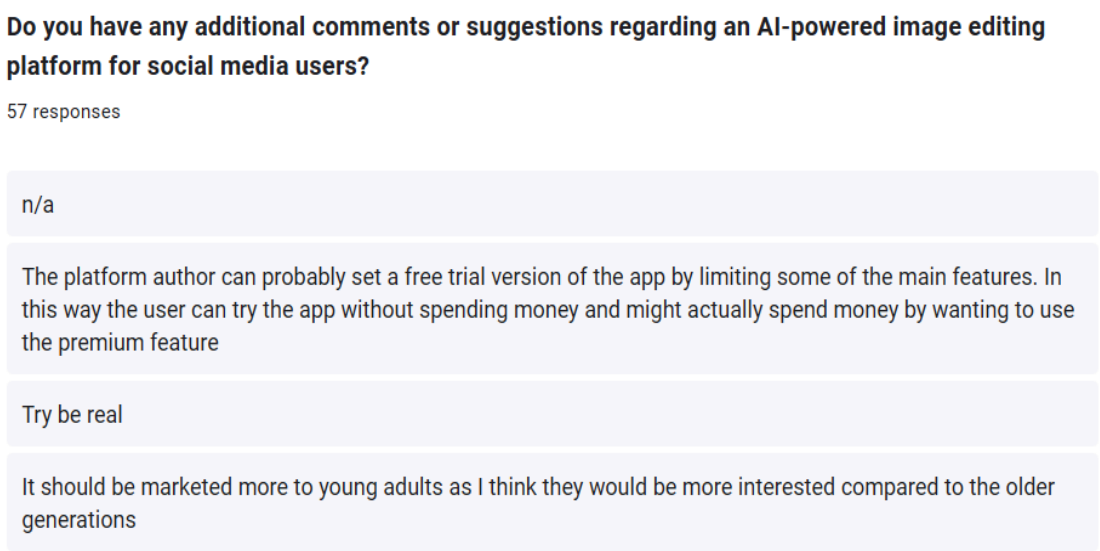

Figure 3.2.16 shows the suggestions of participants on AI image editing platform

Purpose: Collecting open-ended feedback allows users to express specific needs, ideas, or concerns that might not be covered in the structured questions, providing valuable insights for further improvement.

3.3. Requirements Analysis

3.3.1 Project Scope

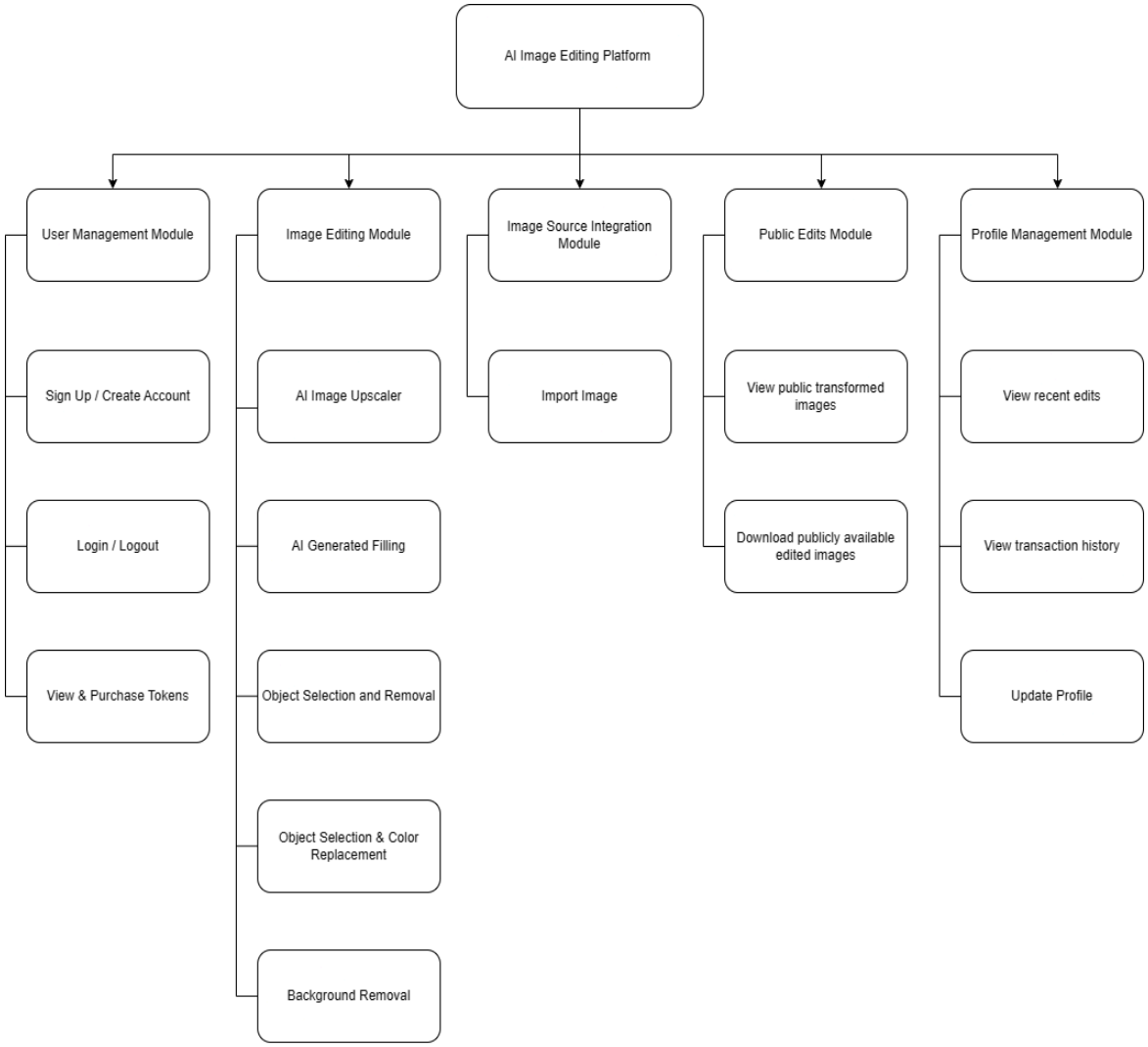

Figure 3.3.1 shows the diagram for AI Image Editing Platform

User Management Module

This module manages user accounts and authentication. It includes:

- **Sign Up / Create Account**: Allows new users to create an account.

- **Login / Logout**: Enables users to log in and log out of their accounts.
- **View & Purchase Tokens**: Allows users to view their token balance and purchase additional tokens for using the platform's services.

Image Editing Module

This module provides various AI-powered image editing tools. It includes:

- **AI Image Upscaler**: Enhances the resolution of images using AI.
- **AI Generated Filling**: Fills missing parts of an image using AI-generated content.
- **Object Selection and Removal**: Allows users to select and remove objects from images.
- **Object Selection & Color Replacement**: Lets users select objects and replace their colors.
- **Background Removal**: Enables users to remove the background from images.

Image Source Integration Module

This module handles the import of images into the platform. It includes:

- **Import Image**: Allows users to import images from various sources into the platform for editing.

Public Edits Module

This module manages publicly available edited images. It includes:

- **View Public Transformed Images**: Allows users to view images that have been transformed and made public.
- **Download Publicly Available Edited Images**: Enables users to download publicly shared edited images.

Profile Management Module

This module manages user profiles and transaction history. It includes:

- **View Recent Edits**: Allows users to view their recent image edits.
- **View Transaction History**: Enables users to view their transaction history, including purchases and usage of tokens.
- **Update Profile**: Allows users to update their profile information.

3.3.2 Development Environment requirements

Hardware Specifications	Requirements
Processor	2.5GHz Quad-Core or faster processor with more cores
GPU	With minimum 4GB of VRAM and above
RAM	8GB of RAM or above
Storage	HDD or SSD (Recommended) with minimum 25GB of free space

3.3.3 Software Specifications

Software	Software Requirements
Programming Language	NextJS,Tailwind CSS, Shadcn,TypeScript
Database	MongoDB
Operating System	Windows 10 or above
IDE	Visual Studio 2022

3.4. Functional and Non-Functional Requirements

3.4.1 Functional Requirements

1. User Management Module
1.1 Users shall be able to sign up and create an account.
1.2 Users shall be able to log in and log out securely.
1.3 Users shall be able to view available tokens and purchase more tokens as needed.
1.4 Users shall be able to reset their password if they forget it.

2. Image Editing Module
2.1 AI Image Upscaler
- Users shall be able to upload images for upscaling.
- The system shall use AI algorithms to deblur and upscale images.
- Users shall be able to download the enhanced images.

2.2 AI Generated Filling
- Users shall be able to upload images and select the desired aspect ratio for enlargement.
- The system shall use AI to fill the gaps intelligently and seamlessly.
- Users shall be able to download the modified images.

2.3 Object Selection and Removal
- Users shall be able to select objects within an image using natural language commands.
- The system shall remove the selected objects while preserving the background.
- Users shall be able to download the edited images.

2.4 Object Selection & Color Replacement
- Users shall be able to select objects and specify color changes using natural language commands.
- The system shall enhance or restore the specified colors within the objects.
- Users shall be able to download the color-enhanced images.

2.5 Background Removal
- Users shall be able to upload images for background removal.
- The system shall automatically remove the background while preserving the foreground objects.
- Users shall be able to download images with transparent backgrounds.

3. Image Source Integration Module
3.1 Users shall be able to import images from Google Drive, Dropbox, Shutterstock, Getty Images, iStock, and Unsplash.
3.2 Users shall be able to export edited images back to these platforms.

4. Public Edits Module
4.1 Users shall be able to view recently transformed images made by other users on the platform.
4.2 Users shall be able to download publicly available edited images.

5. Profile Management Module
5.1 Users shall be able to view their recent edits and history of image transformations.
5.2 Users shall be able to view transaction history.
5.3 Users shall have access to a dashboard displaying their activity and token balance.
5.4 Users shall be able to manage their profiles, including updating personal information.

3.4.2 Non-Functional Requirements

1. Performance
1.1 The platform shall process image uploads, edits, and downloads within a reasonable time (e.g., under 30 seconds for standard resolution images).
1.2 The platform shall support concurrent users and maintain performance without significant degradation.

2. Usability
2.1 The platform shall have an intuitive and user-friendly interface, accessible to users with varying technical expertise.
2.2 The platform shall provide clear instructions and feedback for all actions, including image uploads, edits, and downloads.

3. Reliability
3.1 The platform shall have a high uptime (e.g., 99.9% availability).
3.2 The platform shall provide consistent and accurate image editing results using AI algorithms.

4. Security
4.1 The platform shall use secure protocols for user authentication and data transmission.
4.2 The platform shall ensure the privacy and security of user-uploaded images and personal information.

4.3 The platform shall comply with relevant data protection regulations (e.g., GDPR).

6. Compatibility

6.1 The platform shall be compatible with major web browsers (e.g., Chrome, Firefox, Safari, Edge).

6.2 The platform shall support various image formats for uploads and downloads (e.g., JPEG, PNG, TIFF).

7. Maintainability

7.1 The platform shall have modular and well-documented code to facilitate maintenance and updates.

7.2 The platform shall provide regular updates and improvements based on user feedback and technological advancements.

3.5. Use Case Diagram & Table

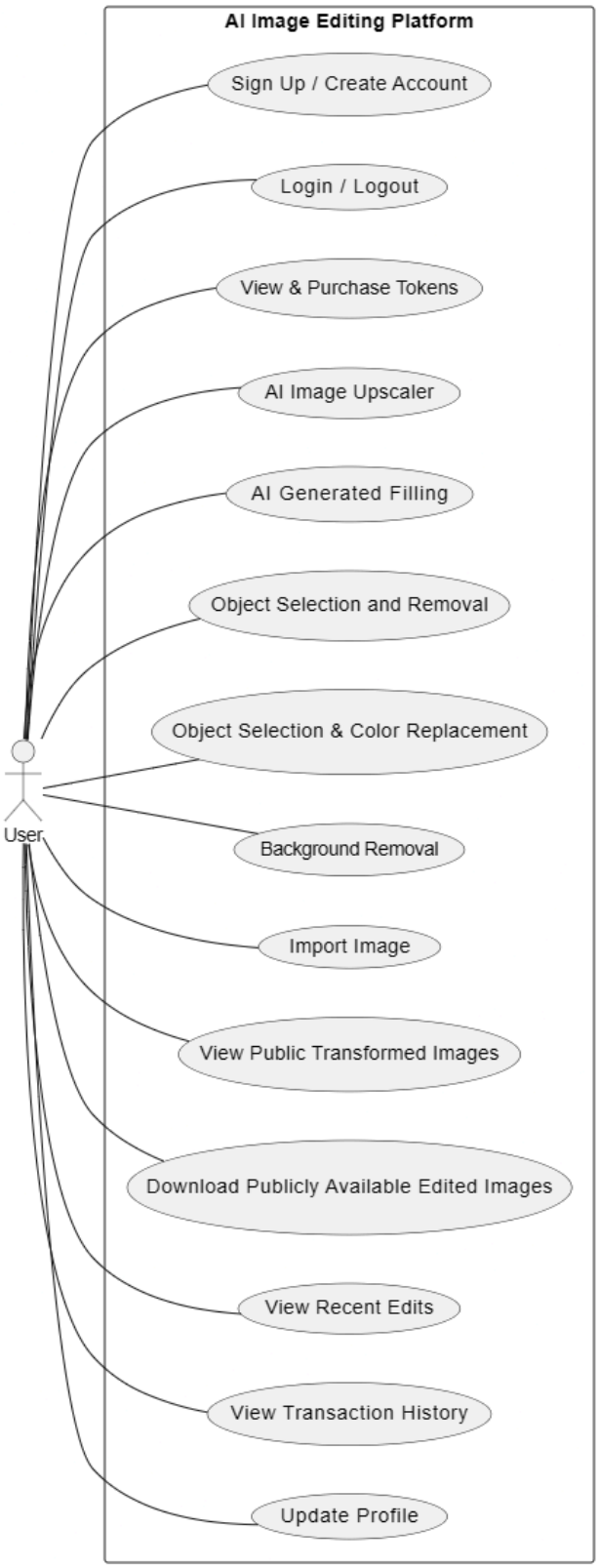

Figure 3.5.1 shows the overall use case diagram for AI Image Editing Platform

Use Case Table: User Registration

Use Case: User Registration	
Description: Allow users to create a new account	
Actor: User	
Pre-Conditions: None	
Actor	System Response
1. Navigate to the sign-up page.	2. System displays the sign-up form.
3. Enter valid user details.	4. System validates the entered details.
5. Click on "Sign Up".	6. System creates the user account.
	7. System logs in the user and redirects to the dashboard.
Alternative Flow: Step 4: If the entered details are invalid, the system will prompt an error message “The entered details are invalid, please re-enter.”	
Postcondition: The user account is created, and the user is logged in.	

Use Case Table: User Login

Use Case: User Login	
Description: Allow users to log into their account	
Actor: User	
Pre-Conditions: User account exists	
Actor	System Response
1. Navigate to the login page.	2. System displays the login form.
3. Enter valid credentials.	4. System validates the entered credentials.
5. Click on "Login".	6. System logs in the user and redirects to dashboard.
Alternative Flow: Step 4: If the entered credentials are invalid, the system will prompt an error message “The entered credentials are invalid, please re-enter.”	
Postcondition: The user is logged in and redirected to the dashboard.	

Use Case Table: Profile Update

Use Case: Profile Update	
Description: Allow users to update their profile information	
Actor: User	
Pre-Conditions: User is logged in	
Actor	System Response
1. Navigate to the profile page.	2. System displays the profile information.
3. Update profile information.	4. System validates the entered information.
5. Click "Save".	6. System updates the profile information.
Alternative Flow: Step 4: If the entered credentials are invalid, the system will prompt an error message “The entered credentials are invalid, please re-enter.”	
Postcondition: Profile information is updated successfully.	

Use Case Table: Purchase Tokens

Use Case: Purchase Tokens	
Description: Allow users to purchase tokens	
Actor: User	
Pre-Conditions: User is logged in	
Actor	System Response
1. Navigate to the purchase tokens page.	2. System displays available token packages.
3. Select token package.	4. System displays payment options.
5. Complete payment.	6. System processes the payment and updates the token balance.
Alternative Flow: Step 6: If the payment fails, the system will prompt an error message “Payment failed, please try again.”	
Postcondition: Tokens are added to the user account.	

Use Case Table: AI Image Upscaler

Use Case: AI Image Upscaler	
Description: Allow users to upscale images using AI	
Actor: User	
Pre-Conditions: User is logged in	
Actor	System Response
1. Navigate to AI Image Upscaler.	2. System displays the image upload form.
3. Upload a blurry image.	4. System processes the image.
5. Click "Upscale".	6. System upscales the image.
	7. System displays the upscaled image.
Alternative Flow: Step 4: If the image processing fails, the system will prompt an error message “Image processing failed, please try again.”	
Postcondition: Image is upscaled and displayed for download.	

Use Case Table: AI Generated Filling

Use Case: AI Generated Filling	
Description: Allow users to fill images with AI-generated content	
Actor: User	
Pre-Conditions: User is logged in	
Actor	System Response
1. Navigate to AI Generated Filling.	2. System displays the image upload form.
3. Upload an image.	4. System displays aspect ratio options.
5. Select desired aspect ratio.	6. System processes the image.
7. Click "Generate".	8. System fills the image and displays the result.
Alternative Flow: Step 6: If the image processing fails, the system will prompt an error message “Image processing failed, please try again.”	
Postcondition: Image is filled and displayed for download.	

Use Case Table: Object Selection and Removal

Use Case: Object Selection and Removal	
Description: Allow users to remove objects from images using AI	
Actor: User	
Pre-Conditions: User is logged in	
Actor	System Response
1.Navigate to Object Selection and Removal.	2. System displays the image upload form.
3. Upload an image.	4. System processes the image and enables selection.
5. Type removal prompt.	6. System identifies the object and removes it.
7. Click "Remove".	8. System displays the edited image.
Alternative Flow: Step 6: If the object removal fails, the system will prompt an error message “Object removal failed, please try again.”	
Postcondition: Object is removed, and image is displayed for download.	

Use Case Table: Object Selection & Color Replacement

Use Case: Object Selection & Color Replacement	
Description: Allow users to replace colors of objects in images using AI	
Actor: User	
Pre-Conditions: User is logged in	
Actor	System Response
1.Navigate to Object Selection & Color Replacement.	2. Navigate to Object Selection & Color Replacement.
3. Upload an image.	4. System processes the image and enables selection.
5. Type object and color change prompt.	6. System identifies the object and changes its color.
7.Click "Replace Color".	8. System displays the color-replaced image.
Alternative Flow: Step 6: If the color replacement fails, the system will prompt an error message “Color replacement failed, please try again.”	
Postcondition: Color is replaced, and image is displayed for download.	

Use Case Table: Background Removal

Use Case: Background Removal	
Description: Allow users to remove backgrounds from images using AI	
Actor: User	
Pre-Conditions: User is logged in	
Actor	System Response
1. Navigate to Background Removal.	2. System displays the image upload form.
3. Upload an image.	4. System processes the image.
5. Click "Remove Background".	6. System removes the background and displays the result.
Alternative Flow: Step 6: If the background removal fails, the system will prompt an error message “Background removal failed, please try again.”	
Postcondition: Background is removed, and image is displayed for download.	

Use Case Table: Image Source Integration

Use Case: Image Source Integration	
Description: Allow users to import and export images to/from various sources	
Actor: User	
Pre-Conditions: User is logged in	
Actor	System Response
1. Navigate to Image Source Integration.	2. System displays available image sources.
3. Select Google Drive.	4. System prompts for authorization.
5.Choose an image.	6. System imports the image and displays it.
7. Click on the export button.	8. System displays available export options.
9. Select Google Drive.	10. System exports the image.
Alternative Flow: Step 6: If the image import fails, the system will prompt an error message “Image import failed, please try again.” Step 10: If the image export fails, the system will prompt an error message “Image export failed, please try again.”	
Postcondition: Image is imported and exported successfully.	

Use Case Table: Public Edits

Use Case: Public Edits	
Description: Allow users to view and download publicly available edited images	
Actor: User	
Pre-Conditions: User is logged in	
Actor	System Response
1. Navigate to Dashboard	2. System displays the list of publicly edited images.
3. Browse the list of transformed images.	4. System displays the selected image.
5. Click on the download button.	6. System prompts the download.
Postcondition: Publicly available edited images are displayed and downloaded successfully.	

3.6. Activity Diagram

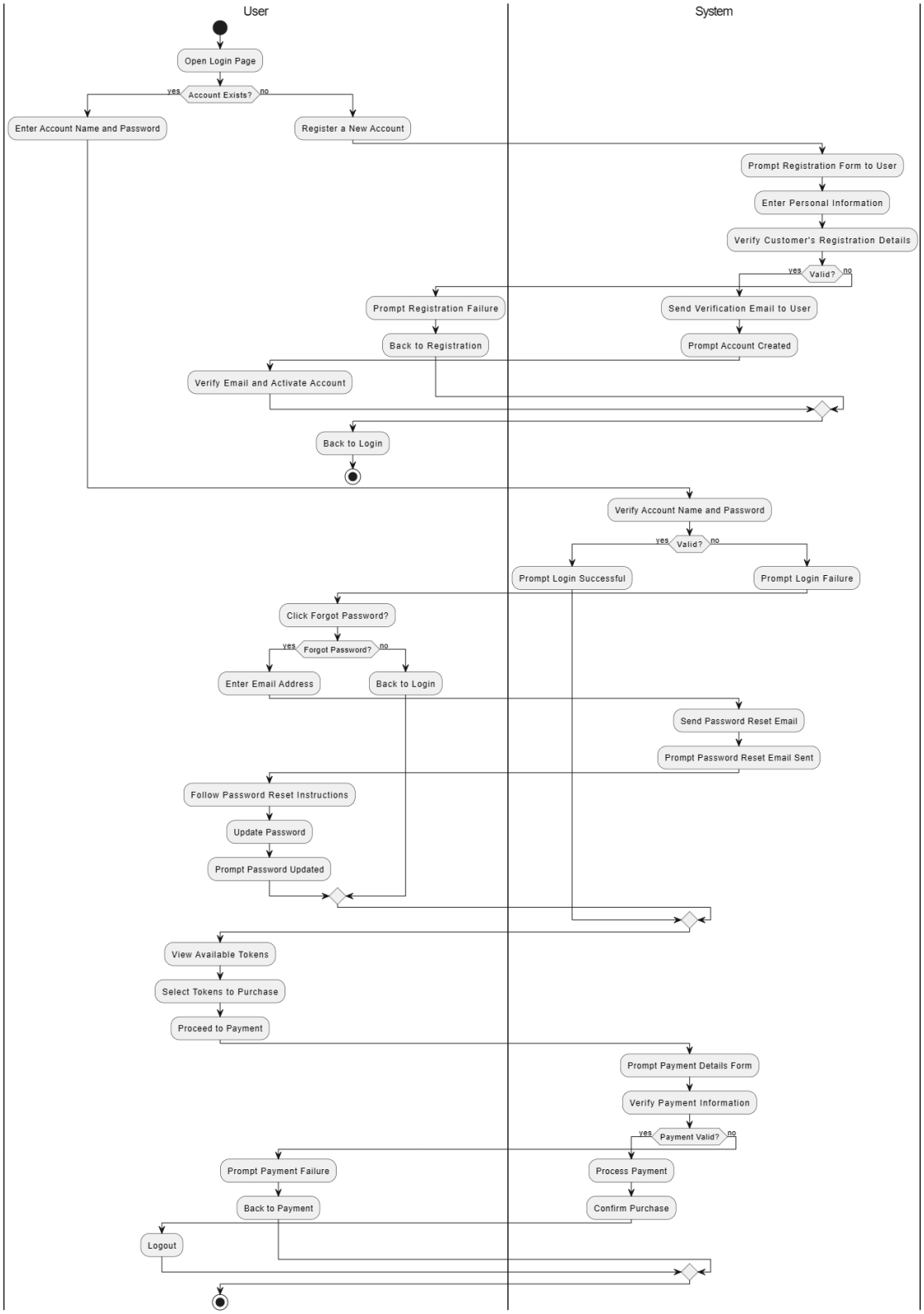

Figure 3.6.1 shows the activity diagram for user management module

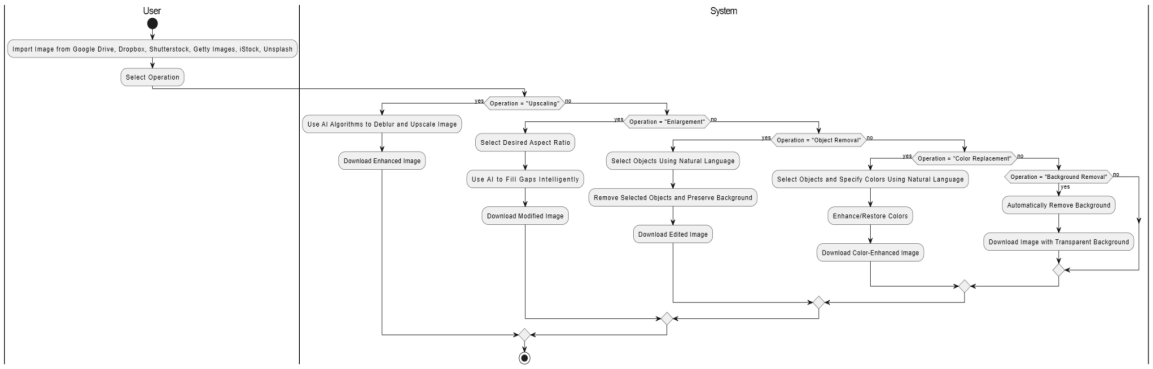

Figure 3.6.2 shows the activity diagram for Image Editing Module

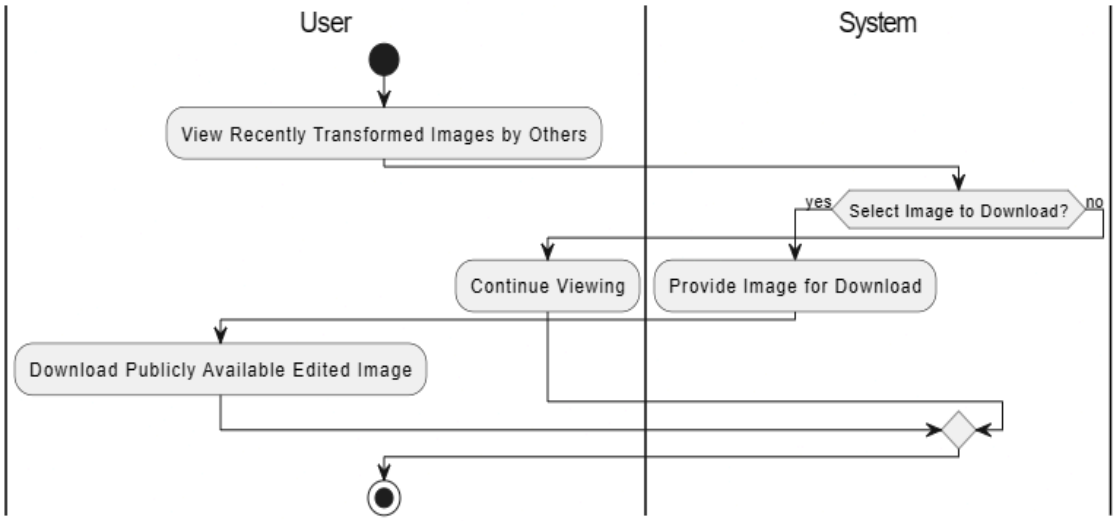

Figure 3.6.3 shows the activity diagram for Public Edits module

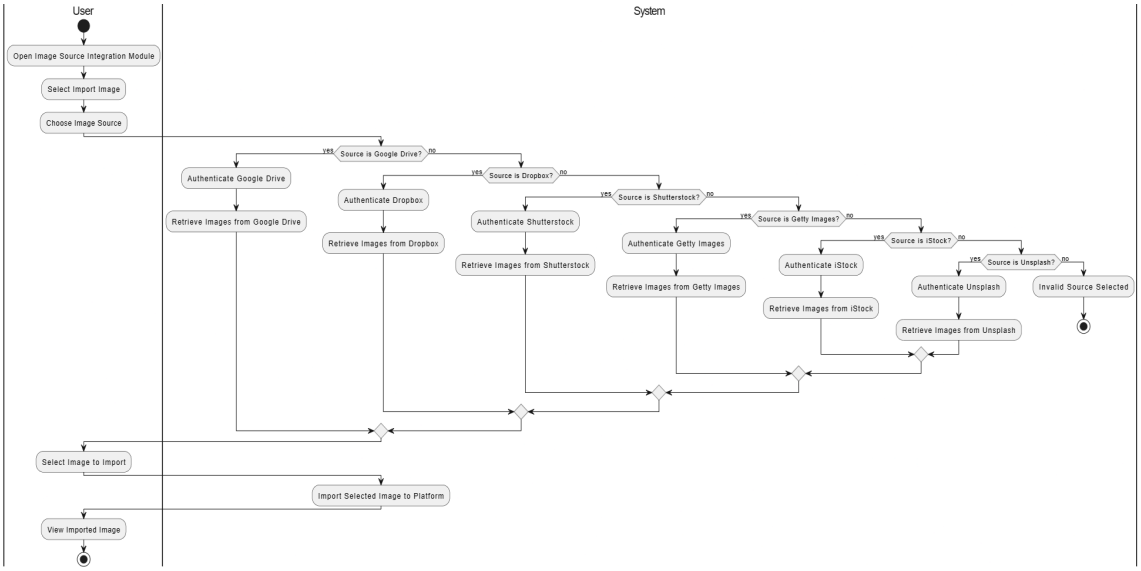

Figure 3.6.4 shows the activity diagram for the Image Source Integration Module

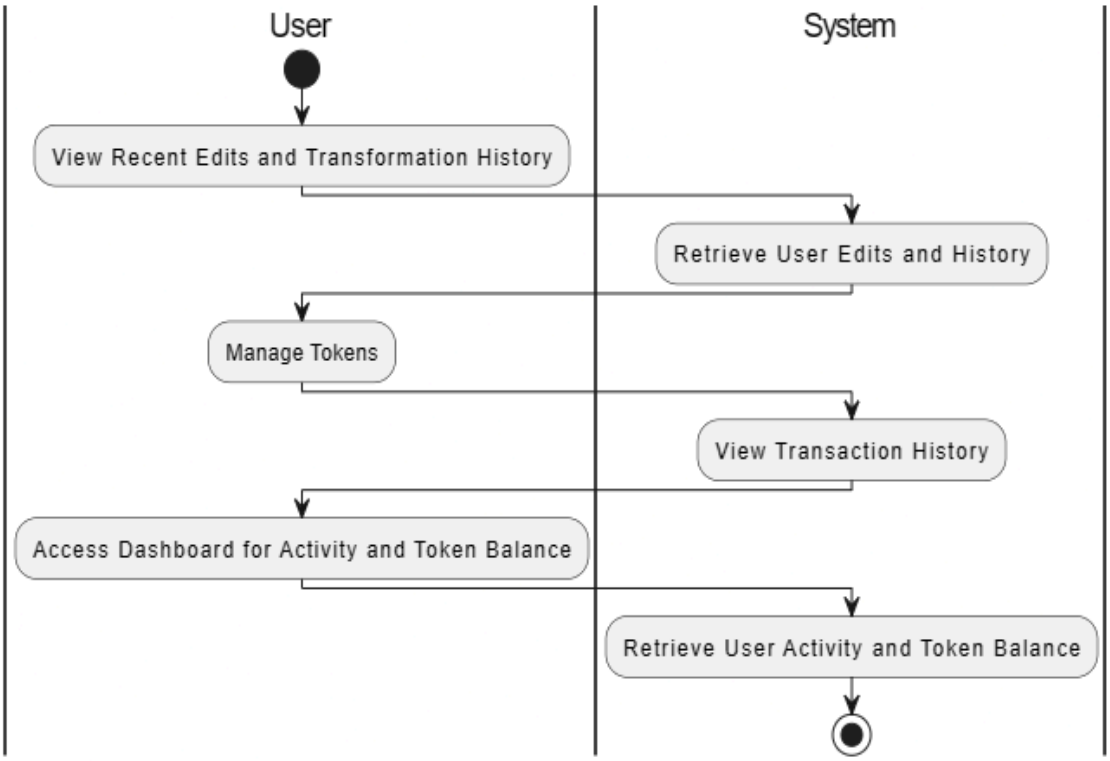

Figure 3.6.5 shows the activity diagram for the Update Profile Module

3.7. Chapter Summary and Evaluation

This chapter explains the use of Agile and requirement analysis in the development of the AI image editing platform. It is chosen for the iterative and flexible methodology, for involving the team members, and responding to the users' feedback. The questionnaires given through Google Forms are used to gather requirements, focused on demographic information, preference and difficulties faced by the users. Among them, a list of detailed modules involves User Management, Image Editing, Image Source Integration, Public Edits, and Profile Management. Besides, detailed functional and non-functional requirements establish the project scope and there is also the development of use case and activities diagrams with which to show how the system works, so that the development is kept as far as possible focused at the user end.

Chapter 4

System Design

4 System Design

Systems design is the process of defining system aspects such as modules, system architecture, components, and interfaces, as well as data, based on the system's specifications. After the stakeholders' requirements have been collected and confirmed, the system design phase will begin to define, develop, and build a system that can suit the user's specific wants and requirements. During the System Design phase, several graphical modeling diagrams are used to depict system requirements, data design, process design, system security design, and other information.

4.1 Class Diagram

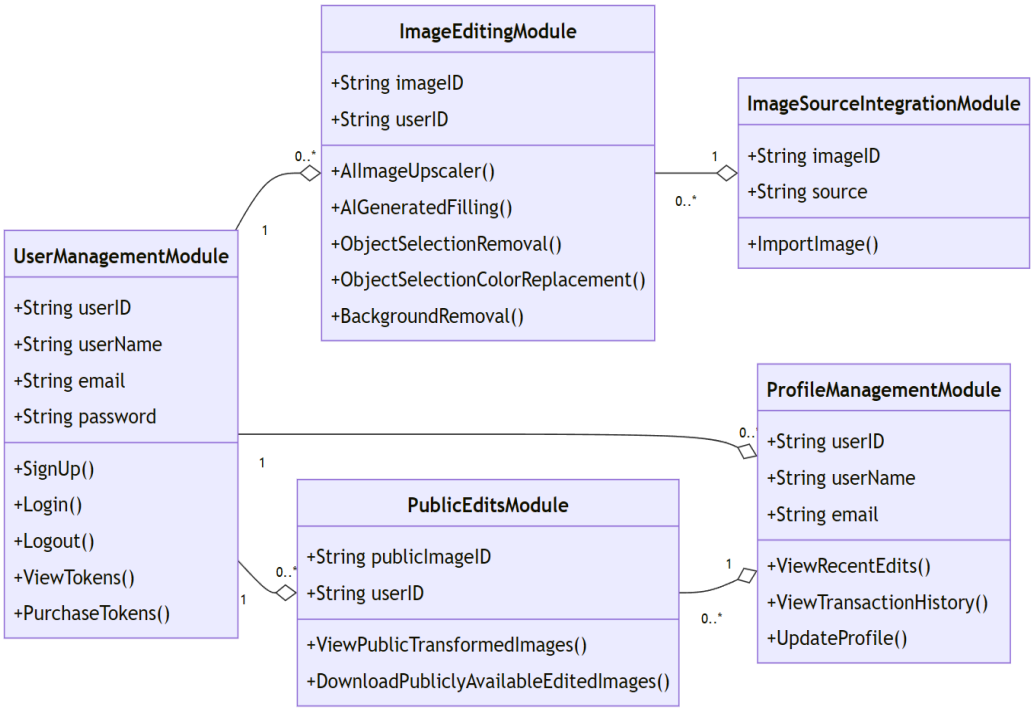

Figure 4.1.1 Class Diagram of AI Image Editing Platform

4.2 Entity-Relationship Diagram

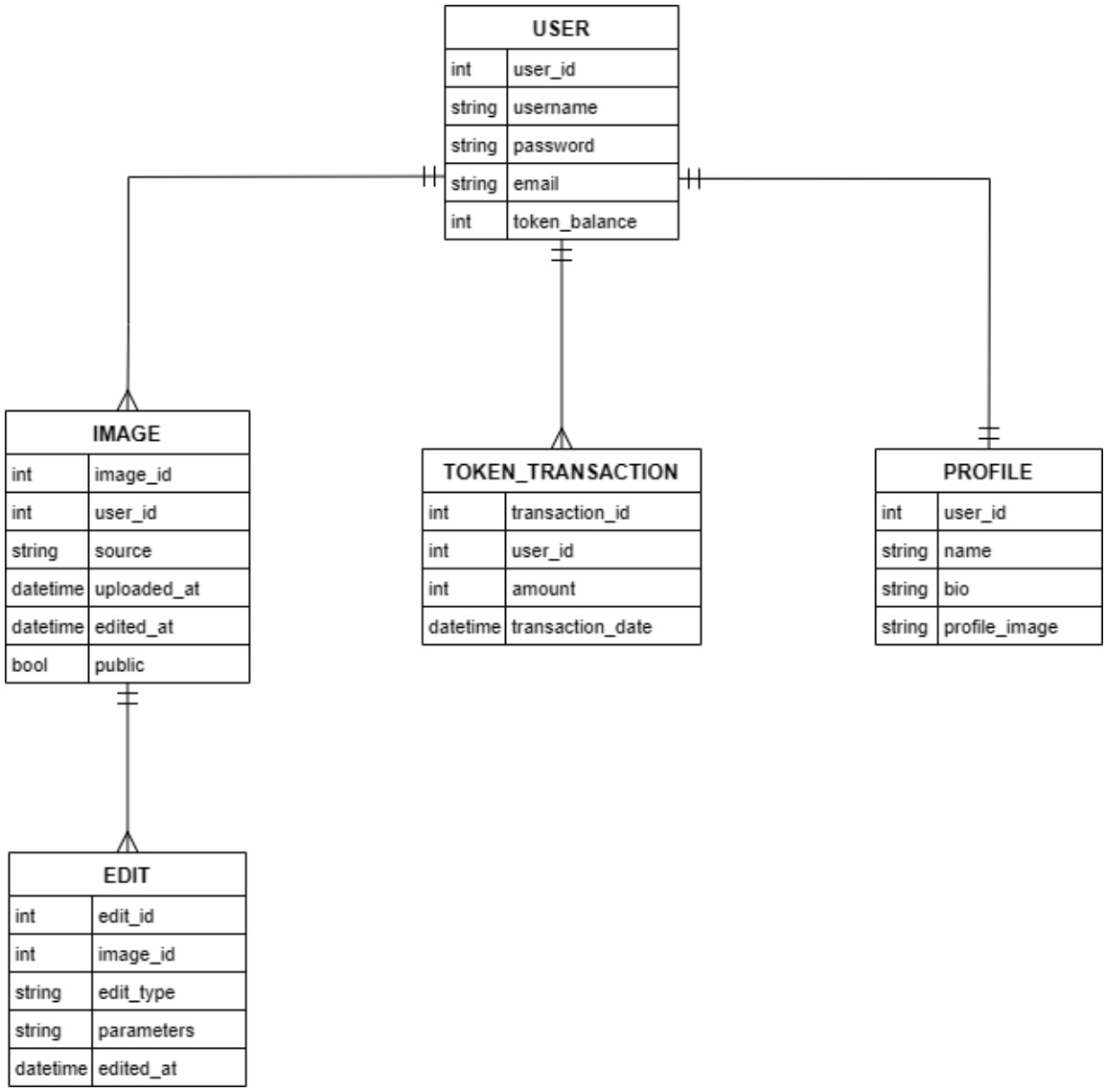

Figure 4.2.1 Entity Relationship Diagram of AI Image Editing Platform

4.3 Sequence Diagram

User Management Module

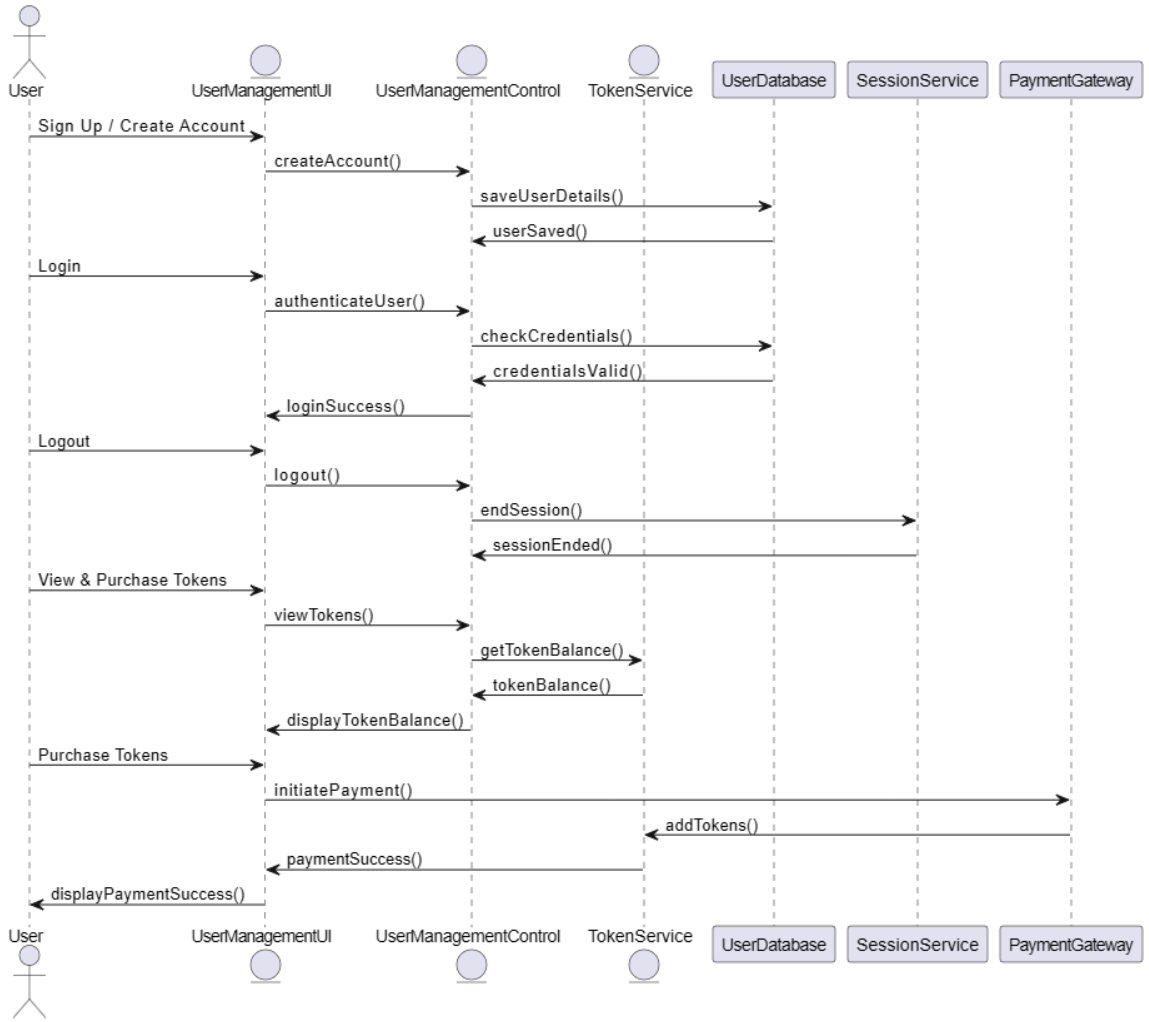

Figure 4.3.1 Sequence Diagram of AI Image Editing Platform

Image Editing Module

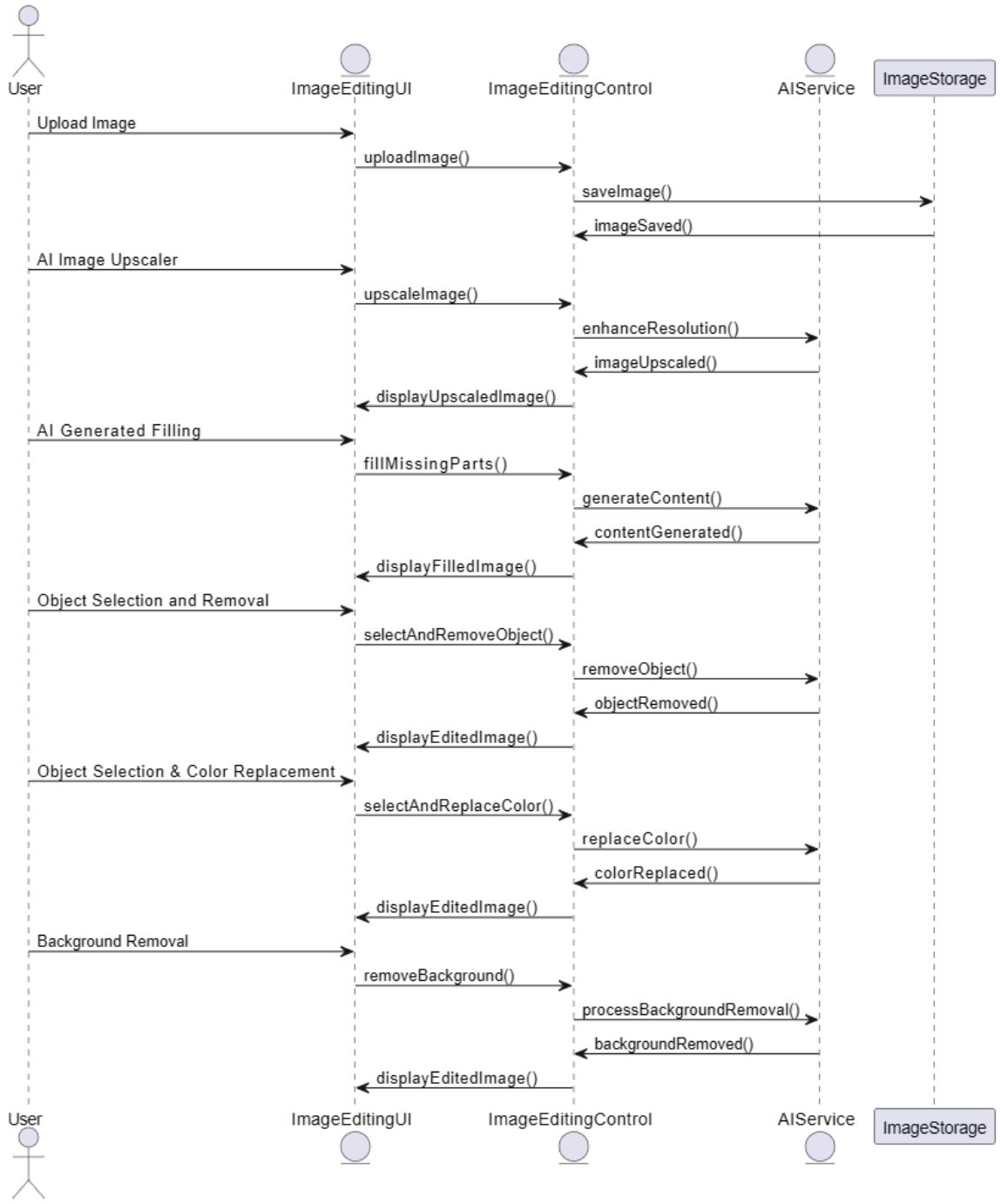

Figure 4.3.2 Sequence Diagram of AI Image Editing Platform

Image Source Integration Module

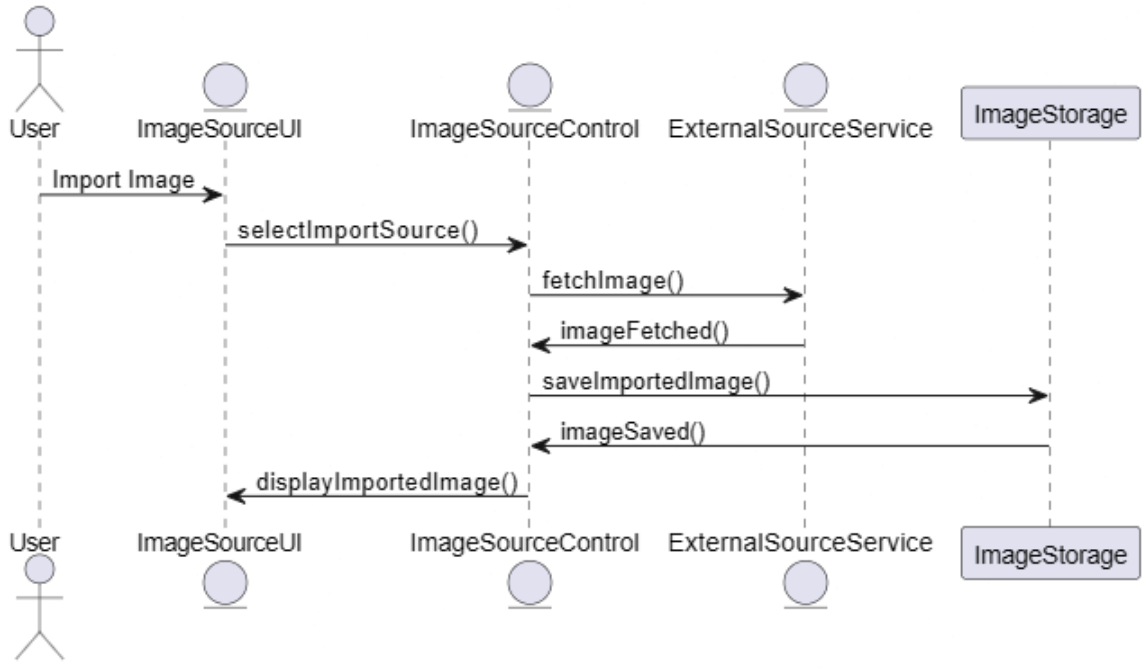

Figure 4.3.3 Sequence Diagram of AI Image Editing Platform

Public Edits Module

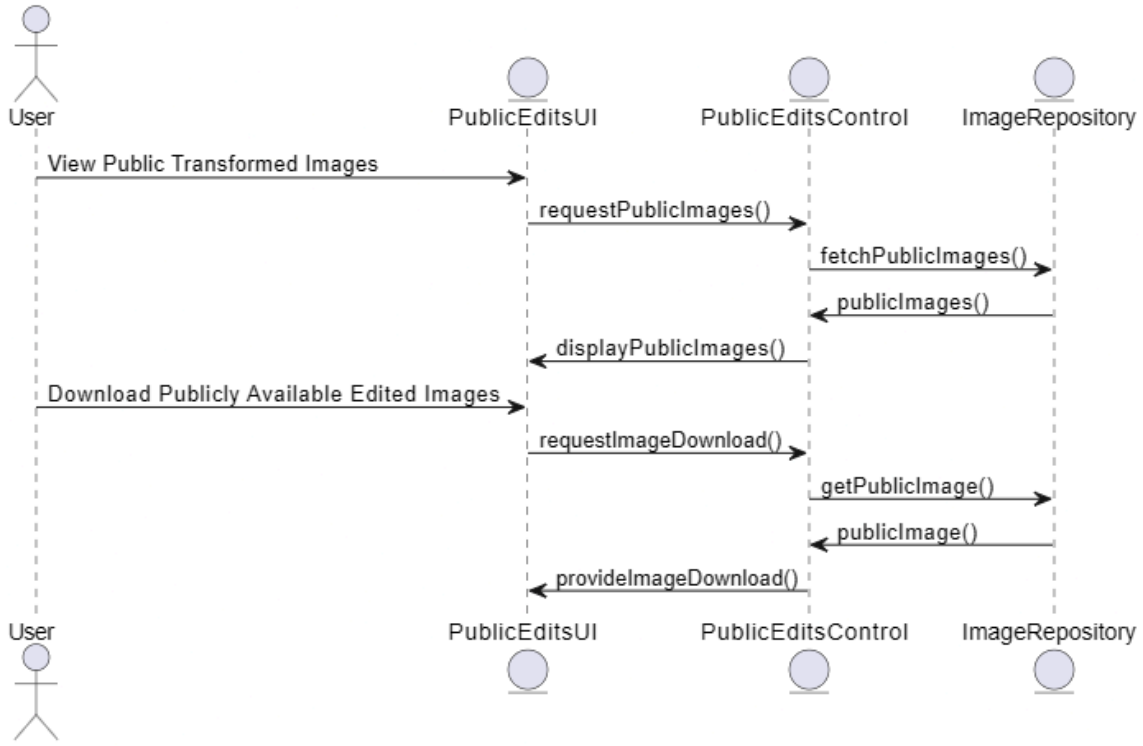

Figure 4.3.4 Sequence Diagram of AI Image Editing Platform

Profile Management Module

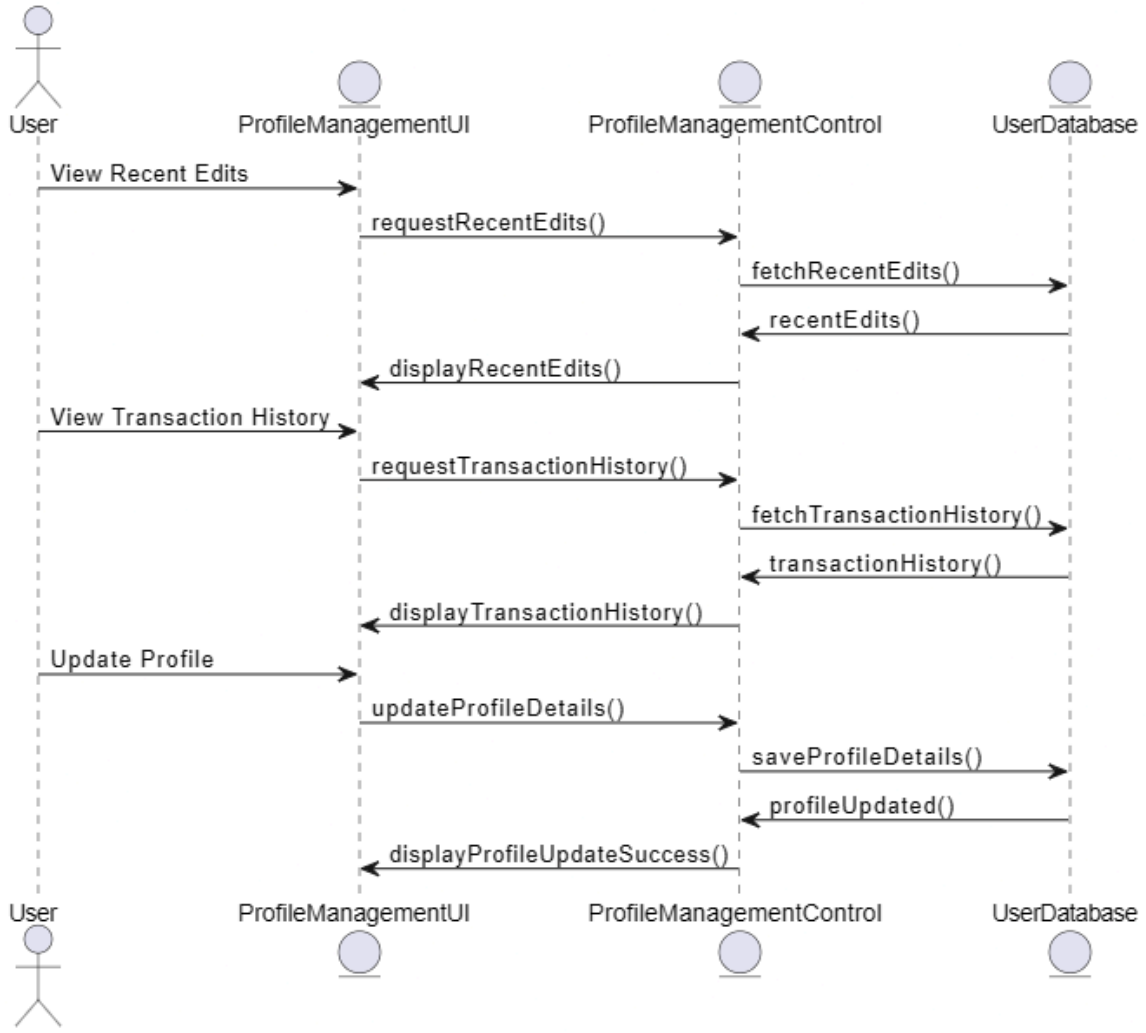

Figure 4.3.5 Sequence Diagram of AI Image Editing Platform

4.4 Software Architecture Diagram

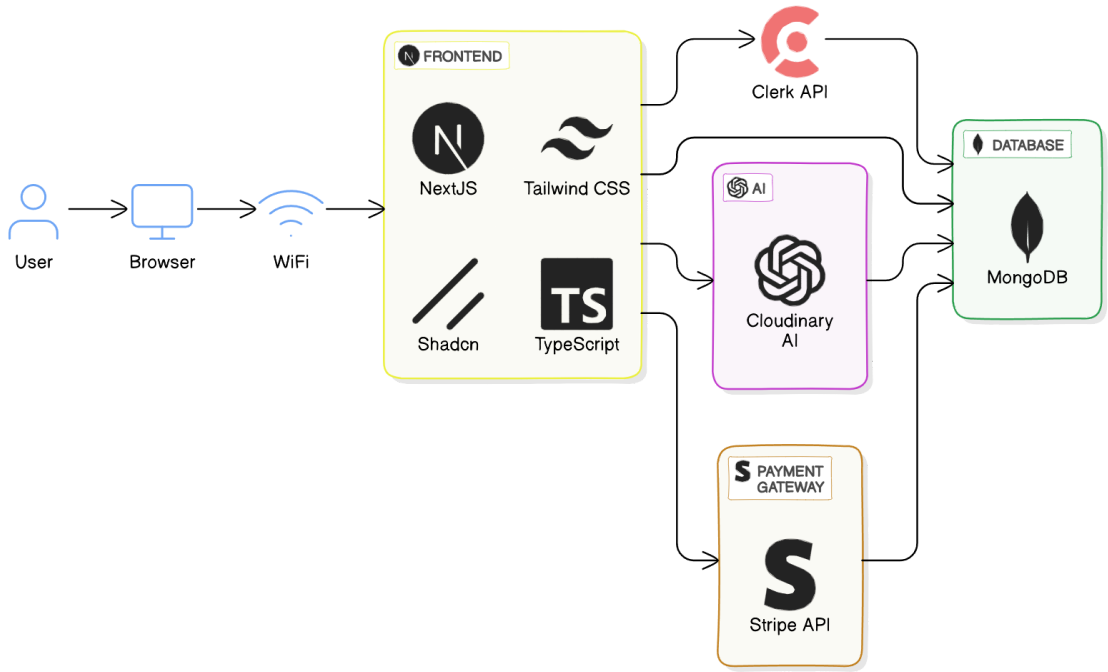

Figure 4.4.1 Software Architecture Diagram of AI Image Editing Platform

The frontend interacts with multiple backend services for the purpose of achieving different tasks. For controlling the authentication and management of users it uses Clerk API. This is taken care of by Cloudinary AI which provides functions like image processing. Payments and any financial operations are carried out using the Stripe API. The selected MongoDB database is used for managing the data storage.

In detail, if a user log in or register, the frontend utilizes the Clerk API which handles the authentication. For tasks related to AI for example, image processing, it interacts with Cloudinary AI. All the payment processing interactions are made to the Stripe API. Last but not least, MongoDB is the target for any data that the application wants to fetch or store. The relationships are represented by the arrows in the diagram.

4.5 Security Design

The security design of the AI Image Editing Platform includes several essential features to protect user accounts and data. The platform will implement a "Forget Password" feature that allows users to securely reset their passwords through email verification, ensuring that only the account owner can initiate a reset. Users will be able to change their passwords at any time, with the system enforcing strong password policies to maintain account security.

An additional login verification code (two-factor authentication) will be used to further secure user accounts, requiring a code sent to the user's email or mobile device upon each login attempt. The platform will also include a "Delete Account" option, which allows users to permanently remove their accounts and associated data. This allows users with the ability to manage their own data and ensures that they maintain control over their personal information and digital footprint. For example, a user who decides to stop using the application due to privacy concerns or a shift in personal preference should have the ability to remove their account and all associated data without undue difficulty. This autonomy is important in creating a sense of ownership and trust, as users know they are not locked into a service against their will. All sensitive data will be encrypted both in transit and at rest, and user activities will be logged to detect any suspicious behavior and ensure overall platform security.

4.6 UI Design

Homepage

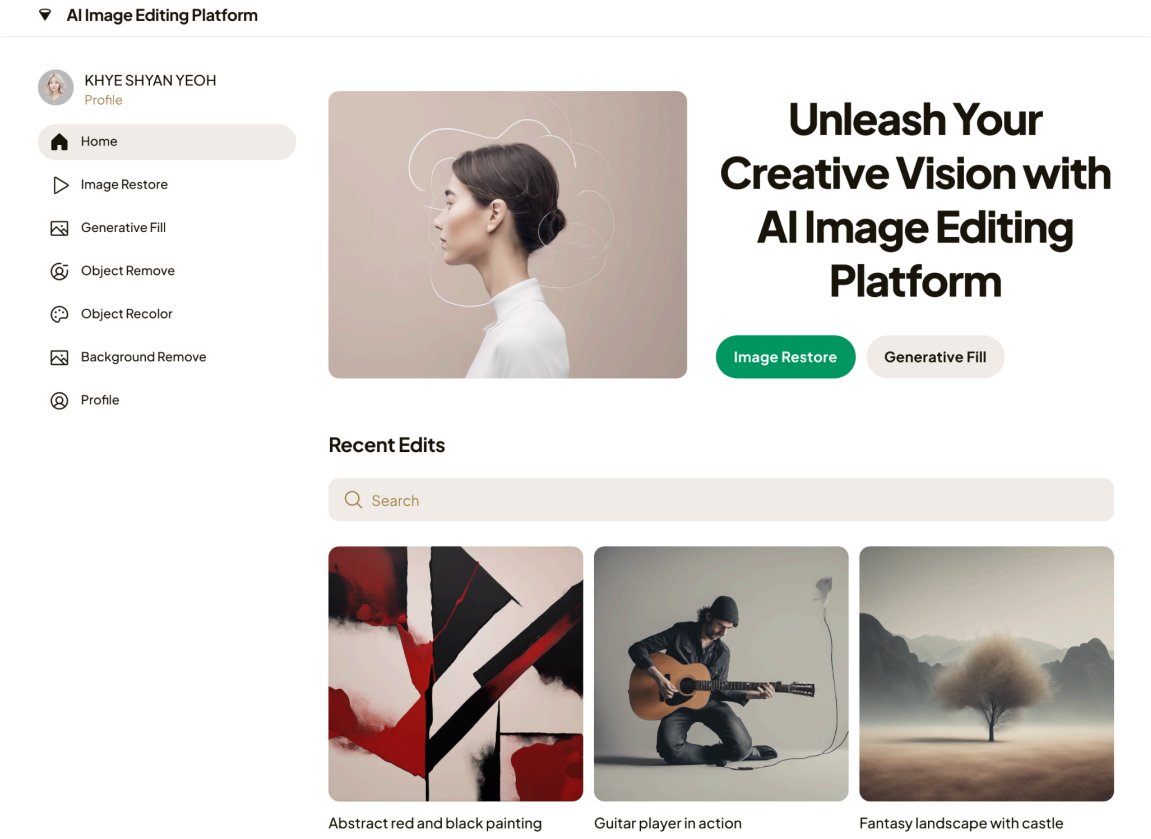

Figure 4.6.1 Homepage UI of AI Image Editing Platform

Login Page

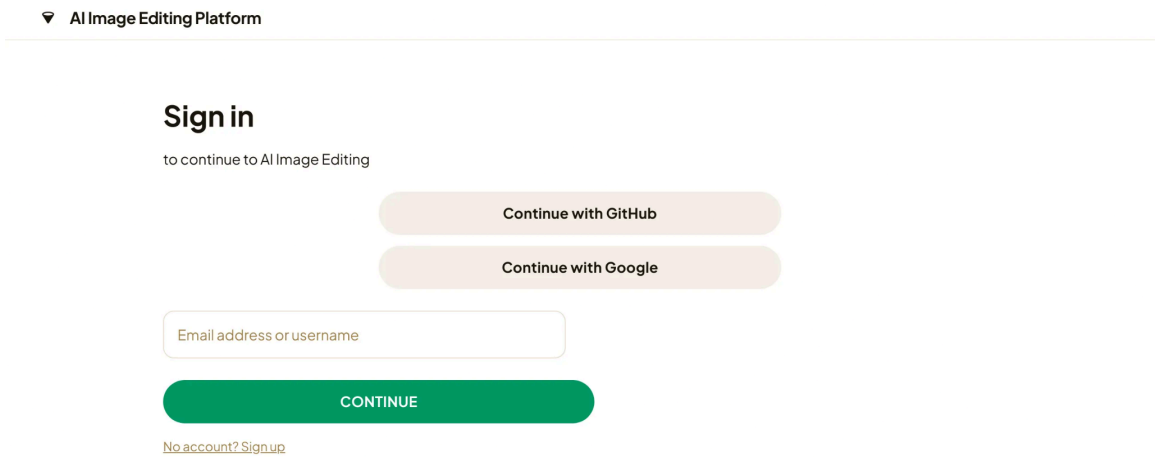

Figure 4.6.2 Login UI of AI Image Editing Platform

Sign Up Page

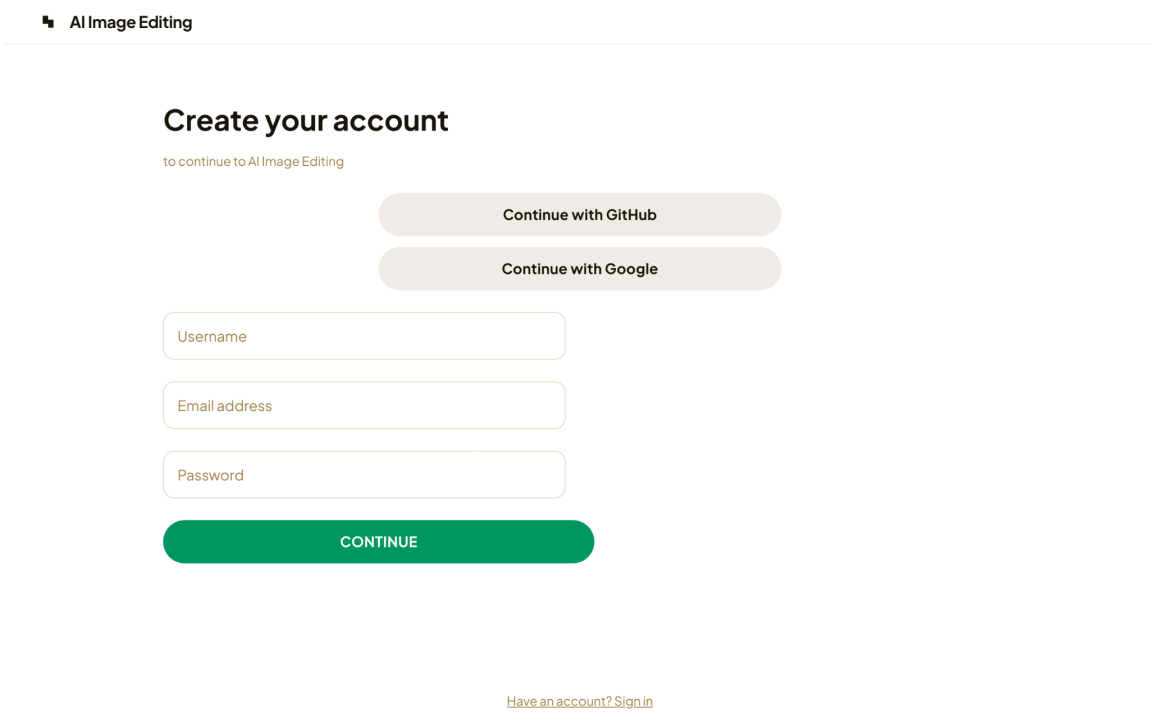

Figure 4.6.3 Sign Up UI of AI Image Editing Platform

Credit Top-Up Page

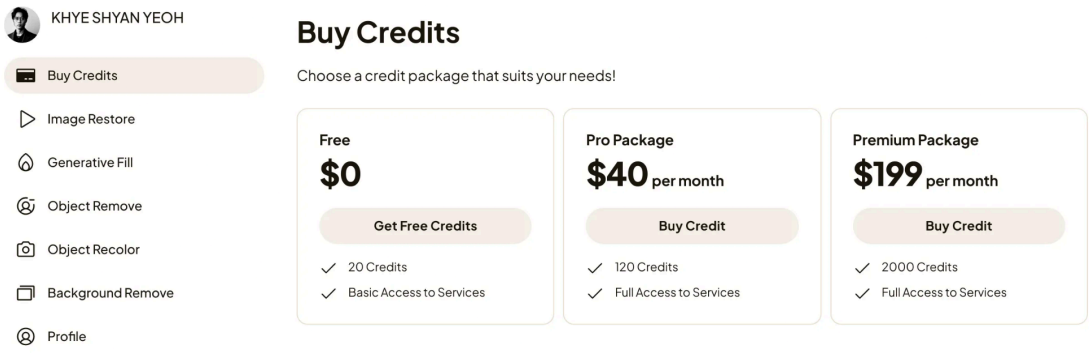

Figure 4.6.4 Credit Top-Up UI of AI Image Editing Platform

Image Restore Page

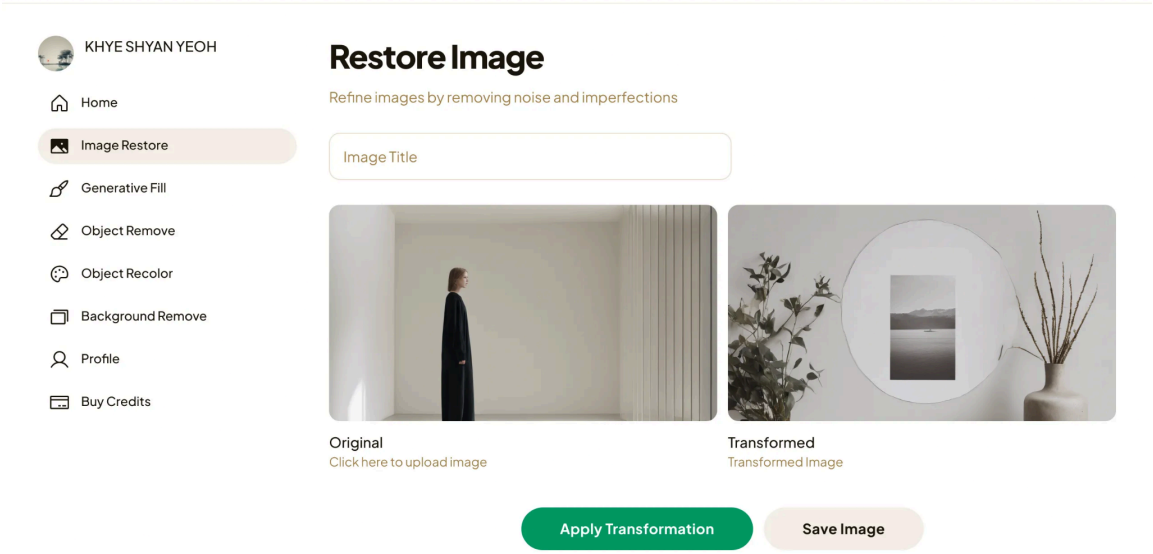

Figure 4.6.5 Image RestoreUI of AI Image Editing Platform

Generative Fill Page

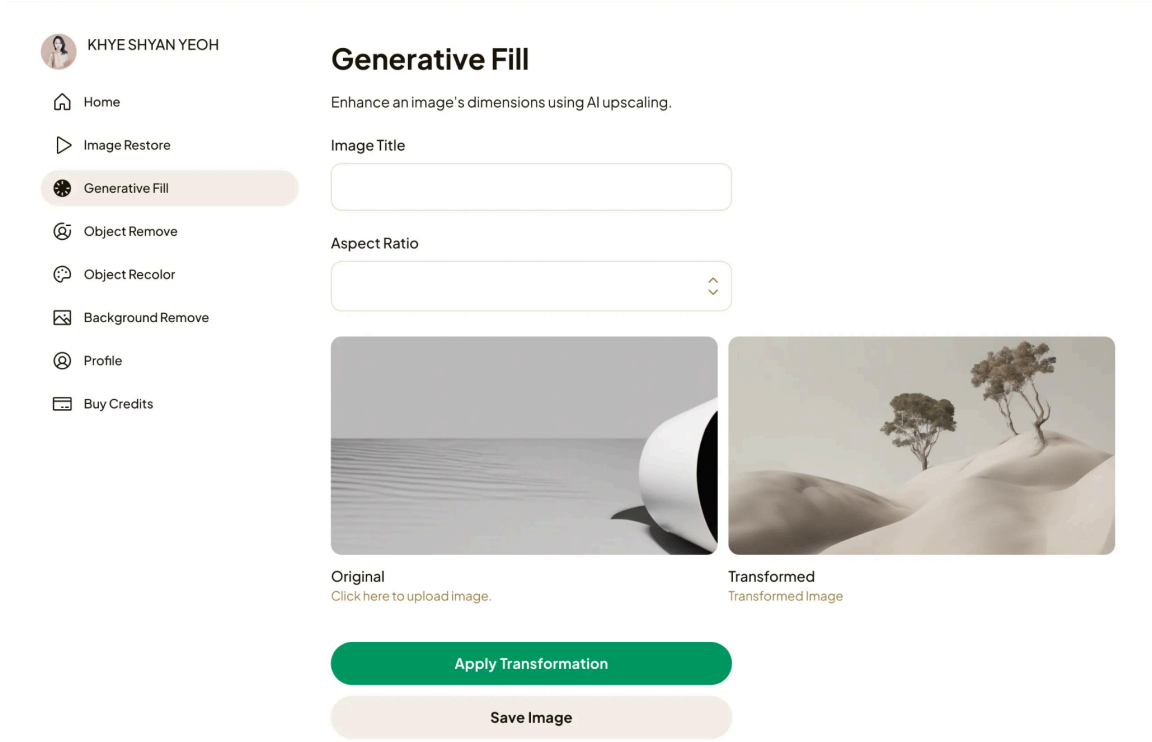

Figure 4.6.6 Generative Fill UI of AI Image Editing Platform

Object Removal Page

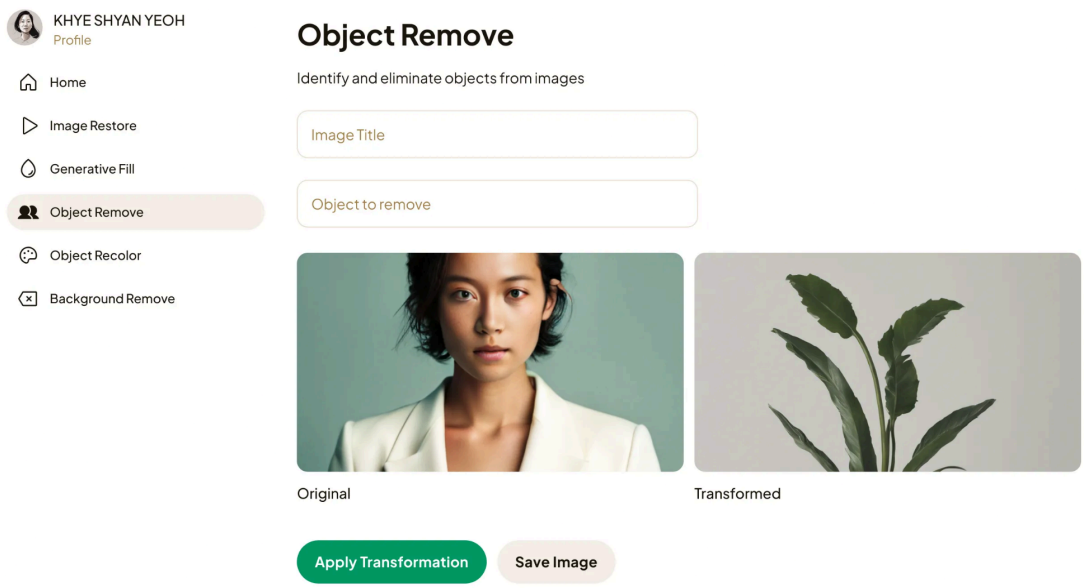

Figure 4.6.7 Object Remove UI of AI Image Editing Platform

Object Recolor Page

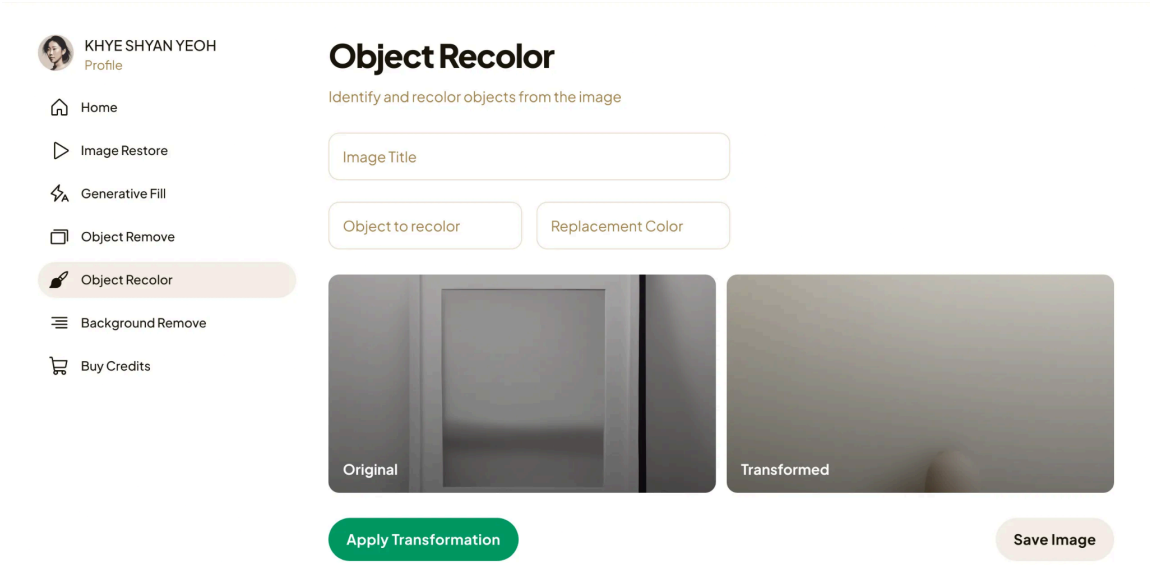

Figure 4.6.8 Object Recolor UI of AI Image Editing Platform

Background Remove Page

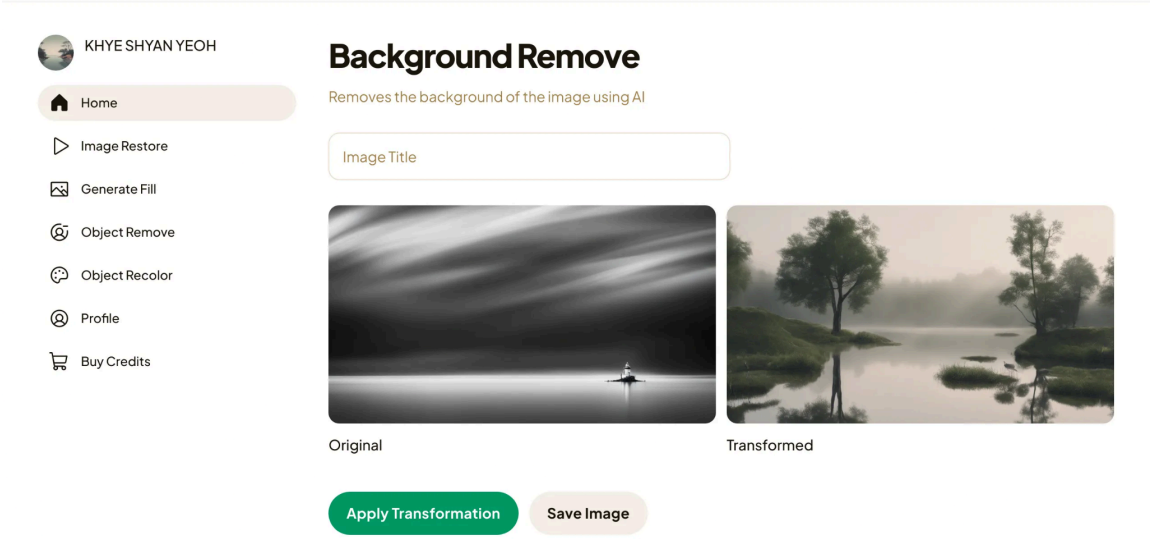

Figure 4.6.9 Background Remove UI of AI Image Editing Platform

Profile Page (Overview)

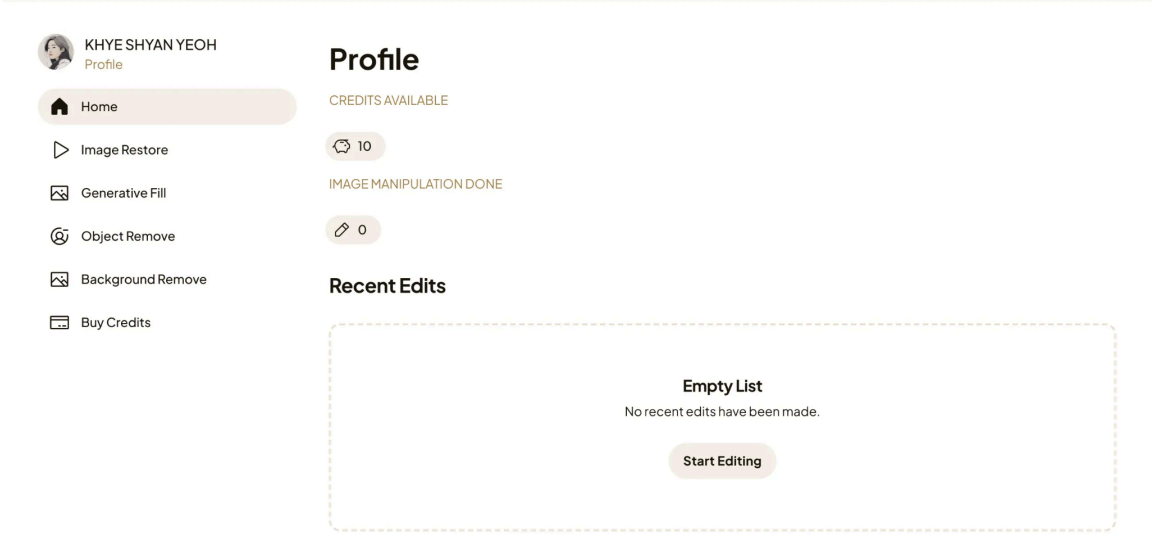

Figure 4.6.10 Profile UI of AI Image Editing Platform

Profile Page (Account Management)

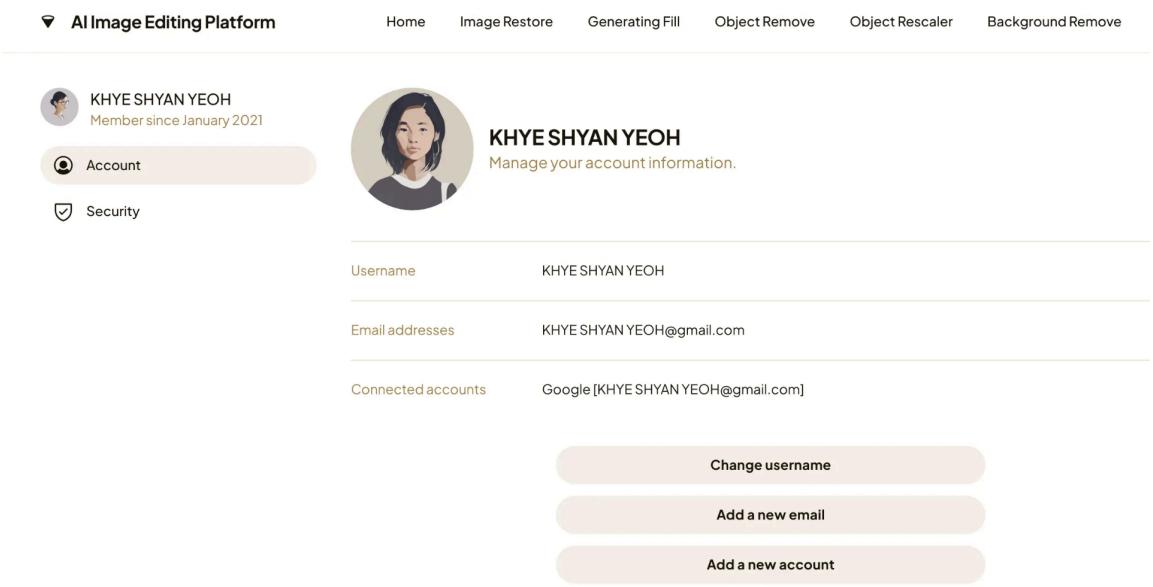

Figure 4.6.11 Account Management UI of AI Image Editing Platform

Profile Page (Security)

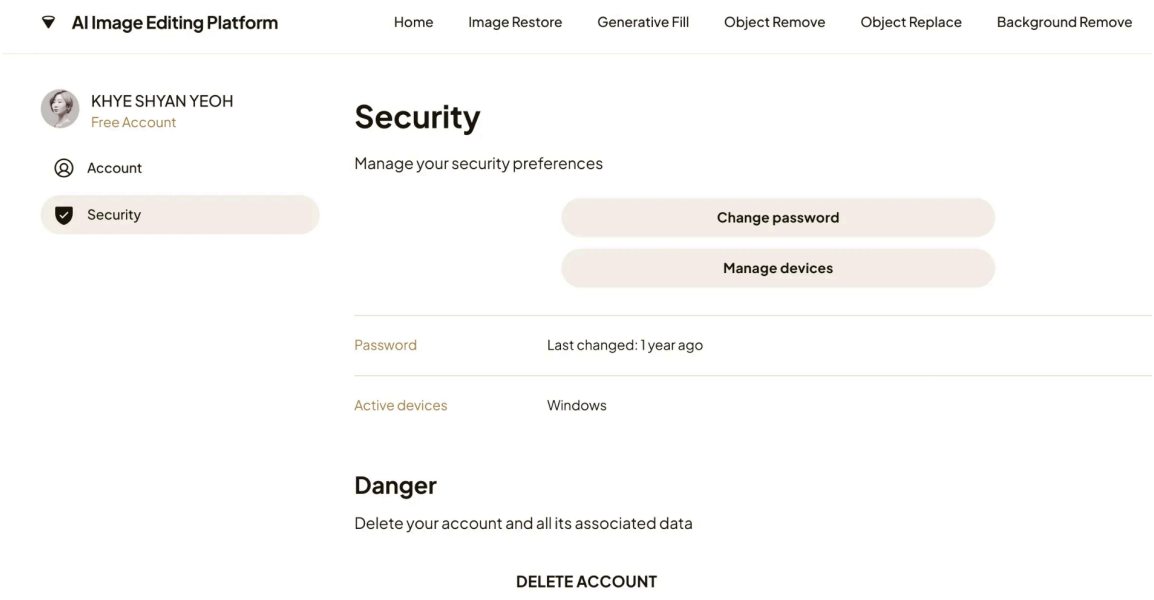

Figure 4.6.12 Account Management(Security) UI of AI Image Editing Platform

4.7 Chapter Summary and Evaluation

The system design, which contains the sequence diagram that describes each module's workflow, is covered in this Chapter 4. It also includes a user interface, or "prototype," of the application so the developer may see the frontend design before they begin working on the application. The Activity Diagram has been included in Chapter 3. Therefore in addition, the data design had been included, containing a class diagram, an entity relationship diagram (ERD), and a sequence diagram. Besides, the security design displays the security features included in the application. Finally, the organization or structure of the application is described in Software Architecture Design.

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Appendix (Proposal)

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PROJECT TITLE: AI IMAGE EDITING PLATFORM (WEB BASED)

ABSTRACT

Traditional photo editing contains an underlying issue, which is that it requires steep learning curves, which costs time and monetary expenses to individuals, content creators and social media influencers who require efficient and affordable photo editing solutions. Therefore, AI Image Editing Platform aims to solve the issue by providing an inexpensive alternative which simplifies the photo editing process, making them accessible to users of all skill levels while reducing the time needed for edits from hours to minutes. By utilizing artificial intelligence, the platform provides specific tools for enhancing, retouching, and manipulating images creatively. Although traditional photo editing contains a number of manual controls and a wide array of tools for detailed image manipulation, AI editing allows for quicker, more automated editing with advanced features which includes image upscaling, generated filling etc.

PROBLEM

The report done by Smith (2019) about Adobe Photoshop software explains that the most challenging thing about it is the learning curve, which is quite steep and therefore it needs a lot of time, effort, and dedication. The report statistics justifies that novice users often get confused with the number of tools, functions, and menus, and, contrary to their expectations, find it impossible to master the complexity of the software. Experienced developers are also not immune to problems when they are trying some innovative features or technologies. Thus, to be a proficient user of a complex software such as Adobe Photoshop takes a lot of hours, energy and attention.

According to Brown & White (2018)'s research on complex software, the steep learning curve is an obstacle to the entrance for the low-level photographers, graphic designers and it limits them from really using their creative skills for the following reasons. Besides, a lot of people are not able to accomplish their goals because of letting off their efforts due to frustration or disappointment. This substantially decreases the number of people in the society who have an access to the creative use of digital images, thus prohibiting the way for the majority of the population to express themselves artistically or to start a creative project.

Moreover, the higher level of education of traditional photo editing software increases the skills differences among the users. Professionals with experience in image editing can get the result that they like, but the less experienced may struggle to attain the desired results. This problem of skill gap can result

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in a feeling of unfairness or frustration which again can lower one's confidence and one's ability to express creatively.

In conclusion, the high learning curve associated with traditional image editing software can be a significant problem for users of all skill levels. Meeting this challenge requires dedication, patience, and resources that may not be readily available to anyone else.

SOLUTION

The identified solution is a flexible AI-powered image editing service website designed to automate the image editing process and make it accessible to all regardless of experience. Using advanced machine learning techniques, the platform website automates complex maintenance tasks and streamlines operations, enabling users to get professional results with minimal effort.

Core Technologies:

Natural Language Processing (NLP) Integration:

- The proposed AI image editing platform will use NLP capability, enabling the users to issue the software commands in a natural language. It can do away with the technicalities and make the editing easier for users with different levels of technical knowledge.

Automated Object Recognition:

- The AI of the image editing platform will be able to recognize objects and elements within the image, helping to make selection and alteration easy. This may include, for instance, detecting faces, landmarks, and other objects, which then allows you to edit them more precisely.

Key Features:

AI Image Upscaler

This objective strives to enhance an image by minimizing or eradicating any degradation that occurred during picture acquisition, transmission, or storage. Users will be able to transform a blurry image into a highly detailed crisp image. It employs high-end algorithms of deblurring and super resolution for better image analysis and solving problems like noise, blurriness, or missing parts which result in high quality and visually pleasing images.

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AI generated filling (with aspect ratio selection)

- This option enables the image to be magnified with the help of AI technologies. For instance, the user can change a horizontal picture into a portrait picture and, therefore, the AI images will fill in the gap of the horizontal picture. It automatically fills out missing or damaged areas in images by generating the content that matches its surroundings, therefore creating the whole and seamless visuals.

Object Selection and Removal

- This tool allows the user to get rid of any object in the image using the search phrase. On the other hand, to remove an unwanted person who is in the background of the photo, type "remove person in the background" in the prompt bar. It removes unwanted components from pictures but leaves the background, resulting in undistracted and more focused visuals that have been edited without use of manual tools.

Object Selection & Color Replacement

- This feature will allow users to automatically restore or enhance the color of objects within an image. Users will just have to type in the name of the object and color for it to work. It enhances or restores faded or degraded colors in objects within images, bringing them back to life with vibrant and accurate hues for a more vivid representation. This process is particularly useful in scenarios where the color information of objects in images has been degraded, faded, or lost over time.

Background Removal

- This feature utilizes artificial intelligence algorithms to automatically remove the background from an image while preserving the foreground objects. This process is particularly useful for creating visually appealing images with transparent backgrounds or isolating objects for various applications such as graphic design, product photography, or image editing.

This AI image editing platform will utilize Next.js (React) and Tailwind CSS for frontend development, TypeScript for backend development, and MongoDB for database management. It also integrates APIs which includes Cloudinary as its main core functionality, Media Uploader, Google Auto Tagging, Clerk, and Stripe for enhanced functionality, including media handling, image categorization, user authentication, and payment processing.

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TARGET MARKET

The focus of target customers for the AI Image Editing Platform includes amateur photographers and social media influencers. These two segments have been chosen because they share the need for accessible, user-friendly image editing tools to enhance their visual products for personal and professional purposes.

Amateur Photographers:
A comprehensive survey which was carried out in 2020 by the Consumer Technology Association revealed that amateur photographers in the US are around 160 million. This number also suggests the size of the market segment that is seeking editing solutions to their photography output. This is an explanation of the growing interest in photography as a hobby. However, on the flip side, many of these photographers find that the usual photo editing software takes a lot of their time and is just too complicated for them to reach the full extent of their creativity. Through simple and intuitive editing tools, the AI editing platform aims to bridge the gap and allow novice photographers to be creative and improve their photos without being limited to complex technical issues.

Social Media Influencers:
Nowadays, social media networks are among the most impactful instruction tools used for communication, entertainment, and business. In January 2024, there were 5.35 billion social media users worldwide, and nowadays social media platforms such as Instagram, YouTube and TikTok are the main platforms for influencer marketing, where visually interesting content are the most common. Social media celebrities depend mainly on engaging images to capture the audience's eyes and land the most lucrative deals as brand ambassadors. In conclusion, this AI Photo Editing Platform is a very convenient software for influencers by which they can effortlessly and instantly capture their photos with consistent images and continuously take the lead in the field of social media advertising.

Realistic Market Size:
Based on the figures obtained from market research and industry reports, the AI Image Editing Platform's target market is likely to be within the tens of millions of subscribers worldwide. This prediction takes into account the global expansion of social media and digital photo usage. Attracting only a fraction of this huge market means having a big chance for growth and profits for the platform.

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COMPETITION/CONTRIBUTION

The AI Image Editing Platform is currently in competition with its industry leader, Adobe Photoshop. The platform differentiates itself as the better option through presenting various compelling advantages that make it efficient and fast. In comparison, Adobe Photoshop uses manual editing procedures that are time-consuming, while the AI-enabled editing platform works on tasks in an automated manner, thus reducing the editing time and improving productivity. Therefore, this not only saves users' precious time but also streamlines the workflow enabling them to achieve the goals in a shorter period.

Secondly, the affordability is another strength of the platform. Unlike Adobe Photoshop, which mainly requires the purchase of a subscription or a one-time license fee, the AI image editing platform comes with more affordable pricing plans. It is this affordability that makes our service an appealing choice for a larger than usual cross-section of the user population including amateur photographers and social media influencers with budget constraints and limited resources.

Also, our platform is convenient and straightforward to use. Adobe Photoshop's interface can be confusing for beginners, but our platform is intuitive and built for ease of use instead. For this reason, users of different levels of abilities can easily get to know their way around the software to access more powerful editing tools, which is promoting increased adoption and creativity among users.

In alignment with SDG 8: Decent Work and Economic Growth, the AI image editing platform boosts economic growth by automating image editing tasks which increases the efficiency of firms heavily relying on graphics and image processing. The efficiency of processes can be increased by saving the time and efforts consumed in the editing process. This can save cost and boost productivity for the business. It, therefore, leads to a conducive setting for good work and economic growth which supports sustainable development.

Furthermore, in accordance with SDG 9: Industry, Innovation, and Infrastructure, which promotes equal opportunities to those from different backgrounds to participate in the digital economy, the system ensures that users from different economic groups and geographical locations can actively participate in visual communication and creative expressions. Therefore, this opens up space for innovation and the construction of resilient facilities that will be the bedrock for sustainable industrialization on an international level.

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MILESTONES

Project Schedule:

1. Project Planning and Research (3 weeks):
- Define the project objectives, scope, and requirements.
- Get user requirements by conducting surveys, interviews, and usability testing.
- Carry out marketing research and feasibility study.
- Setup development tools and technologies.

2. Prototype Development (10 weeks):
- Create user interface and workflow.
- Implement AI algorithms for automatic editing.
- Incorporate key features like image enhancement, filters and adjustments.
- Carry out interactive testing and refinement.

3. Testing and Evaluation (4 weeks):
- Conduct comprehensive testing of the functionality and performance of the prototype.
- Find and fix any problems or defects spotted in the testing process.
- Assess the prototype based on the objectives and criteria for success of the project.

4. Finalization and Documentation (2 weeks):
- Create the finalized prototype on the basis of the feedback and test results.
- Develop user documentation and instructional materials.
- Create a final project report which summarizes the development process, results and lessons learned.
- Present the prototype and the findings to the project supervisor and the moderator.

Development Model:

Scrum Development: Embracing the Scrum methodology gives a structured framework for the development management of the project. it can accordingly accomplish the project through several iterative cycles known as sprints to effectively manage the tasks and the order of deliverables. This methodical approach enables the project to have better flexibility and fulfill the user requirements gathered from research.

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