

**TOONIFYVIBE:
AN IMAGE TO CARTOON CONVERTER**

A PROJECT REPORT

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ABSTRACT

ToonifyVibe is an innovative image to cartoon generator system that employs deep learning techniques to transform ordinary images into visually appealing and stylized cartoon representations. The system offers a seamless and user-friendly approach to generating high-quality cartoon images.

The core functionality of the ToonifyVibe system lies in the style transfer module, which employs a deep learning model trained on a vast dataset of cartoon artwork. This model effectively transfers the unique characteristics and style of cartoons to the input image, resulting in a stylized cartoon representation that preserves important details and exhibits coherent visual elements. The style transfer process utilizes sophisticated convolutional neural networks to achieve accurate stroke generation and vibrant color reproduction.

Whether for entertainment, creative expression, or professional purposes, ToonifyVibe provides a powerful and accessible tool for generating high-quality cartoon representations.

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1) Introduction

1.1 Introduction

ToonifyVibe is an image to cartoon generator system that utilizes deep learning techniques to transform regular images into captivating cartoon representations. This system aims to bridge the gap between traditional artistry and modern technology by providing users with a simple yet powerful tool to convert their photographs or digital artworks into stylized cartoon visuals. In our web application user can temporarily upload the image and the system will convert that image into the cartooned version then the user can download that respective image. The user experience is a key consideration in the design of ToonifyVibe.

The system provides a user-friendly interface that allows users, regardless of their artistic skills or technical background, to easily upload their images and apply the cartoonization process with a simple click. The generated cartoons can then be saved providing users with the flexibility to integrate their unique creative vision into the final artwork.

1.2 Scope

The scope of the ToonifyVibe project encompasses delivering a robust image to cartoon generator system that provides users with an accessible, visually appealing, and customizable solution for transforming their images into captivating cartoons. The project aims to enable artistic expression, entertainment, social media sharing, and explore potential commercial applications, while maintaining a user-friendly interface and leveraging the power of deep learning techniques.

1.3 Project summary and Purpose

ToonifyVibe is an innovative project that focuses on developing an image to cartoon generator system. The primary purpose of this project is to create a robust and user-friendly tool that can transform ordinary images into visually appealing and stylized cartoon representations. By leveraging deep learning techniques and computer vision algorithms, ToonifyVibe aims to bridge the gap between traditional artistry and modern technology, enabling users to unlock their creativity and bring their images to life in a cartoon-like fashion.

To ensure a delightful user experience, ToonifyVibe provides a user-friendly interface that allows users of all skill levels to easily upload their images and apply the cartoonization process with just a few clicks. The system strives to be accessible, intuitive, and efficient, providing users with a seamless experience throughout the cartoon generation process.

The primary purpose of the ToonifyVibe project is to develop an advanced image to cartoon generator system that allows users to effortlessly transform ordinary images into visually appealing and engaging cartoon representations.

The ToonifyVibe project aims to deliver a state-of-the-art image to cartoon generator system that combines the power of deep learning and computer vision with a user-friendly interface. By providing users with the tools to easily transform their images into captivating cartoon visuals, ToonifyVibe unlocks new creative possibilities and brings the joy of cartoons to a wider audience.

1.4 Overview of the project

ToonifyVibe is an exciting project that revolves around the development of an image to cartoon generator. The project aims to create a sophisticated system capable of transforming ordinary images into visually appealing and captivating cartoon representations. By leveraging advanced algorithms and deep learning techniques, ToonifyVibe bridges the gap between traditional artistry and modern technology, offering users a powerful tool to unlock their creativity and bring their images to life in a vibrant and stylized cartoon form.

In ToonifyVibe user can interact with our simple and compact web interface to temporarily upload, convert and download the image in just a few clicks.

ToonifyVibe finds applications in various domains and use cases. Users can utilize the system for personal enjoyment, transforming their photographs into playful and imaginative cartoons.

In summary, the ToonifyVibe project aims to deliver a powerful image to cartoon generator system that combines algorithms, deep learning techniques, and a user-friendly interface. By offering users a tool to transform their images into captivating cartoons, ToonifyVibe enables artistic expression, promotes engagement and entertainment, and finds practical applications in personal, social, and commercial contexts.

1.5 Problem definition

Converting ordinary images into captivating and visually appealing cartoon representations traditionally requires artistic skills and time-consuming manual effort. This poses a challenge for individuals without the necessary artistic expertise or resources to create professional-quality cartoons. There is a need for an automated and accessible image to cartoon generator system that can efficiently transform images into stylized cartoons while preserving essential details and maintaining visual coherence.

2) Technology and Literature Review

2.1 About Tools and Technology

The ToonifyVibe project utilizes a combination of tools and technologies to develop an efficient and robust image to cartoon generator system. The following are some key tools and technologies involved in the project:

- **Python:** Python is a popular programming language known for its versatility and extensive libraries. It serves as the primary language for developing the ToonifyVibe system, allowing efficient implementation of algorithms and integration of various components.
- **Convolutional Neural Networks (CNNs):** CNNs are a fundamental component of ToonifyVibe, enabling the extraction of features and style transfer from input images. CNN architectures like VGG, ResNet, or U-Net can be utilized to capture important structural and textural details and generate accurate stroke patterns.
- **Image Processing Libraries:** Image processing libraries, such as OpenCV is used for various preprocessing tasks like image resizing, enhancement, and feature extraction. These libraries provide efficient algorithms for manipulating and analyzing images.

2.2 Brief History of Work Done

Our team has successfully developed an impressive machine learning model capable of transforming inputted images into captivating cartoon versions. Notably, this model also demonstrates its remarkable functionality by seamlessly converting live camera input into real-time cartoon renditions.

We are committed to bringing this technology to a wider audience by creating a dedicated website for the platform. This website will serve as an accessible and user-friendly interface, allowing individuals from all walks of life to effortlessly experience the enchantment of seeing their favorite images or live moments beautifully transformed into captivating and artistic cartoon forms.

3) System Requirements Study

3.1 User Characteristics

Analyzing user characteristics is an important aspect of any project. It allows us to clearly define and focus on who the end users are for the project. Also, it allows checking the progress of the project to ensure that we are still developing the system for the end users. The user must have following characteristics:

- **Image Upload:** Users should be able to easily upload their images to the ToonifyVibe system. The system supports common image file formats and allow for seamless uploading from different devices, such as computers, smartphones, or tablets.
- **Compatibility:** ToonifyVibe should be compatible with different web browsers and devices to ensure broad accessibility. The system should work smoothly across major browsers, including Chrome, Firefox, Safari, and Edge. Also, users must be able to easily interact with the proposed system.
- **Basic Knowledge:** Users must have basic knowledge of Smart Phones and Browsers.

3.2 Hardware and Software Requirements

Software and Hardware Requirements are used to describe the minimum hardware and software requirements to run the website, these requirements are described below:

Software Requirements:

Client:

Operating System: Android 5.0 (Lollipop) or up, Windows 10 or up

Server:

Operating System: Windows 10 or up

Hardware Requirements:

Client:

Recently updated browser (Chrome, Firefox, Edge, etc.)

Android Smart Phone (5.0 Lollipop or up) with updated browser

Laptop or Desktop with Windows 10 or up

Stable Internet Connection

Device with webcam or internal Camera

3.3 Constraints

3.3.1 Regulatory Policies

Regulatory Policies for ToonifyVibe are as following:

- **Copyright Compliance:** ToonifyVibe adheres to all copyright laws and regulations. Users must not upload or use copyrighted images without proper authorization.
- **Content Guidelines:** Users must not upload any inappropriate, offensive, pornographic or harmful images to the system.
- **Data Privacy and Security:** ToonifyVibe complies with data privacy laws and protects user data from unauthorized access, use, or disclosure. The system does not store any data without user's permission or the necessary data used for operation.

3.3.2 Hardware Limitations

Hardware Limitations for ToonifyVibe are as following:

- **Processing Speed:** The image to cartoon conversion process can be computationally intensive, particularly for high-resolution images or complex artistic styles. Users with older or less powerful hardware may experience slower processing times, leading to potential delays in generating cartoon outputs.

- **Internet Connectivity:** ToonifyVibe relies on cloud-based processing. Users with limited or unstable internet connectivity may experience delays or may not be able to use the system effectively.
- **Storage Space:** Storing and managing processed images can consume significant storage space on the user's device, particularly for high-resolution cartoons. Users should be mindful of storage limitations, especially on devices with limited internal storage.

3.3.3 Higher Order Language Requirements

Some of the higher-order languages that are used for developing ToonifyVibe include:

- **Python:** Python is a popular and versatile higher-order programming language known for its simplicity and readability. It offers a wide range of libraries and frameworks, including OpenCV and NumPy, which are well-suited for image processing tasks.
- **JavaScript:** JavaScript, often used for web development, can be a higher-order language for front-end components of ToonifyVibe, such as interactive user interfaces.
- **OpenCV:** OpenCV (Open-Source Computer Vision Library) is an open-source software library that offers a comprehensive set of tools and functions for computer vision and image processing tasks.

3.3.4 Reliability Requirements

Reliability Requirements for ToonifyVibe are as following:

- **Cross-Browser Compatibility:** Ensure the website functions reliably across various web browsers and devices, providing a consistent user experience for all visitors.
- **Scalability:** Design the website to handle varying levels of user traffic, ensuring that it can scale to accommodate increased demand without significant performance degradation.
- **Data Integrity and Security:** Ensure the integrity and security of user data. Implement measures such as data encryption, secure authentication, and regular backups to prevent data loss or unauthorized access.

3.3.5 Safety and Security Consideration

Safety and Security Considerations for ToonifyVibe are as following:

- **Data Privacy:** User data, including uploaded images, remains private and secure. Implement encryption protocols and secure storage practices to protect sensitive information from unauthorized access.
- **Secure File Upload:** Users cannot upload image to the system without proper login authorization.
- **User Authentication:** System contains secure user authentication to prevent unauthorized access to user accounts and data with strong passwords.
- **Secure APIs:** The website uses APIs for image processing or other functionalities, which are secured with authentication and access controls to prevent misuse or unauthorized access.

3.4 Assumptions and Dependencies

Assumptions:

- User is the person having enough knowledge for the basic web browsers.
- We will provide a user-friendly interface so that any user can easily navigate through the system, but he/she should be capable of providing valid images for successful conversion.
- The server used for ToonifyVibe is always online.

Dependencies:

- The system is dependent upon the user's valid credentials. If user inputs wrong username or password, he/she will not be allowed to login to the system. But user can reset his/her password.

4) System Analysis

4.1 Study of Current System

Case study of Toonme:

ToonMe is an online platform that allows users to transform their photos into cartoon-like images. While I don't have access to specific case studies, I can provide you with a general understanding of its features and user experience.

User-friendly interface: ToonMe aims to provide a user-friendly experience, allowing users to easily upload their photos and apply various cartoon-style filters and effects. The website likely offers clear instructions and a straightforward process to guide users through the cartoonization process.

Cartoon styles and customization options: ToonMe likely offers a range of cartoon styles, allowing users to choose the look they desire. This may include different artistic interpretations, such as cartoon, sketch, or comic styles. The platform may also provide customization options like adjusting line thickness, color saturation, or other parameters to fine-tune the output.

Social sharing and community: ToonMe may offer features that allow users to share their transformed images directly on social media platforms or within the ToonMe community. This can enable users to showcase their creations, receive feedback, and engage with other users who have a shared interest in cartoonized images.

Mobile application: ToonMe may also have a mobile application available for iOS and Android devices, providing users with the convenience of transforming their photos into cartoons on the go. The app may offer additional features or enhancements specifically designed for mobile devices.

Case Study of the Cartoonize.net:

Cartoonize.net is an online platform that allows users to transform their photos into cartoon-like images. Users can upload their photos to the website and apply various cartoon styles and effects to achieve a cartoonized look. The website offers customization options for parameters like brightness, contrast, and line thickness, allowing users to fine-tune the output to their liking.

Cartoonize.net aims to provide a user-friendly interface, making it easy for users to upload their photos and apply cartoon effects. It simplifies the process of transforming images into cartoons, making it accessible to users with different levels of technical expertise.

It's important to note that the specific features, functionalities, and user experiences of Cartoonize.net may evolve over time. For a more detailed understanding of Cartoonize.net and its usage in specific case studies, it would be best to refer to any available documentation, user reviews, or official information provided by the platform itself.

Case Study of the Deepart.io:

DeepArt.io is an online platform that utilizes deep neural networks to transform images into various artistic styles. It employs a technique known as style transfer, where the artistic style of one image is applied to the content of another image, resulting in a unique and stylized output.

Users can upload their images to DeepArt.io and select from a range of pre-defined artistic styles or upload their own style references. The system then processes the input images using deep learning algorithms to generate the stylized output, combining the content of the original image with the chosen artistic style.

DeepArt.io aims to provide a user-friendly interface, making it accessible for users to upload their images and experiment with different artistic styles. The platform allows users to preview and adjust the stylization parameters before generating the final output.

4.2 Problem and Weaknesses of Current System

Toonme:

- **Limited customization options:** Users have noted that ToonMe offers limited customization options for the cartoonization process. The available parameters for adjusting line thickness, color saturation, or other settings may be restricted, limiting users' ability to fine-tune the cartoonized output to their preferences.
- **Inconsistent results:** Users have reported inconsistencies in the cartoonization results produced by ToonMe. Depending on the input image and the chosen cartoon style, the quality and fidelity of the output may vary. Some users have experienced mixed outcomes in terms of preserving details or achieving a desired cartoon-like appearance.
- **Performance issues:** Some users have reported occasional performance issues with ToonMe, including slow processing times or occasional glitches when uploading or processing images. This can impact the overall user experience, especially when dealing with larger or more complex images.
- **Limited range of cartoon styles:** While ToonMe offers various cartoon styles, some users have expressed a desire for a wider variety of options or more artistic effects beyond the available choices. This can limit the creative possibilities and customization potential for users seeking specific cartoon aesthetics.
- **Mobile application limitations:** While ToonMe provides a mobile application for convenience, users have mentioned that the mobile version may have fewer features or customization options compared to the web version. This disparity can result in a more limited experience for users on mobile devices.

Cartoonize.net:

- **Limited customization options:** Users have expressed that Cartoonize.net offers limited control over the cartoonization process. The available customization options may be restrictive, limiting the ability to achieve desired results or tailor the cartoon style to individual preferences.
- **Inconsistent output quality:** Users have reported inconsistencies in the quality of cartoonized images produced by Cartoonize.net. Depending on the input image and

chosen cartoon effect, the output may vary in terms of preserving details, colour accuracy, or overall visual appeal.

- **Lack of advanced editing features:** Cartoonize.net may lack advanced image editing features commonly found in other tools. Users may find it limiting when it comes to more intricate adjustments, layer editing, or fine-grained control over specific elements of the cartoonized image.
- **Potential loss of image detail:** Some users have observed a loss of detail in the cartoonized output compared to the original image. This may affect the overall fidelity and accuracy of the transformation, especially for complex or highly detailed photographs.
- **Performance issues:** Users have occasionally reported performance issues with Cartoonize.net, such as slow processing times or occasional glitches when uploading or processing images. This can impact the user experience, particularly when dealing with larger or more complex images.

Deepart.io:

- **Longer processing times:** DeepArt.io utilizes deep neural networks for artistic stylization, which can be computationally intensive. As a result, generating stylized images may require longer processing times, especially for high-resolution or complex images. This can be a source of inconvenience for users who expect quick results.
- **Limited user control:** DeepArt.io relies on pre-trained models and may not provide extensive customization options for users. The system may limit user control over specific elements of the artistic style, making it difficult to fine-tune or tailor the output to individual preferences.
- **Potential loss of original image details:** Users have reported instances where the stylization process in DeepArt.io may result in a loss of fine details or textures present in the original image. While the transformation may yield a unique artistic output, it may not always faithfully retain the finer nuances of the original photograph.
- **Dependency on internet connection:** DeepArt.io is an online platform, which means users need a stable internet connection to access and use its services. This dependency

on internet connectivity may limit the availability and usability of the platform, especially in areas with limited or unreliable internet access.

- **Limited focus on cartoonization:** DeepArt.io primarily focuses on artistic stylization rather than specific cartoonization. While it can generate various artistic styles, it may not always align with user expectations or provide the desired cartoon-like output.

4.3 Requirements of New System

4.3.1 User Requirements:

- Users should be able to create an account with ToonifyVibe using a unique username and a valid email address.
- Registered users should be able to log in to their accounts using their username and password.
- Users should be able to upload their images to ToonifyVibe for cartoonization.
- Users should have the option to turn on their device's camera and receive a live cartoonized preview.
- After cartoonizing an image, users should be able to download the cartoonized version.
- Users should be informed of any issues, such as failed image processing or incorrect inputs.

4.3.2 System Requirements:

- The system should be capable of processing images efficiently and quickly to provide a smooth user experience.
- The system should be scalable to accommodate an increasing number of users and image processing demands.
- The UI should be intuitive, visually appealing, and easy to navigate for users of all technical levels.
- The system should have error handling mechanisms to capture and log errors for future debugging and improvements.

4.4 Feasibility Study

4.4.1 Can the system be implemented using the current technology and within the given cost and schedule constraints?

Cost Constraints:

Implementing the cartoonification system might involve costs related to software development, hardware infrastructure, data acquisition, and potentially licensing fees for third-party algorithms or datasets. The cost can be optimized by leveraging open-source solutions, utilizing existing frameworks, and carefully managing the development process.

Schedule Constraints:

The schedule for implementing the system will be influenced by the complexity of the chosen algorithm and the scope of the project. Using pre-existing models or libraries can significantly reduce development time. Adequate testing and quality assurance will also impact the schedule.

4.4.2 Can the system be integrated with other system which are already in place?

In future our system can be integrated with various social media services to instantly create feeds, stories or posts with the before and after or various type of cartoonized content.

4.5 Activity/Process in New System (Event table)

Event	Description	Inputs	Outputs	Source
User Registration	User creates a new account to access the system	User details (username, password)	User account created successfully	User
User Login	Registered user logs in to the system	User credentials (username, password)	User logged in successfully	User
User Adding Image	User uploads an image to the system	Image file	Image successfully added to the system	User
User Downloading Converted Image	User downloads the converted cartoon image	Cartoon image file	Cartoon image downloaded successfully	User
Live Cartoonized Preview	User turns on the camera and gets live cartoon preview	Camera access permission	Live cartoonized preview displayed on the user's device	User

4.6 Features of New System

- **User Interface:** We have developed an intuitive and visually appealing user interface that allows users to easily upload and preview images before and after cartoonification.
- **Image Upload:** Enables users to easily upload images from various sources, including local storage, URLs, or directly from a camera or device.
- **Real-Time Cartoonification:** Implemented a fast and responsive cartoonification process to provide real-time results for users.
- **Save and Download:** Users can easily save and download the cartoonified images.
- **User Accounts and Profiles:** The option for users to create accounts or profiles to save their settings and access their cartoonified images in the future.
- **Security and Privacy:** Our system doesn't take users data to ensure data privacy during the image processing and storage.

4.7 Object Interaction

User Interaction:

The user will interact with the user interface to add picture to the site and will get a preview and download option of the converted image. User can also use his device's camera to see live cartoonization of the input. User can also login and logout with the options to reset his/her profile details and change his/her password.

Admin Interaction:

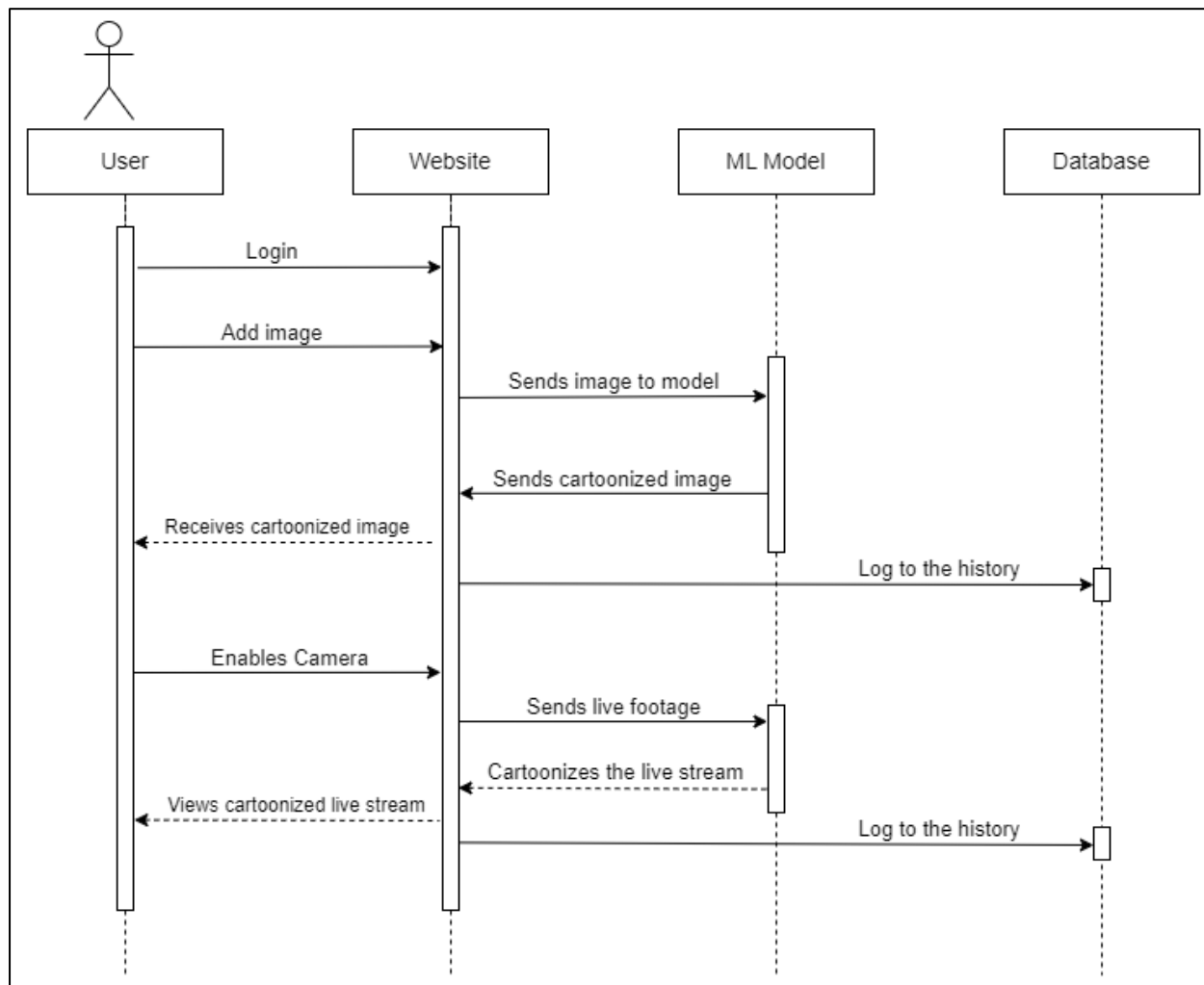
The admin can create new accounts for users who want to use the system and set unique login credentials for each user. Additionally, the admin can disable or delete accounts if required.

4.8 System Activities (Use Case Diagram)



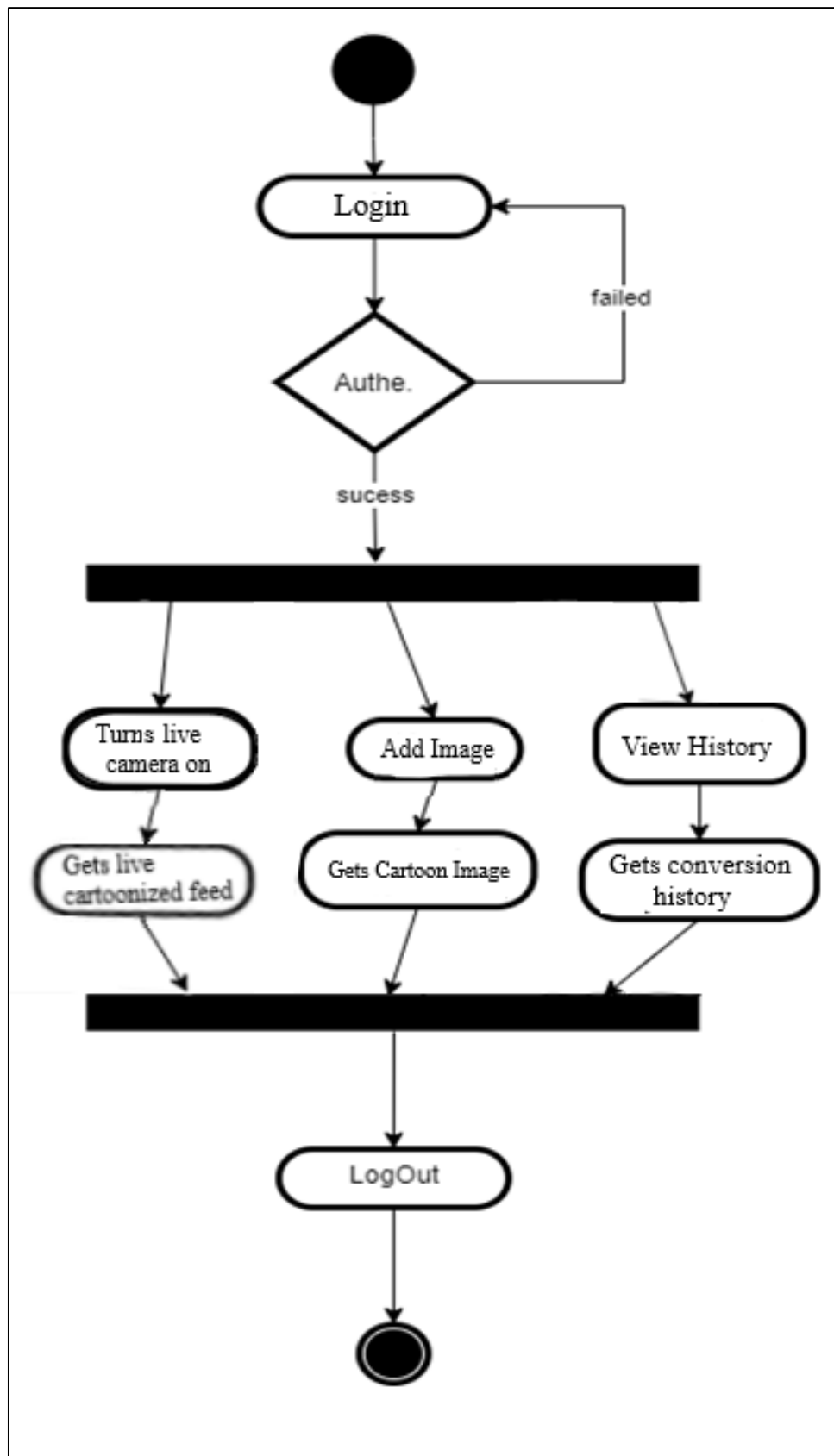
(Diag.1 Use Case Diagram of the system)

4.9 Sequence Diagram



(Diag.2 Sequence Diagram of the system)

4.10 Activity Diagram



(Diag.3 Activity Diagram of the system)

5) System Design

5.1 System Application Design

5.1.1 Method Pseudo code

update_c (C, hist): This function is used to update the centroids (C) for the K-means clustering algorithm iteratively until convergence. The K-means algorithm is utilized to find representative colors in the input histogram (hist). It forms clusters of color intensities based on the initial centroids and assigns each intensity to its closest centroid. Then, it recalculates the new centroids based on the average of the intensities in each cluster. This process repeats until the centroids do not change significantly.

K_histogram(hist): This function performs K-means clustering on the histogram hist to find the most representative color intensities (centroids). It starts with an initial guess of a single centroid, and then it iteratively updates the centroids by splitting clusters with a large spread of intensities.

Caart(img): This is the main controlling function to create the cartoon effect on the input image. Here's the step-by-step process it follows:

- Applies bilateral filtering on each color channel of the input image to smooth out noise while preserving edges.
- Uses Canny edge detection to detect edges in the filtered image.
- Converts the filtered image from RGB to HSV color space.
- Computes histograms for each channel of the HSV image.
- Applies the K_histogram function to get representative color intensities (centroids) for each channel.
- Quantizes the colour values of the image using the obtained centroids to give it a cartoon-like appearance.
- Finds contours from the Canny edge-detected image.
- Draws the detected contours on the quantized image.
- Performs erosion on the output image to further simplify the cartoon-like appearance.

5.2 Database Design

5.2.1 Table and Relationship

User Table:

Column Name	Data Type	Size/Length	Extra
username	VARCHAR(50)	50	PRIMARY KEY, UNIQUE
email	VARCHAR(100)	100	UNIQUE
password	VARCHAR(100)	100	NOT NULL

5.2.2 Logical Description of Data

Username: This column is of type VARCHAR(50) and stores the username chosen by the user during registration which acts as the primary key for the table. The UNIQUE constraint ensures that each username is unique in the table.

Email: This column is of type VARCHAR(100) and stores the user's email address. The UNIQUE constraint ensures that each email is unique in the table.

Password: This column is of type VARCHAR(100) and stores the password chosen by the user during registration. It is essential to store passwords for security purposes.

6) System Testing

Test Cases for ToonifyVibe:

Test cases for ToonifyVibe are specific scenarios or conditions created to validate the functionality and behavior of the application. Each test case outlines the inputs, actions, and expected outcomes to ensure the system works correctly and meets its requirements. These test cases help identify defects, ensure quality, and verify that the application performs as expected in various situations.

White Box Testing for ToonifyVibe:

White box testing for ToonifyVibe involves examining the internal structure and code of the system. Testers, who have knowledge of the application's code design and architecture, create test cases to assess how well the code functions. The objective is to verify if all code paths and logic have been adequately covered, ensuring that the code executes correctly and adheres to coding standards. White box testing helps identify potential code-related issues, such as logic errors, dead code, or incorrect conditional statements, which can impact the application's functionality.

Black Box Testing for ToonifyVibe:

Black box testing for ToonifyVibe focuses on the application's external behavior and functionality without any knowledge of its internal code. Testers create test cases based on the system's functional requirements, specifications, and intended behavior. They interact with the system through its user interface or APIs, without access to the source code. The primary goal is to validate that ToonifyVibe meets its functional requirements, works as expected, and handles inputs and outputs correctly. Black box testing ensures that the application performs correctly from an end-user perspective, regardless of the internal code structure. By combining both white box and black box testing techniques, the testing process for ToonifyVibe achieves comprehensive test coverage. White box testing helps catch potential code issues, while black box testing ensures that the system meets its functional requirements and provides an optimal user experience. This comprehensive testing approach enhances the overall quality and reliability of the ToonifyVibe web application.

7) Conclusion

In conclusion, the project report of ToonifyVibe presents a comprehensive overview of the image-to-cartoon generator application, showcasing its features, functionalities, and the underlying system requirements. Throughout the report, we explored the essential components and user interactions of ToonifyVibe, providing a clear understanding of how users can interact with the system and the expected behavior.

Additionally, the System Requirements play a crucial role in shaping the technical aspects of the application. By addressing platform compatibility, performance, security, scalability, and user interface considerations, the System Requirements guarantee that ToonifyVibe functions efficiently, securely, and offers an enjoyable user experience across various devices and operating systems.

Furthermore, the report introduces the key components and interactions through various diagrams, including the event table and other diagrams. These visual representations offer a concise and clear understanding of the system's behavior and flow, aiding developers and stakeholders in conceptualizing the application's architecture and user journey.

With the event table, we defined the core events of user registration, login, image upload, and image download, and expanded the table to include a live cartoonized preview event, demonstrating the application's real-time processing capabilities. The sequence diagrams provided insight into the interactions between users and ToonifyVibe, showcasing step-by-step actions and responses for each user event.

In conclusion, the project report of ToonifyVibe serves as a comprehensive guide to the application's design, functionality, and technical requirements. By meeting the user expectations and system specifications, ToonifyVibe is positioned to provide users with a delightful experience, transforming their images into captivating cartoons. As the application continues to evolve and adapt to user feedback, we anticipate that ToonifyVibe will emerge as a favored tool for users seeking creative and fun ways to bring their images to life.

8) Bibliography

www.geeksforgeeks.org/machine-learning

<https://app.diagrams.net/>

<https://www.geeksforgeeks.org/cart-classification-and-regression-tree-in-machine-learning/>

<https://opencv.org/>

https://en.wikipedia.org/wiki/K-means_clustering

<https://www.javatpoint.com/k-means-clustering-algorithm-in-machine-learning>

<http://ijmtst.com/volume7/issue05/10.IJMTST0705037.pdf>

https://openaccess.thecvf.com/content_CVPR_2020/papers/Wang_Learning_to_Cartoonize_Using_White-Box_Cartoon_Representations_CVPR_2020_paper.pdf