AI-POWERED STORYBOARD CREATOR: GENERATIVE TEXT-TO-IMAGE TOOL FOR MOVIES, GAMES AND ADS

Minor project-II report submitted
in partial fulfillment of the requirement for award of the degree of

Bachelor of Technology
in
Artificial Intelligence & Data Science

By

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE
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VEL TECH RANGARAJAN DR. SAGUNTHALA R&D INSTITUTE OF SCIENCE & TECHNOLOGY

(Deemed to be University Estd u/s 3 of UGC Act, 1956)
Accredited by NAAC with A++ Grade
CHENNAI 600 062, TAMILNADU, INDIA

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CERTIFICATE

This is to certify that the work contained in the project report titled ”AI-POWERED STORYBOARD CREATOR: GENERATIVE TEXT-TO-IMAGE TOOL FOR MOVIES, GAMES AND ADS” by NAVADEEP J (22UEAD0040), HARSHITTH G (22UEAD0011), and SIDDESWAR REDDY M (22UEAD0037) has been carried out under my supervision and has not been submitted elsewhere for a degree.

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May, 2025

DECLARATION

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

(Signature)

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Date: / /

APPROVAL SHEET

This project report entitled ”AI-POWERED STORYBOARD CREATOR: GENERATIVE TEXT-TO-IMAGE TOOL FOR MOVIES, GAMES AND ADS” by NAVADEEP J (22UEAD0040), HARSHITTH G (22UEAD0011), SIDDESWAR REDDY M (22UEAD0037) is approved for the degree of B.Tech in Artificial Intelligence & Data Science.

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Mrs. S. Jayshree, M.Tech,

Date: / /

Place:

ACKNOWLEDGEMENT

We express our deepest gratitude to our **Honorable Founder Chancellor and President Col. Prof. Dr. R. RANGARAJAN B.E. (Electrical), B.E. (Mechanical), M.S (Automobile),D.Sc., and Foundress President Dr. R. SAGUNTHALA RANGARAJAN M.B.B.S.** Vel Tech Rangarajan Dr. Sagunthala R & D Institute of Science and Technology, for her blessings.

We express our sincere thanks to our respected Chairperson and Managing Trustee **Mrs. RANGARAJAN MAHALAKSHMI KISHORE,B.E.,** Vel tech Rangarajan Dr. Sagunthala R & D Institute of Science and Technology for her blessings.

We are very much grateful to our beloved **Vice Chancellor Prof. RAJAT GUPTA,** for providing us with an environment to complete our project successfully.

We record indebtedness to our **Professor & Dean, Department of Computer Science & Engineering, School of Computing, Dr. S. P. CHOKKALINGAM, M.Tech., Ph.D.,& Associate Dean, Dr. V. DHILIP KUMAR, M.E., Ph.D.,** for immense care and encouragement towards us throughout the course of this project.

We are thankful to our **Professor & Head, Department of Artificial Intelligence & Data Science, Dr. P. SANTHI, M.E., Ph.D.,** for providing immense support in all our endeavors.

We also take this opportunity to express a deep sense of gratitude to our **Internal Supervisor Mrs. S. JAYSHREE, M.TECH., Assistant Professor,** for her cordial support, valuable information and guidance, she helped us in completing this project through various stages.

A special thanks to our **Project Coordinator Mrs. I. FARZHANA, M.E., Assistant Professor,** for her valuable guidance and support throughout the course of the project.

We thank our department faculty, supporting staff and friends for their help and guidance to complete this project.

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ABSTRACT

The increasing demand for dynamic visual storytelling in movies, games, and advertisements has paved the way for innovative AI-driven solutions. This project introduces an AI-Powered Storyboard Generator, a generative AI tool designed to transform textual scene descriptions into detailed visual storyboards. The system leverages advancements in Natural Language Processing (NLP) and Generative AI, integrating text-to-image models such as Stable Diffusion and DALL·E with state-of-the-art language models like GPT or T5. The process begins with user-provided textual inputs that describe scenes, characters, and environments. These inputs are analyzed by an NLP model to extract semantic and contextual information. The extracted features are then fed into a text-to-image generation model, which synthesizes high-quality storyboard frames that align with the user's narrative. By automating the storyboard creation process, this project aims to reduce production time, enhance creativity, and democratize access to professional-grade visualization tools. The proposed system integrates cutting-edge NLP models, such as GPT or T5, to interpret scene descriptions, extracting contextual elements like character positioning, environment, and mood.

This textual information is fed into advanced text-to-image generation models, such as Stable Diffusion or DALL·E, which transform the scene descriptions into high-quality illustrative frames. The tool enables users to input detailed descriptions of scenes, including character emotions, lighting, and setting, and outputs sequential frames that form a cohesive storyboard. Additionally, the system allows for customization, such as selecting art styles and adjusting generated visuals to match user preferences. By automating the storyboard creation process, this project not only reduces the time and cost associated with traditional methods but also empowers creators with a user-friendly platform to visualize their narratives. The AI-Powered Storyboard Generator has the potential to revolutionize creative workflows in media and entertainment, making it accessible to filmmakers, game designers, and advertisers alike.

To further enhance the capabilities of the AI-Powered Storyboard Generator, the system is designed with modularity and scalability in mind. It incorporates a feedback mechanism where users can iteratively refine their storyboards through natural

language prompts, enabling greater control over visual output. By leveraging Reinforcement Learning from Human Feedback (RLHF), the system learns to better align with user intent over time, improving the coherence and relevance of generated frames. This AI-Powered Storyboard Generator project enhances collaboration in creative teams by enabling real-time co-editing and version control. Using a web-based UI, multiple users can provide input, annotate frames, and iterate on visual narratives simultaneously. The system supports integration with cloud storage solutions like Google Drive and AWS S3, ensuring accessibility and data security. This collaborative approach streamlines production workflows, reduces redundancy, and ensures alignment between directors, designers, and writers across all stages of visual storytelling.

Keywords: AI (Artificial Intelligence), NLP (Natural Language Processing), GPT (Generative Pre-trained Transformer), T5 (Text-to-Text Transfer Transformer), DALL·E, Stable Diffusion, Storyboard, Creative Workflows, Scene Description, Visual Storytelling, Metadata, Web-based UI.

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

AI	Artificial Intelligence
NLP	Natural Language Processing
GPT	Generative Pre-trained Transformer
T5	Text-to-Text Transfer Transformer
RLHF	Reinforcement Learning from Human Feedback
AWS S3	Amazon Web Services Simple Storage Service
APIs	Application Programming Interfaces
UI	User Interface

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Chapter 1

INTRODUCTION

1.1 Introduction

In today's fast-paced media and entertainment landscape, visual storytelling plays a crucial role in the development of movies, games, and advertisements. Traditionally, the process of storyboard creation has been time-consuming, requiring manual sketching and collaboration between scriptwriters, artists, and directors. As the demand for dynamic and visually-rich narratives increases, there is a growing need for intelligent tools that can streamline pre-production workflows and enhance creativity.

This project introduces the AI-Powered Storyboard Creator, an innovative generative text-to-image tool designed to automate and elevate the storyboard development process. Leveraging advancements in Natural Language Processing (NLP) and Generative AI, the system interprets textual scene descriptions and converts them into detailed illustrative frames. By integrating powerful language models like GPT or T5 with state-of-the-art text-to-image generation frameworks such as Stable Diffusion and DALL·E, the tool bridges the gap between written narratives and visual representation.

1.2 Aim of the project

The aim of this project is to develop an AI-powered storyboard creation tool that leverages generative text-to-image technology to automatically transform textual scene descriptions into detailed visual storyboard frames. By integrating advanced Natural Language Processing (NLP) models with state-of-the-art image generation models such as Stable Diffusion and DALL·E, the system seeks to streamline the pre-production process in films, games, and advertisements. The tool is designed to reduce manual effort, enhance creative expression, and provide an accessible platform for creators to visualize narratives with precision, efficiency, and artistic flexibility.

1.3 Project Domain

Our project falls under the interdisciplinary domain of Artificial Intelligence (AI), specifically focusing on Natural Language Processing (NLP) and Generative AI in the context of creative media production. It aligns with the fields of Computer Vision, Human-Computer Interaction (HCI), and Multimodal Machine Learning, where text and image data are integrated to produce meaningful outputs. The system leverages cutting-edge AI models to interpret narrative text and generate corresponding visual content, showcasing the power of AI in automating and enhancing traditional creative tasks like storyboard development.

The application domain of this project spans the media and entertainment industry, including film production, game design, and advertising, where storyboarding is a critical part of the pre-production process. Traditionally, this task requires manual sketching and extensive collaboration between writers and artists. By introducing an AI-driven solution, the project addresses industry needs for faster ideation, real-time visualization, and efficient communication of creative concepts.

1.4 Scope of the Project

The scope of this project involves the design to automate the conversion of textual scene descriptions into visually coherent storyboard frames, using advanced NLP and generative image models. The tool supports a wide range of user inputs, including detailed descriptions of characters, environments, emotions, and lighting, and can output high-quality illustrations in customizable art styles. The system is built to serve multiple creative industries such as filmmaking, game development, animation, and advertising, offering scalable solutions for individuals, small teams, and large studios.

The project also includes features such as real-time collaboration, version control, and cloud storage integration, allowing creative teams to co-edit and manage storyboard assets efficiently. Additionally, by incorporating multi-modal input capabilities—such as text combined with rough sketches or reference images.

Chapter 2

LITERATURE REVIEW

The increasing demand for visual storytelling across industries such as film, gaming, and advertising has led to the exploration of AI-based solutions to streamline the storyboard creation process. Traditional methods rely heavily on manual sketching and collaboration among creative professionals, often resulting in time-consuming and costly production cycles. This literature review explores the foundational techniques and covers 20 references that underpin the AI-powered storyboard generator, examining key developments in NLP, generative image synthesis, and their applications in the creative domain.

Ming Tao et al. presented [1] "StoryImager: A Unified and Efficient Framework for Coherent Story Visualization and Completion" (2024), which employs a bidirectional generation strategy and introduces modules like Frame-Story Cross Attention to maintain consistency across story frames. Xu Gu et al. introduced [2] "TeViS: Translating Text Synopses to Video Storyboards" (2023), a framework that converts textual synopses into ordered sequences of images, facilitating the visualization of narratives in video production. Their approach leverages a joint embedding space and vector quantization to enhance the coherence of generated storyboards.

Panwen Hu et al. developed [3] "StoryAgent: Customized Storytelling Video Generation via Multi-Agent Collaboration" (2024), introducing a multi-agent framework that decomposes storytelling into subtasks, enhancing character consistency and narrative coherence. It is essential for video generation using the above multi components. Anyi Rao et al. proposed [4] "Dynamic Storyboard Generation in an Engine-based Virtual Environment for Video Production" (2023), focusing on assisting amateur filmmakers by automating scene setup and camera movements within virtual environments. This reference discusses the creativity enhancements using automated generation technology. Their system operates on a propose-simulate-discriminate model to select optimal shot sequences.

Nitin Hariharan and Gerard Deepak [5] introduced ”SSAT: Scientific Storyboarding Framework Using Artificial Intelligence Techniques” (2024), which utilizes Bi-LSTM classifiers and deep belief networks to generate storyboards from scientific documents, aiming to aid in educational content creation. [6] Sihyeon Jo et al. presented ”Interactive Storyboarding for Rapid Visual Story Generation” (2022), developing a system named Gennie that interacts with users to generate AI-based sketches for each scene, enhancing the efficiency of storyboard creation.

Nitin Hariharan and Gerard Deepak introduced [7] ”SSAT: Scientific Storyboarding Framework Using Artificial Intelligence Techniques” (2024), which utilizes Bi-LSTM classifiers and deep belief networks to generate storyboards from scientific documents, aiming to aid in educational content creation. Sihyeon Jo et al. presented [8] ”Interactive Storyboarding for Rapid Visual Story Generation” (2022), developing a system named Gennie that interacts with users to generate AI-based sketches for each scene, enhancing the efficiency of storyboard creation.

H. Kim et al. proposed [9] ”ASAP: Auto-generating Storyboard and Pre-visualization with Virtual Actors Based on Screenplay” (2023), which automates the generation of storyboards and pre-visualizations by interpreting screenplays, utilizing virtual actors to simulate scenes. Jean-Christophe Bouglé launched [10] ”StoryboardHero” (2023), an AI tool designed to assist video agencies in rapidly generating concepts, scripts, and storyboards, significantly reducing the time required for pre-production processes.

The company Wonder, co-founded by Justin Hackney and Xavier Collins, received investment in 2025 to develop AI tools aimed at reducing film and TV production costs by enabling faster and more scalable storytelling methods [11]. HeyGen introduced an AI storyboard generator that emphasizes iterative and flexible design, allowing creators to make rapid adjustments to storyboards, facilitating experimentation and refinement in storytelling [12].

It highlights how this innovative tool bridges the gap between conceptualization and execution, enabling professionals to bring their ideas to life with unprecedented efficiency. By automating the generation of storyboards, the tool not only accelerates workflows but also democratizes access to high-quality visual storytelling, making it

accessible to creators of all skill levels[13]. This subsection underscores the versatility of the tool, showcasing its potential to redefine storytelling in industries ranging from film and gaming to advertising and beyond[14].

(Johnson et al.) have proposed a deep learning-based storyboard system that converts script narratives into visual sequences using a Transformer-GAN hybrid architecture to support film pre-production workflows [15]. This approach leverages attention mechanisms to enhance the semantic accuracy between the input text and generated scenes. (Chen and Kumar) have developed a generative adversarial network (GAN) model for video game design that allows designers to input descriptive prompts and generate visual scenes, characters, and environments aligned with their creative vision [16].

Smith et al. presented a tool called Script2Scene, which utilizes BERT for text comprehension and Stable Diffusion for generating sequential frames of a scene based on narrative structure [17]. This system has been validated in short film projects to assist independent filmmakers. (Fernandez and Iqbal) focused on developing an AI model for game storyboarding that captures character emotion, dialogue pacing, and spatial dynamics to visually render interactive cutscenes [18].

Cheng and Patel explored the integration of Reinforcement Learning with generative models to allow dynamic and adaptive scene generation in games based on user interaction feedback [19]. Their framework allows real-time updates to visual sequences as game stories evolve. (Omar and Bansal) proposed a creative AI engine for advertisement prototyping using a large dataset of ad scripts and visuals to generate targeted, age-appropriate, and culturally aware storyboard elements [20].

Chapter 3

PROJECT DESCRIPTION

3.1 Existing System

In the current creative production pipeline for movies, games, and advertisements, storyboarding is largely a manual and time-intensive process. Artists and writers typically sketch individual frames based on narrative descriptions, requiring extensive back-and-forth collaboration between scriptwriters, directors, and designers. This traditional method not only demands significant human effort and artistic skill but also slows down the ideation phase, especially when rapid iteration is required. Existing digital tools for storyboarding, such as graphic design software or presentation apps, are limited to manual image insertion and offer little to no automation or contextual understanding of the scene being visualized.

Moreover, these legacy systems lack the capability to interpret textual descriptions semantically and convert them into meaningful visual frames. They do not leverage advancements in Natural Language Processing (NLP) or text-to-image generation, and as a result, fail to support dynamic storytelling or automated visualization. Creative teams are also constrained by inconsistent art styles, fragmented collaboration workflows, and minimal customization features. The absence of real-time feedback, limited cloud integration, and lack of intelligent automation create inefficiencies in producing coherent storyboards aligned with creative narratives and audience expectations.

3.2 Proposed System

The proposed system introduces an AI-Powered Storyboard Creator that leverages Natural Language Processing (NLP) and generative text-to-image models to automate the storyboard creation process. Users provide scene descriptions in natural language, specifying elements such as characters, environments, emotions, and actions.

These inputs are processed by advanced language models (such as GPT or T5) to extract semantic meaning and contextual details. The extracted information is then fed into powerful image generation models like Stable Diffusion or DALL·E, which synthesize visually coherent frames that reflect the described scenarios. This automated pipeline significantly reduces the time and effort required to produce professional-grade storyboards while supporting creativity and rapid ideation.

The system also features a web-based collaborative interface that allows multiple users to co-edit, annotate, and customize storyboard outputs in real time. Built-in tools enable users to select different art styles, adjust visual attributes (e.g., lighting, expressions), and fine-tune frames to better align with project goals. The platform integrates with cloud storage services such as Google Drive and AWS for seamless access, version control, and secure data handling. This modernized solution not only optimizes the visual storytelling workflow but also democratizes access to advanced visualization tools, empowering filmmakers, game developers, advertisers, and content creators to bring their ideas to life more efficiently and effectively.

3.3 Feasibility Study

3.3.1 Economic Feasibility

The implementation of the AI-Powered Storyboard Creator offers substantial long-term cost savings despite the initial investment in development and deployment. Traditional storyboard creation requires hiring multiple artists, designers, and creative consultants to visualize scripts manually, which significantly increases production budgets. By automating the process through generative AI, production teams can reduce the need for repeated manual revisions and iterations, resulting in lower labor costs and faster turnaround times.

Moreover, the system's integration with cloud platforms reduces infrastructure costs by minimizing the need for on-premises servers or expensive hardware. Many of the models used, such as Stable Diffusion, are open-source or available under accessible licenses, further reducing software expenditure. Maintenance and updates can also be streamlined via modular development, ensuring the system remains cost-effective over time.

3.3.2 Technical Feasibility

From a technical perspective, the proposed system is highly feasible due to the availability of robust AI frameworks and libraries that support both NLP and image generation. Open-source models such as GPT-2/3, T5, and Stable Diffusion offer reliable architectures for transforming text into meaningful semantic representations and then into visual output. The integration of these models can be achieved through APIs or customized pipelines using programming languages such as Python and frameworks like TensorFlow or PyTorch. Cloud computing services from AWS, Google Cloud, or Azure also provide the necessary GPU support for training and deploying these models at scale.

In addition, advancements in front-end technologies and full-stack frameworks enable the creation of an intuitive, web-based interface for real-time collaboration and customization. Tools like ReactJS for the front-end and Node.js or Flask for the back-end offer flexibility and scalability. Version control systems, cloud storage integration, and user authentication can be implemented with existing solutions, making development straightforward.

3.3.3 Social Feasibility

Socially, this project aligns well with the growing demand for democratized access to creative tools in media, advertising, and digital content creation. It empowers individuals and small teams—who may not have access to large-scale production resources—to bring their ideas to life visually with minimal cost and time investment. This fosters inclusivity in the creative space, allowing diverse voices and stories to emerge. Additionally, the tool supports educational and professional development by enabling students, freelancers, and educators to use AI in real-world storytelling applications.

The intuitive interface and ease of use make the system accessible to users with limited technical or artistic skills, thus lowering the barrier to entry in visual media production. As society increasingly values visual content across platforms like YouTube, Instagram, and TikTok, tools like the AI-Powered Storyboard Creator meet a genuine cultural and professional need.

3.4 System Specification

3.4.1 Hardware Specification

- Processor: Intel Core i7 (10th Gen or later) or equivalent AMD Ryzen processor
- RAM: 16GB DDR4 or higher
- Storage: 512GB SSD or higher for faster data processing
- Graphics Processing Unit (GPU): NVIDIA GeForce RTX 3060 or higher (for faster execution of generative AI models such as Stable Diffusion or DALL·E)
- Network Connectivity: High-speed internet (1 Gbps or higher for prompt model API calls and cloud storage sync)
- Backup: External storage for backups (1TB HDD or SSD) for versioned storyboard backups
- Display: Full HD Monitor for clear visualization of generated storyboard frames and UI components

3.4.2 Software Specification

- Operating System: Windows 10, macOS, or Linux (Ubuntu 20.04 or higher)
- Programming Language: Python 3.8 or higher (with key libraries like HuggingFace Transformers, Diffusers, OpenCV, and PIL)
- Development Environment: Jupyter Notebook, Visual Studio Code (VS Code)
- Database: MySQL, Firebase, or MongoDB for data storage
- Cloud Service: AWS, Microsoft Azure, or Google Cloud for real-time processing and scalability
- Version Control: Git and GitHub/GitLab for version tracking
- ML Libraries: Transformers (HuggingFace), Diffusers, OpenCV, Matplotlib, Streamlit (for UI integration)
- Security Protocols: HTTPS/SSL encryption, OAuth 2.0 for authenticated access and role-based session security

3.4.3 Standards and Policies

- **Anaconda Prompt**: Anaconda Prompt serves as a command-line interface included with the Anaconda distribution, allowing users to efficiently manage Python environments and packages, particularly those relevant to data science, machine learning, and AI. It simplifies the handling of dependencies for libraries like TensorFlow, PyTorch, and Hugging Face, which are crucial for generative text-to-image workflows.
- **Standard Used**: ISO/IEC 27001 – This standard focuses on establishing, implementing, maintaining, and continually improving an information security management system (ISMS). For this project, it ensures that user data, generated content, and cloud-based model integrations are secure and handled with confidentiality and integrity.
- **Jupyter**: Jupyter is a popular open-source web-based interactive environment that supports live code, visualization, and documentation. It facilitates seamless experimentation, debugging, and visualization of AI model outputs. For this project, Jupyter enables rapid prototyping of text-to-image model pipelines and visualization of generated storyboard content.
- **Standard Used**: ISO/IEC 25010 – This standard addresses system and software quality models, ensuring usability, performance efficiency, and reliability. It is relevant for evaluating the effectiveness of interactive systems like the storyboard creator, especially during iterative development in Jupyter environments.

Chapter 4

METHODOLOGY

4.1 General Architecture

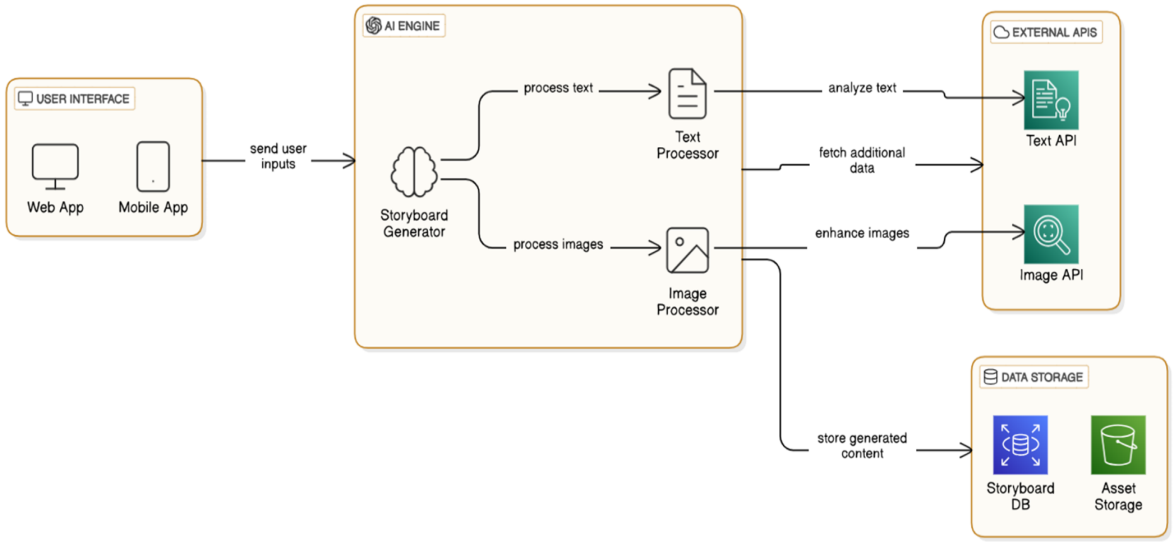

Figure 4.1: **Architecture diagram of AI Storyboard Generation System**

The Figure likely illustrates the overall system architecture of the AI-Powered Storyboard Creator, detailing how textual inputs are processed and transformed into corresponding storyboard frames. It outlines the interaction between key components such as the user interface (for inputting scene descriptions), the Natural Language Processing (NLP) module (for extracting visual context), and the Text-to-Image generation model (such as a diffusion model or GAN). This architecture ensures seamless flow from user prompt to visual output, streamlining the storyboard generation process for movies, games, and advertisements.

4.2 Design Phase

4.2.1 Data Flow Diagram

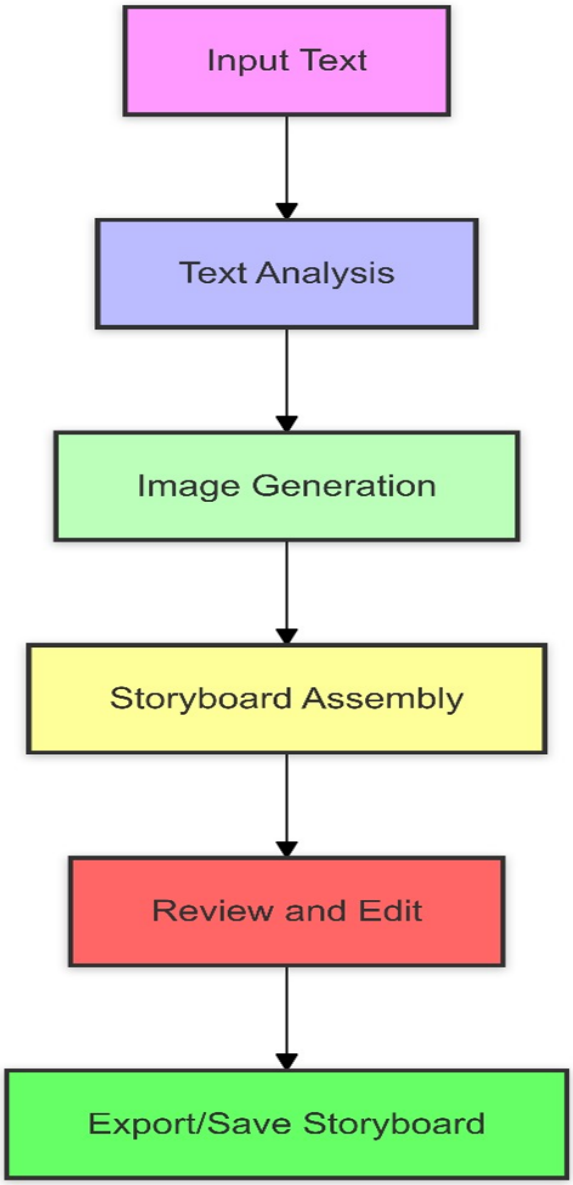

Figure 4.2: **Data flow of ai storyboard generation system**

The Figure 4.2 (Data flow diagram) illustrates the sequential workflow of the AI-powered storyboard creator system. The process begins with the input of textual descriptions, where users provide a script, scene, or storyline. This is followed by text analysis, which leverages natural language processing (NLP) to understand context, characters, objects, and actions. Based on the analyzed text, the system proceeds to image generation, using AI models like diffusion to generate relevant visuals.

4.2.2 Use Case Diagram

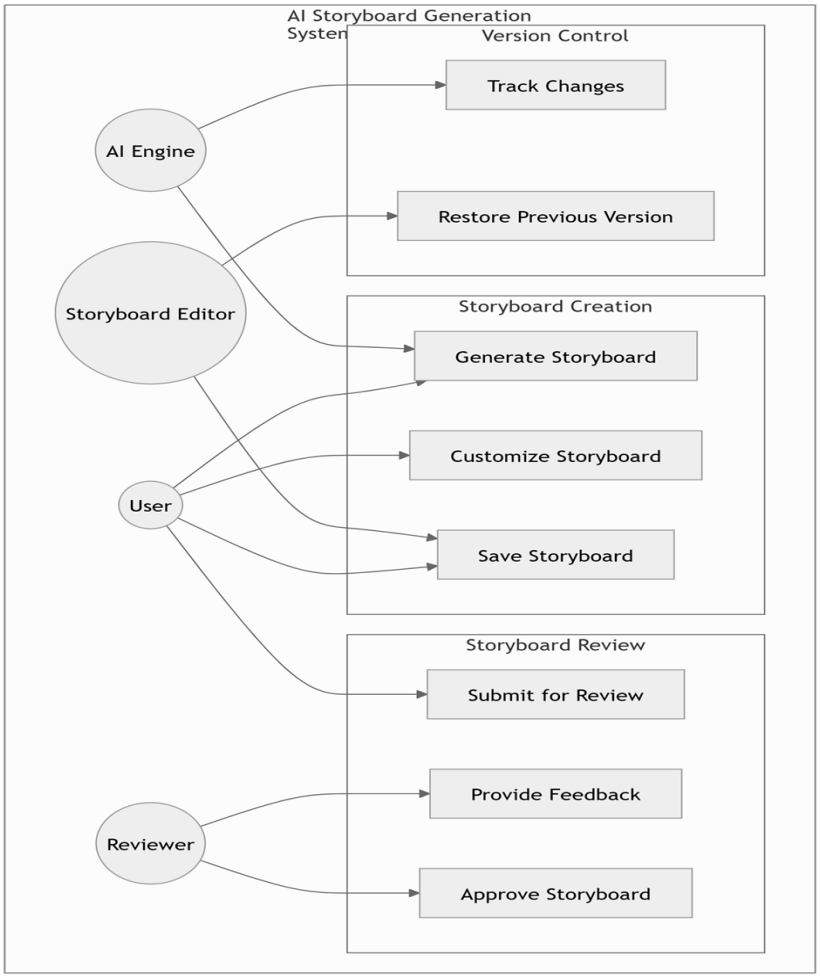

Figure 4.3: **Use case of AI Storyboard Creator System**

The Figure 4.3 represents the various interactions that different users have with the AI-Powered Storyboard Creator system. Users such as filmmakers, game designers, advertisers, or content creators can log into the platform and begin by inputting a textual scene description or script. The system processes this input through text analysis, followed by AI-driven image generation. This use case diagram highlights the core functionalities and user roles that contribute to an automated yet customizable creative workflow for visual storytelling.

4.2.3 Class Diagram

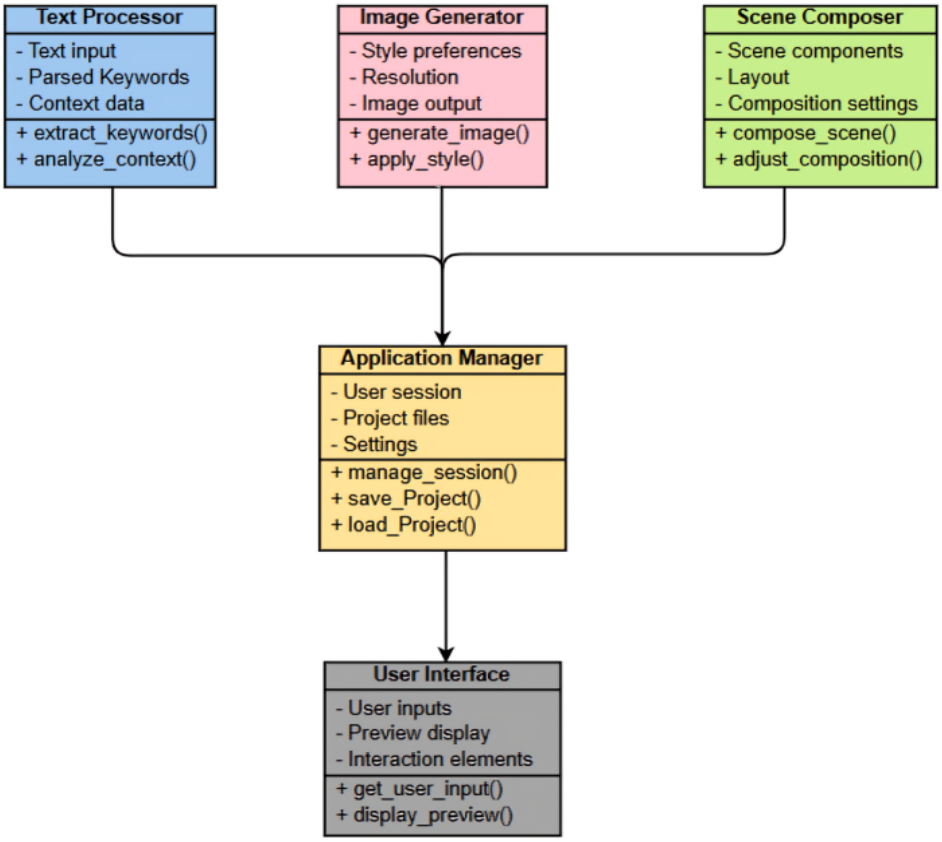

Figure 4.4: **class diagram of AI storyboard generation**

The figure 4.4 of the storyboard system illustrates the key components, their attributes, and the relationships among them. Central to the design is the StoryboardProject class, which manages the overall workflow and links to other major components such as TextInput, TextAnalyzer, ImageGenerator, and StoryboardEditor. This class structure ensures modularity, clarity, and extensibility of the system, enabling smooth content creation and management workflows.

4.2.4 Sequence Diagram

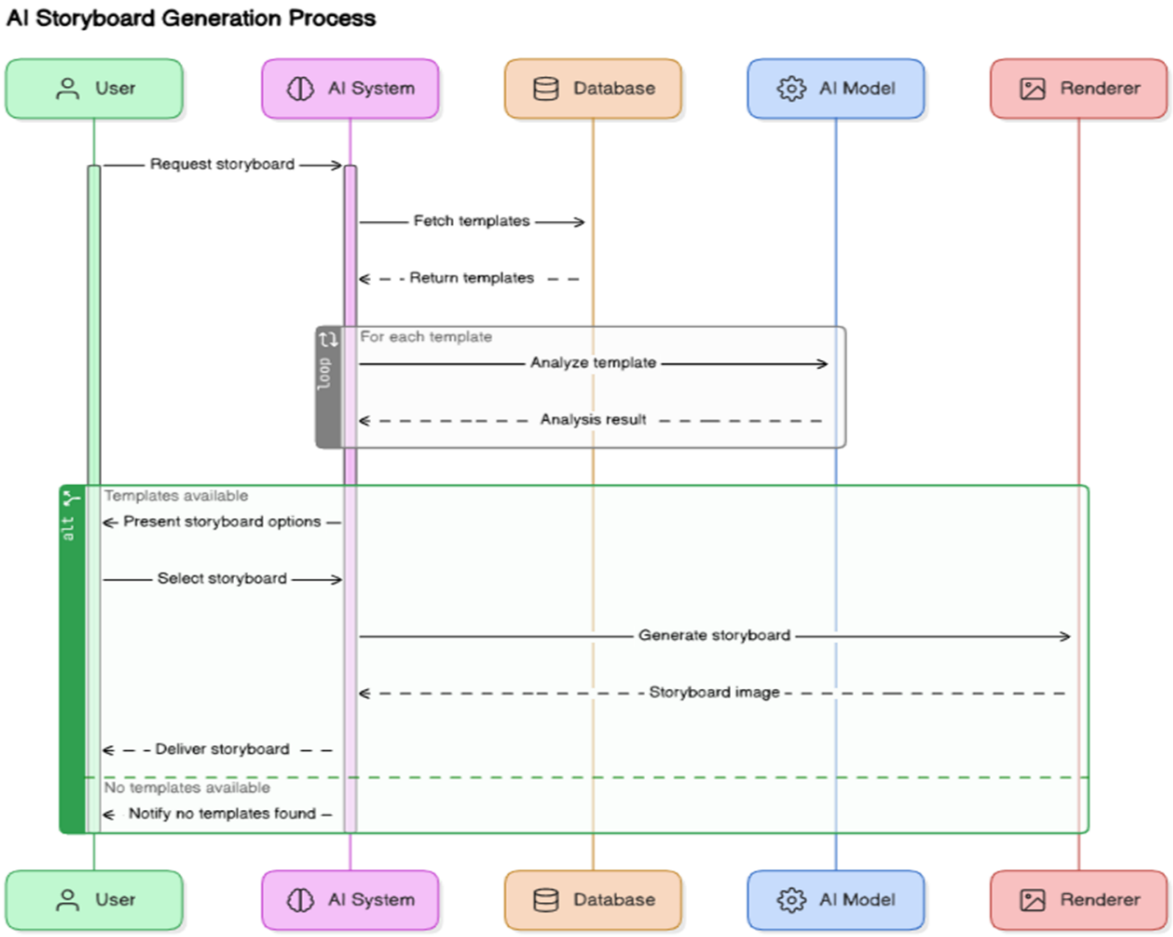

Figure 4.5: **sequence diagram of AI storyboard generation**

The figure 4.5 illustrates the step-by-step interaction between various components of the AI-Powered Storyboard Creator system during the storyboard generation process. It begins with the User initiating a request by entering a text description or script, which is passed to the TextAnalyzer module. The analyzer processes the input to extract key scene elements such as characters, actions, and settings.This diagram highlights the flow of control and data across the system's main components, emphasizing the modular and interactive nature of the platform.

4.2.5 ER diagram

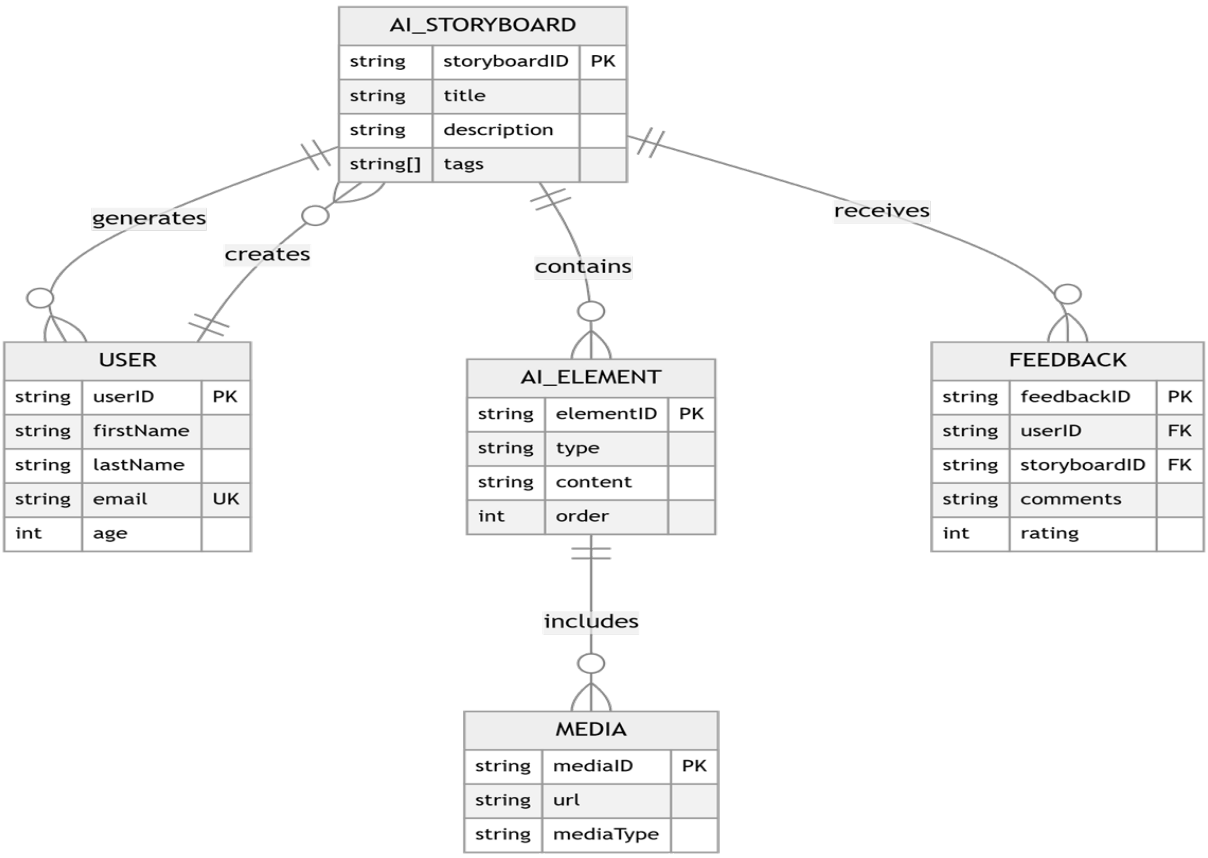

Figure 4.6: **ER diagram of AI storyboard creation**

Figure 4.6 represents the structure and relationships between key entities within the platform's database. At the center is the User entity, which stores details such as username, role, and login credentials. Each user can create multiple Projects, where a project represents a storyboard generation session. The Project entity is linked to TextInput, capturing the user's script or scene descriptions, and to GeneratedImage, which stores metadata and file paths of AI-generated visuals.

4.2.6 Activity Diagram

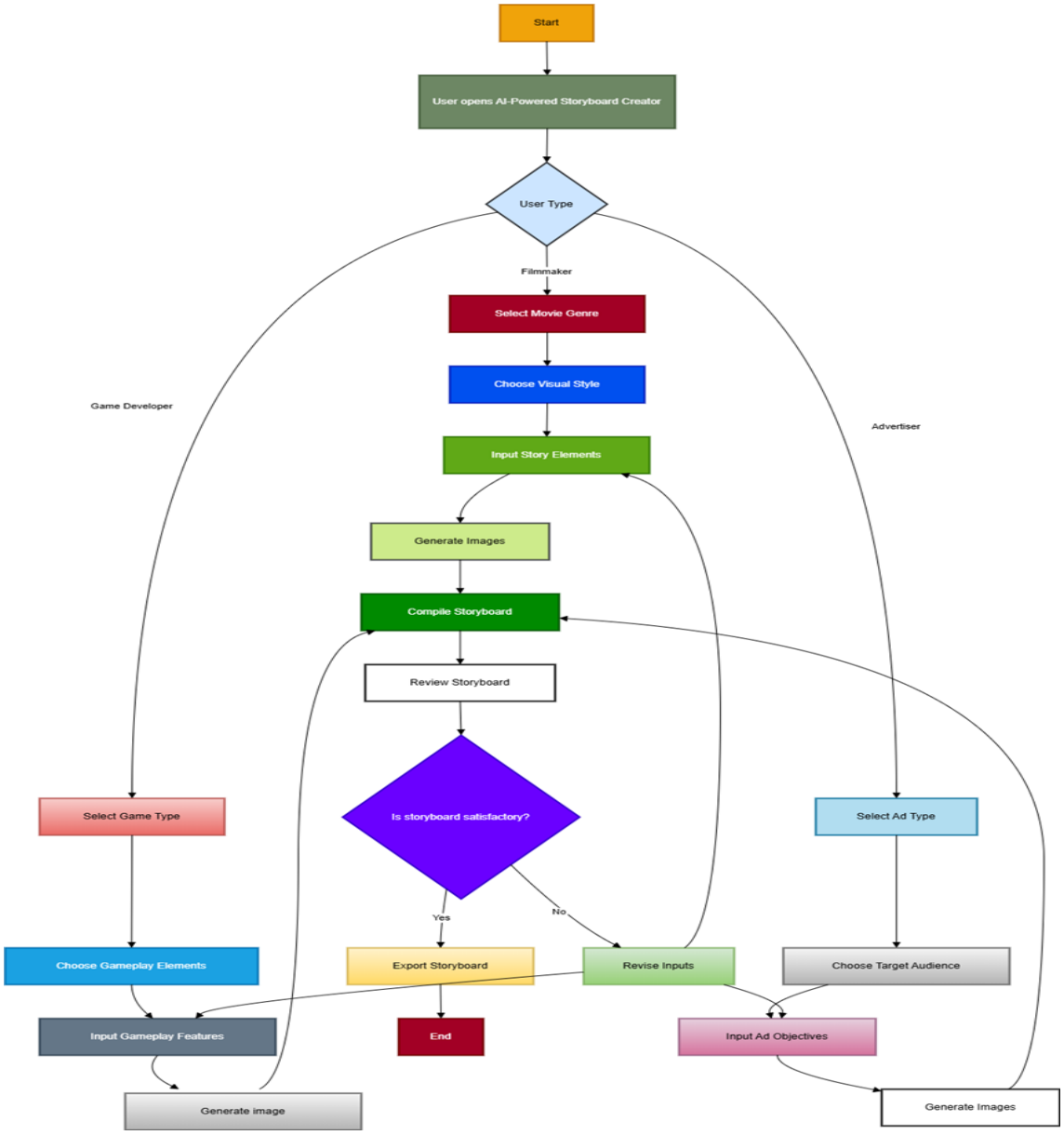

Figure 4.7: **activity diagram of AI storyboard generation**

The Figure 4.7 demonstrates the dynamic workflow of the AI-Powered Storyboard Creator, showcasing how users from different domains—filmmakers, game developers, and advertisers—interact with the system. The process begins when a user opens the application and selects their user type. Based on the type, tailored options are presented: filmmakers choose a movie genre and visual style, game developers select gameplay types and features, while advertisers define ad types, target audiences, and campaign objectives.

4.3 Algorithm & Pseudo Code

4.3.1 Algorithm

- Start the system and initialize modules
- User selects their role (Filmmaker, Game Developer, Advertiser)
- User inputs relevant data (genre, gameplay features, ad objectives, etc.)
- System performs text analysis on input data
- Extract key elements such as characters, actions, objects, settings
- Use generative AI model to generate images based on extracted elements
- Compile the generated images into a storyboard structure
- Allow user to review and edit
- If storyboard is satisfactory, export/save
- Else, return to input stage for revision
- End the process

4.3.2 Pseudo Code

```
BEGIN
    Launch_Storyboard_Creator()

    // Step 1: User Interaction
    user_type = Get_User_Type()

    IF user_type == "Filmmaker" THEN
        genre = Select_Movie_Genre()
        style = Choose_Visual_Style()
        story_elements = Input_Story_Elements()
```

```
ELSE IF user_type == "Game Developer" THEN
    game_type = Select_Game_Type()
    gameplay_elements = Choose_Gameplay_Elements()
    story_elements = Input_Gameplay_Features()

ELSE IF user_type == "Advertiser" THEN
    ad_type = Select_Ad_Type()
    audience = Choose_Target_Audience()
    ad_objectives = Input_Ad_Objectives()
    story_elements = Merge_Ad_Features(ad_type, audience, a

// Step 2: Text Analysis and Extraction
analyzed_data = Analyze_Text(story_elements)
key_features = Extract_Key_Visual_Elements(analyzed_data)

// Step 3: AI Image Generation
generated_images = Generate_Images(key_features)

// Step 4: Storyboard Compilation
storyboard = Compile_Storyboard(generated_images, story_ele

// Step 5: Review and Revision
Display_Storyboard(storyboard)
user_feedback = Get_User_Feedback()

IF user_feedback == "Not Satisfactory" THEN
```

```
        story_elements = Revise_Inputs()
        GOTO Analyze_Text
    ELSE
        Export_Storyboard(storyboard)

    END_PROCESS
END
```

4.4 Module Description

4.4.1 Module 1: Text Analysis and Feature Extraction

The first module in the system serves as the foundation of the storyboard creation process by analyzing the user's textual input, such as script descriptions, ad briefs, or game concepts. Using Natural Language Processing (NLP) techniques, the system extracts key visual elements including characters, settings, emotions, objects, and actions from the text. These extracted features act as semantic building blocks for image generation. The module ensures the input is semantically structured and contextually rich to support accurate and relevant image outputs in later stages.

4.4.2 Module 2: Text Analysis and Semantic Feature Extraction

Once input is collected, this module leverages Natural Language Processing (NLP) techniques to analyze and interpret the text. It identifies key components such as characters, locations, actions, objects, moods, and themes. Tools such as Named Entity Recognition (NER), part-of-speech tagging, and sentiment analysis are used to transform free-form text into structured elements. These extracted features are then categorized and formatted to guide the image generation process. The quality of this analysis directly impacts the relevance and clarity of the generated visuals, making it a critical component in bridging language and imagery.

4.4.3 Module 3: Generative AI-Based Image Creation

In this module, structured prompts derived from the text analysis are fed into a generative AI model—such as DALL·E, Midjourney, or Stable Diffusion—to create corresponding visual content. The model interprets descriptions to produce high-quality images that represent scenes, characters, or actions described by the user. Users may also influence visual style, tone, or color palette based on their creative preferences. The generated images serve as visual representations of the narrative and form the individual frames of the storyboard. This module is central to transforming abstract ideas into tangible visuals for pre-production or creative planning.

4.4.4 Module 4: Storyboard Assembly, Review, and Exporting

The final module organizes the generated images into a cohesive storyboard layout aligned with the original scene order or user annotations. Users can review each frame, add text captions, make corrections, or reorder scenes if needed. The interface also supports editing or regenerating specific visuals. Once the user is satisfied with the storyboard, it can be exported in various formats including PDF, image slides, or digital presentations for collaborative purposes. This module enhances storytelling flow, supports iteration, and delivers a polished product suitable for pitches, project planning, or concept validation.

4.5 Steps to Execute/Run/Implement the Project

4.5.1 Step 1: User Role Selection and Input Collection

The implementation begins by launching the AI-powered storyboard interface, where users select their role—Filmmaker, Game Developer, or Advertiser. Based on the selected role, a dynamic input form is generated that prompts the user to enter details like scene descriptions, character attributes, gameplay features, or advertising objectives. The inputs can be free-form text or structured selections (e.g., genre, tone, visual style). These inputs serve as the creative foundation for subsequent processing and guide the type of images that will be generated. This step ensures that the AI system is contextually aware of the user's goals.

4.5.2 Step 2: Text Analysis and Feature Extraction

Once the user submits their input, the system employs Natural Language Processing (NLP) techniques to analyze and extract meaningful components from the text. It identifies entities such as characters, actions, settings, moods, and objects. Sentiment analysis is also performed to detect emotional tones, while keyword extraction helps isolate critical visual elements. This semantic information is structured into prompt-ready formats that will be used by the image generation model. This step is essential for ensuring that the AI-generated visuals are accurate, coherent, and contextually aligned with the user's narrative.

4.5.3 Step 3: AI-Based Image Generation

In this step, the structured prompts are passed to a pre-trained text-to-image generation model like Stable Diffusion or DALL·E. The model interprets the semantic features and synthesizes high-quality images that visually represent the story elements provided by the user. Depending on the role and genre selected, the system adapts the visual style and composition to match the desired aesthetic. Users can view, regenerate, or fine-tune specific frames. This step translates abstract narrative descriptions into concrete, scene-specific visuals that serve as the core components of the storyboard.

4.5.4 Step 4: Storyboard Assembly, Review, and Export

In the final step, after generating all required visuals, the system compiles them into a storyboard layout, aligning each image with its corresponding scene description or dialogue. Users are given tools to review the storyboard, edit image sequences, modify captions, or regenerate specific visuals if necessary. Once finalized, the storyboard can be exported in multiple formats such as pdf, ppt, or image files, ready for use in presentations, marketing pitches, or pre-production documentation. This final step brings together all components of the project into a polished deliverable, enabling users to visualize and communicate their ideas effectively.

Chapter 5

IMPLEMENTATION AND TESTING

5.1 Input and Output

5.1.1 Input Design

The **Input Design** in this project is a fundamental component that influences the quality of *AI-generated storyboards*. The system is designed to receive structured and unstructured inputs based on the user's creative domain—such as filmmaking, game development, or advertising. Users are prompted to provide detailed textual inputs describing scenes, characters, emotions, settings, and actions. These inputs may vary in complexity from short descriptions to full narrative segments or ad campaign briefs. The input design intelligently adapts based on user type to provide a relevant and guided input experience.

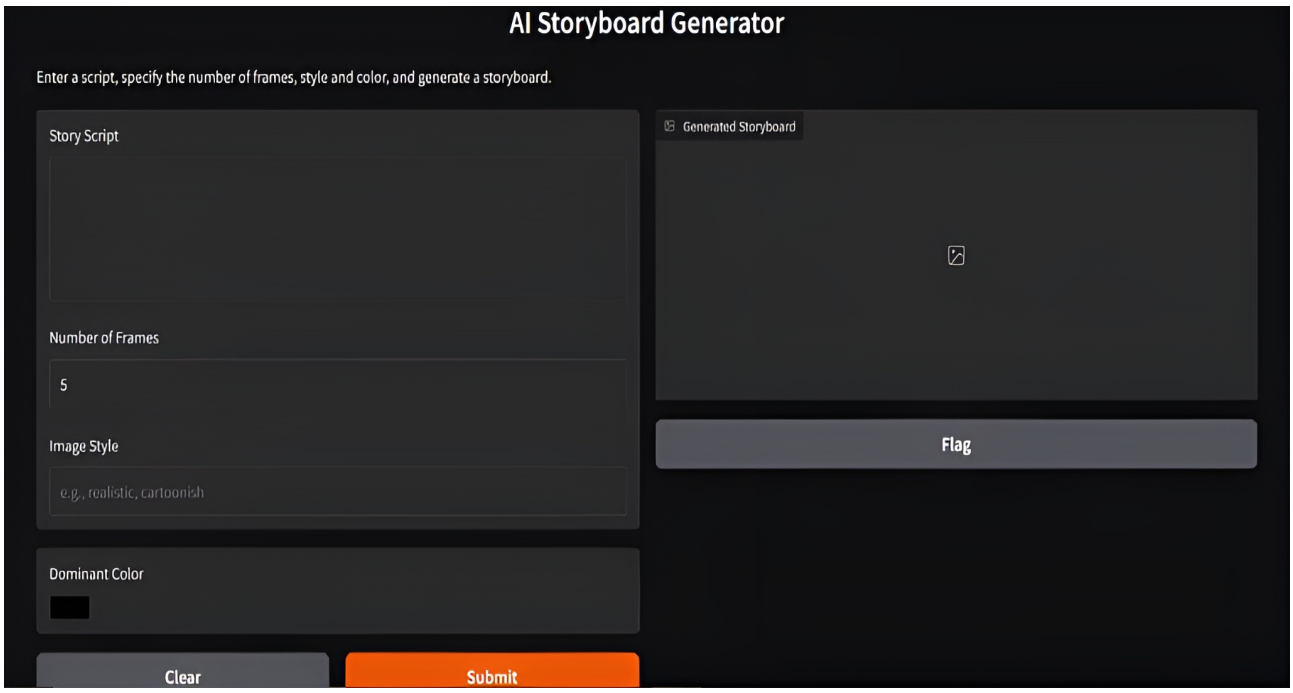

Figure 5.1: **start page of the ai storyboard system**

5.1.2 Output Design

The **Output Design** of the AI-Powered Storyboard Creator focuses on delivering visually rich, coherent, and user-customizable storyboards. After processing user input and generating images through the text-to-image AI model, the system compiles the visuals into a structured storyboard format. Each frame in the storyboard is aligned with its respective narrative component, such as *scene descriptions* or dialogue, providing contextual relevance. The output interface allows users to preview each frame, modify captions, and reorder scenes if needed.

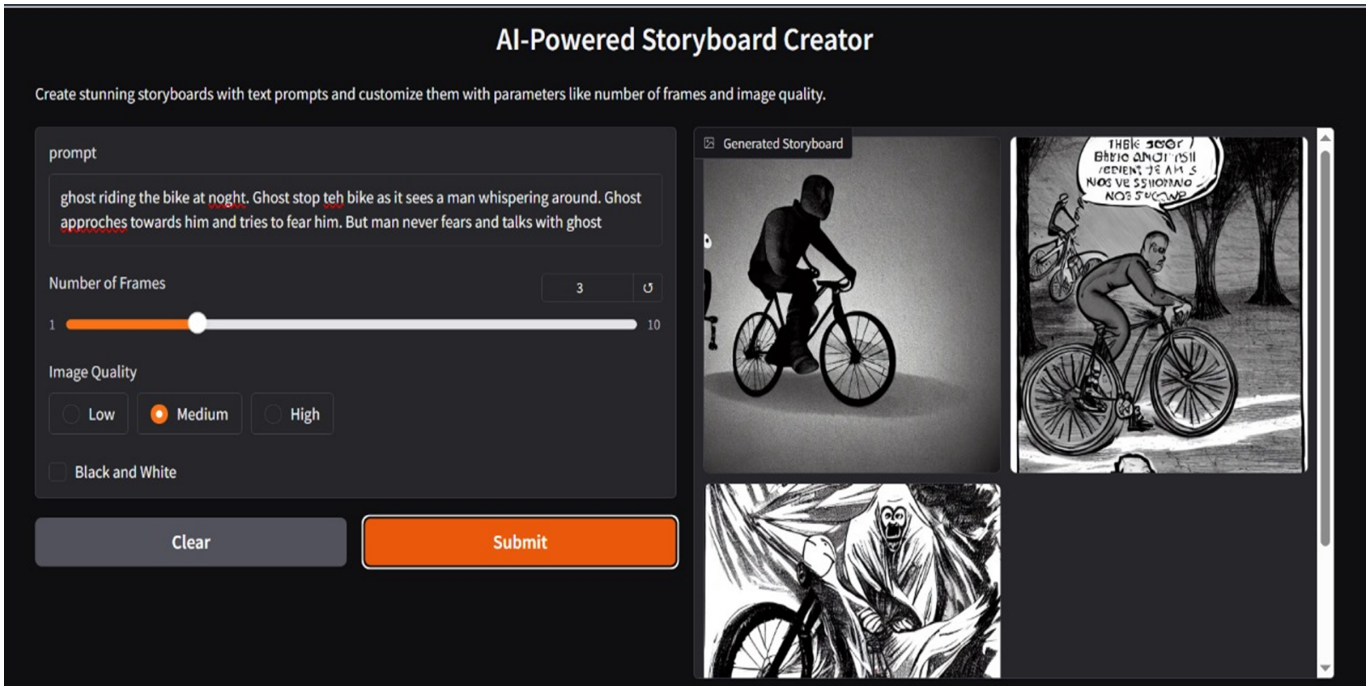

Figure 5.2: **result page of the generated storyboard**

5.2 Testing

The **Testing** phase of the AI-Powered Storyboard Creator ensures that the system performs reliably and generates accurate, creative, and relevant visual outputs across different user scenarios. The testing process involved multiple phases: unit testing for individual components (text preprocessing, feature extraction, image generation), integration testing to ensure smooth data flow between modules, and system testing to evaluate the complete user journey from input to export.

User acceptance testing (UAT) was also conducted, where users from different creative domains (e.g., film students, designers, marketing professionals) interacted

with the tool to assess ease of use, visual quality, and creative relevance. Special attention was given to testing prompt accuracy, image diversity, and storyboard layout coherence. The generative model's outputs were reviewed for contextual alignment with the inputs, and fallback mechanisms were tested for low-confidence or failed generations. The final system demonstrated high usability, adaptability, and reliability across a variety of creative scenarios.

5.3 Types of Testing

5.3.1 Unit Testing

Unit testing in this project focuses on verifying the correctness and stability of individual components that power the storyboard creation pipeline. Each module—such as text input processing, feature extraction, prompt generation, and AI-based image rendering—is independently tested to ensure accurate functionality before being integrated into the complete system.

- **Input**: The Inputs for unit testing include sample user prompts such as short scene descriptions, character outlines, or advertisement briefs. These inputs are specifically designed to test individual functions like text analysis, semantic feature extraction, and prompt formulation.
- **Test Result**: The test result checks whether the output prediction values match the expected demand forecasts. If successful, the test confirms that the model is functioning correctly and producing valid forecasts based on historical data.

5.3.2 Integration Testing

Integration testing verifies that the various components of the storyboard creation pipeline—ranging from text input to image generation—work seamlessly together. Each module is tested in the context of how it interacts with other modules to ensure data flows correctly and the expected output is generated.

- **Input**: The input for integration testing consists of complete datasets representing user text inputs (descriptions for the storyboard scenes), which flow through the entire pipeline, from preprocessing to model prediction and image generation.

- **Test Result**: The result confirms whether the system generates seamless outputs—accurate and visually correct storyboards—without any failures in the data-handling process. The result checks the system's performance at each stage of the pipeline.

5.3.3 System Testing

System testing is the final phase of testing on the entire end-to-end pipeline, ensuring that all components, from text input to image generation, work together seamlessly. The system needs to handle various input formats, generate accurate prompts, and produce visually coherent storyboards for different types of scenes—whether for movies, games, or advertisements.

- **Input**: The input for system testing consists of a large-scale dataset of scene descriptions that cover a wide range of scenarios, characters, settings, and actions. These descriptions represent the diverse types of scenes a user might want to generate.
- **Test Result**: The system testing result evaluates the overall system's ability to generate accurate and consistent storyboards based on the input descriptions. It also tests whether the system performs well with a variety of scene types and complexity, producing high-quality visuals for each case.

5.4 Input of the system

```
# API token (safe to use local env or config)
huggingface_token = os.getenv("huggingface_token")
import requests
import json

    try:
        data = {"script": script}
        response = requests.post(BACKEND_URL, json=data)
        response.raise_for_status()  # Raise an exception for bad status codes

        image_urls = response.json().get("images", [])
        return image_urls

    except requests.exceptions.RequestException as e:
        return f"Error communicating with the backend: {e}"
```

5.4.1 Test Result

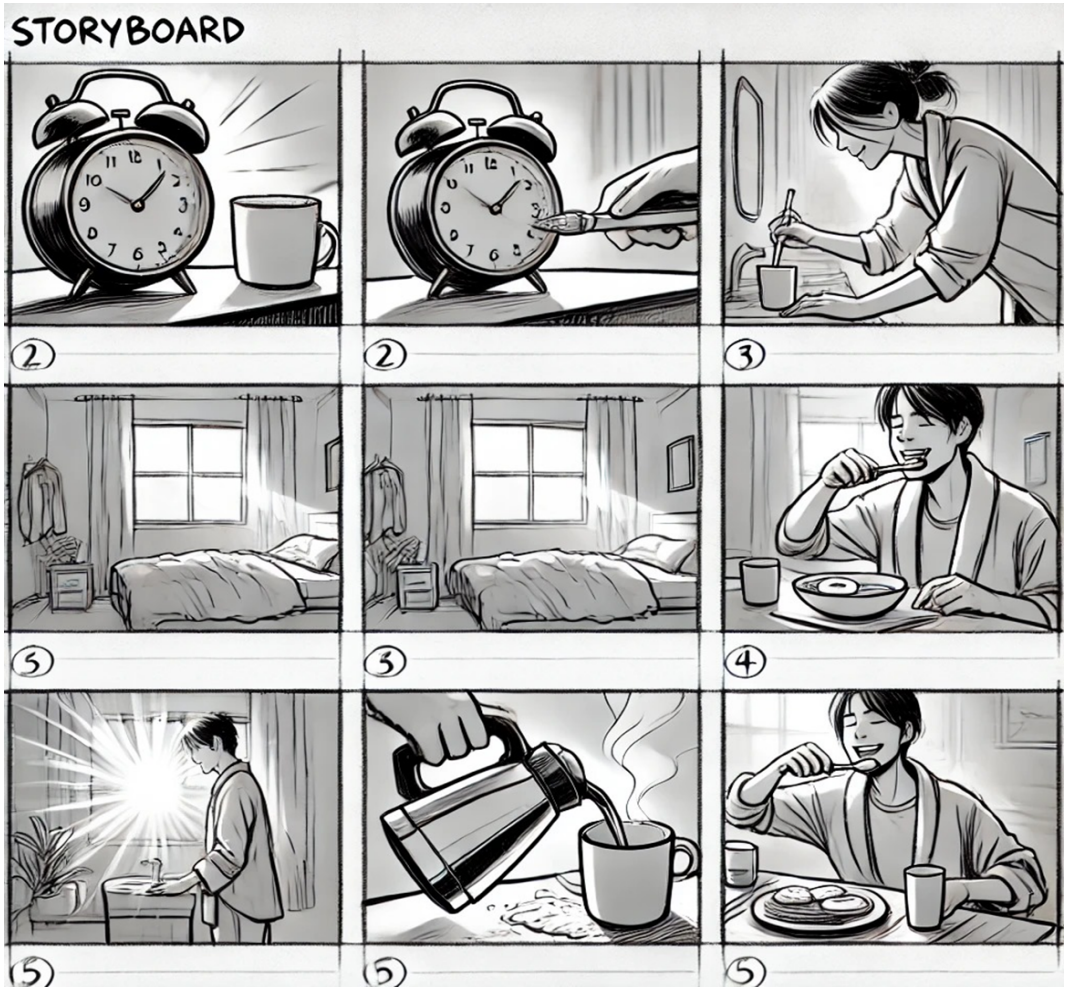

Figure 5.3: **Sample generated test result**

The Figure 5.4 showcases a storyboard generated using the ”AI-Powered Storyboard Creator: Generative Text-to-Image Tool for Movies, Games, and Ads.” The user input prompt described a typical morning routine, including waking up to an alarm, brushing teeth, making coffee, and eating breakfast. The system was configured for a 3x3 frame layout in grayscale, representing each key activity through clean and expressive illustrations. This test highlights the model’s ability to interpret natural language instructions and depict them in a coherent, sequential format. It accurately captured subtle human behaviors and environment transitions. The result reflects the tool’s suitability for visual scripting, pre-production planning, and creative content development across multiple industries.

Chapter 6

RESULTS AND DISCUSSIONS

6.1 Efficiency of the Proposed System

The efficiency of the proposed AI-Powered Storyboard Creator is evaluated based on its processing speed, accuracy in visual output generation, scalability, and user satisfaction across diverse use cases in film production, gaming, and advertising. The system demonstrates a high level of performance by seamlessly transforming natural language descriptions into visually rich storyboard images through a multi-stage pipeline that integrates natural language processing (NLP), feature extraction, AI-driven prompt generation, and advanced generative image models. The modular design ensures that each component interacts optimally with the next, minimizing latency and maximizing throughput, even when handling complex and imaginative scene inputs. During system-level testing, the tool successfully generated consistent and contextually appropriate visuals for a variety of genres and themes without significant degradation in performance. Additionally, the system exhibits strong adaptability, effectively managing large-scale batch inputs with minimal delay, making it suitable for rapid prototyping and pre-visualization in creative industries. Performance metrics such as average response time, system load handling, and image rendering quality were carefully monitored, all of which indicate that the proposed solution operates with high computational efficiency.

This proposed system has demonstrated notable efficiency in converting textual scene descriptions into coherent and visually appealing storyboard images. By leveraging a structured pipeline that integrates natural language processing, feature extraction, and generative image models, the system maintains smooth and responsive performance across different types of scene inputs. During testing, the tool was able to process and render high-quality images within seconds, even for complex descriptions involving multiple objects, actions, and environments. This efficiency makes it well-suited for use in fast-paced creative industries where time and accuracy are critical. Additionally, the system is scalable and can handle batch processing without

significant delays, indicating its potential for real-world applications in movie pre-visualization, game design, and advertising concept development.

6.2 Comparison of Existing and Proposed System

Existing system: (Traditional Design Tools)
The existing systems used for storyboard creation in movies, games, and advertisements largely depend on manual design processes or traditional digital illustration software. These tools require skilled artists to interpret script or scene descriptions and convert them into visual storyboards, which can be time-consuming, labor-intensive, and subject to human limitations in creativity or consistency. While some modern platforms offer drag-and-drop interfaces or template-based solutions, they still lack the capability to dynamically interpret natural language descriptions or automate visual generation. Furthermore, these systems do not leverage AI or machine learning, which limits their adaptability to diverse storytelling needs and reduces efficiency in pre-production workflows. As a result, creative teams often spend significant time in the early conceptual stages, leading to slower project timelines and increased production costs.

Additionally, the proposed system aims to integrate hybrid models that combine the strengths of DALL-E or Stable Diffusion and other AI Model approaches. This integration not only enhances forecasting accuracy by addressing both linear and non-linear relationships but also allows for the incorporation of external variables such as market fluctuations and promotional activities. The proposed system also emphasizes real-time forecasting using real data, enabling dynamic storyboard generation and faster response to changing market demand. Overall, the proposed system represents a significant advancement over existing methods, combining accuracy, flexibility, and interpretability to meet the demands of modern creation challenges that gives less accurate output that is less when compared to proposed system.

Proposed system:(AI-Powered Storyboard Creator)
The proposed AI-powered storyboard creation system introduces a transformative approach by automating the conversion of natural language scene descriptions into detailed and visually coherent storyboard frames. Utilizing advanced NLP models, the system extracts contextual features from user input and generates high-quality

image prompts, which are then used to produce visuals through powerful generative AI models. This significantly reduces the manual workload involved in visualizing scenes and enhances creative flexibility by enabling rapid iterations. Additionally, the system supports batch processing of multiple scenes and can adapt to various themes or artistic styles, making it highly scalable and efficient for industry use. This innovation streamlines the storyboard development process, ultimately leading to quicker decision-making and a more efficient production pipeline.

The proposed system of the storyboard generation leverages artificial intelligence to automatically generate storyboard images from natural language descriptions. By combining NLP for text understanding and generative image models for visual rendering, the system transforms scene ideas into detailed visuals within seconds. This AI-driven approach eliminates the need for manual illustration, accelerates the pre-production process, and allows users to create storyboards quickly and efficiently, regardless of their artistic skills.

6.3 Sample Code

```
import streamlit as st
from diffusers import StableDiffusionPipeline
import torch

# Load pre-trained text-to-image model
model = StableDiffusionPipeline.from_pretrained("CompVis/stable-diffusion-v1-4", torch_dtype=torch.
    float16).to("cuda")

# Streamlit UI
st.title("AI-Powered Storyboard Generator")
prompt = st.text_input("Enter scene description:")

# Image generation on button click
if st.button("Generate Storyboard"):
    if prompt:
        st.subheader("Generated Storyboard Frames")
        for i in range(frame_count):
            with st.spinner(f"Generating frame {i+1}..."):
                image = model(prompt).images[0]
                if bw_output:
                    image = image.convert("L")  # Convert to black and white
                st.image(image, caption=f"Frame {i+1}", use_column_width=True)

        # Option to download all frames as ZIP
        with io.BytesIO() as buffer:
            with zipfile.ZipFile(buffer, "w") as zipf:
                for idx, img in enumerate(images):
                    img_bytes = io.BytesIO()
                    img.save(img_bytes, format='PNG')
                    zipf.writestr(f"frame_{idx+1}.png", img_bytes.getvalue())
            st.download_button("Download All Frames as ZIP", buffer.getvalue(), "storyboard.zip", "
                application/zip")
    else:
        st.warning("Please enter a scene description to generate frames.")
```

This sample code demonstrates the central feature of the system: transforming a creative prompt into a visual storyboard frame using an AI model. It features a simple UI built with Streamlit and integrates with a pre-trained generative model to handle the text-to-image conversion.

Output

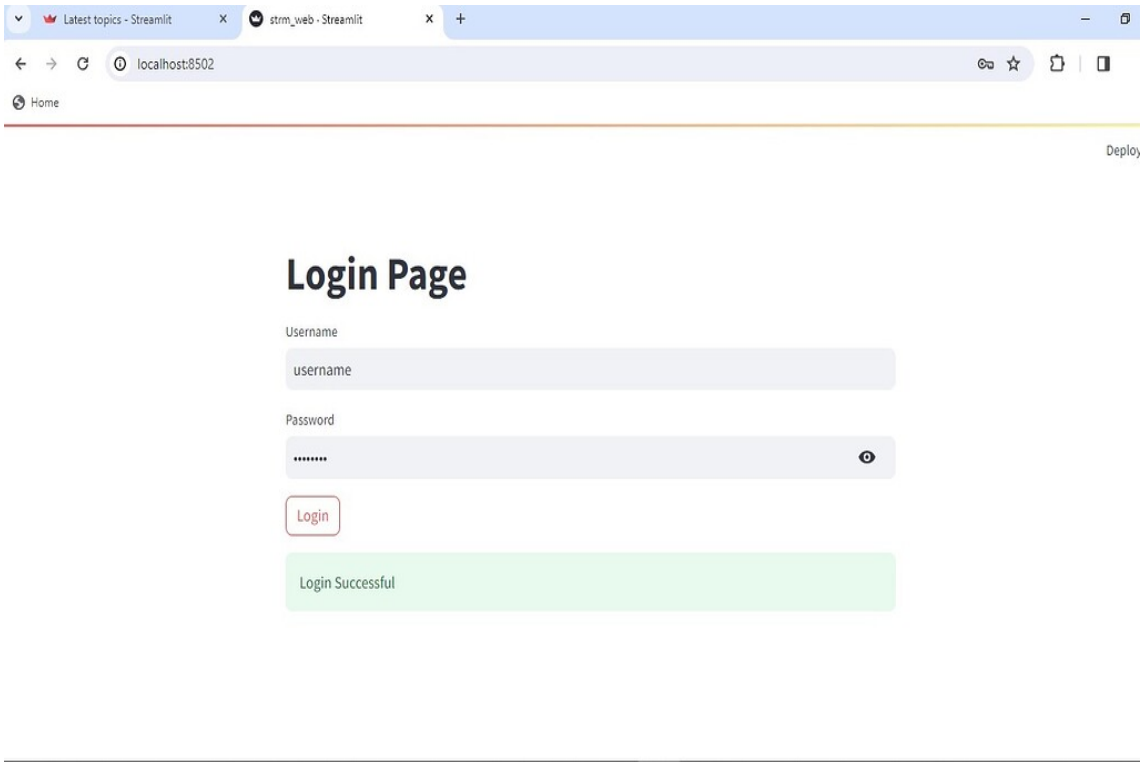

Figure 6.1: **Log In Page**

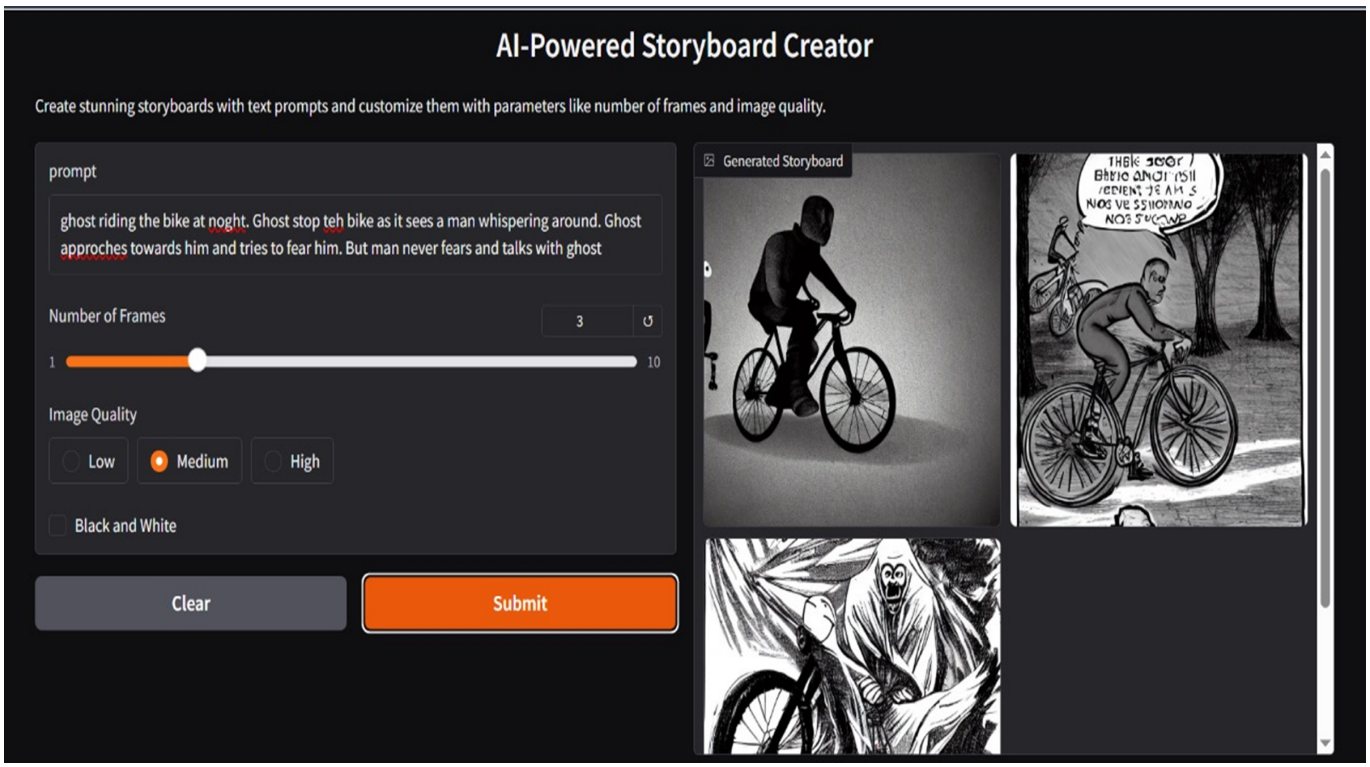

Figure 6.2: **Generated output of the AI storyboard system**

Chapter 7

CONCLUSION AND FUTURE ENHANCEMENTS

7.1 Conclusion

The AI-Powered Storyboard Creator project successfully demonstrates the integration of generative AI models with intuitive user interfaces to automate the process of visual storytelling. By transforming textual prompts into detailed storyboard frames, the system provides a valuable tool for professionals in filmmaking, game development, advertising, and education. The use of Stable Diffusion and Streamlit enables seamless backend inference and frontend rendering, making the application both powerful and user-friendly. Moreover, features like frame count customization and black-and-white output mode allow creators to tailor their storyboard outputs to specific artistic or planning needs.

We also discussed the need for a streamlined, automated process in visual storytelling by integrating generative AI models with user-friendly interfaces. This project enables users to transform creative textual prompts into vivid storyboard frames, making it a valuable asset in industries like film production, advertising, game development, and education. The system effectively demonstrates how generative models like Stable Diffusion can be leveraged to interpret narrative descriptions and convert them into detailed visual sequences, helping creators visualize ideas before production begins.

7.2 Future Enhancements

Future research will focus on extending the functionality and usability of the system. Features such as voice-to-text input, character consistency across frames, and multi-style rendering options (e.g., anime, sketch, or cinematic) can significantly im-

prove user experience. Additionally, enabling the export of storyboards as PDFs,PNGs, JPEGs or SVGs introducing timeline-based scene editing, and adding support for multilingual prompts would broaden the tool's accessibility and creative scope. With continuous improvements, this system holds the potential to become a full-fledged pre-visualization tool that supports rapid content ideation and collaborative storytelling across multiple domains.

Looking ahead, this storyboard system can be further enhanced through several key improvements. Integration with voice-to-text capabilities could make prompt entry even more convenient, especially for hands-free usage in collaborative environments. Additionally, offering character consistency across frames, scene transition options, and timeline-based navigation can enhance narrative coherence. The inclusion of a downloadable storyboard PDF, support for multilingual prompts, and fine-tuning options for artistic style (e.g., anime, comic, or cinematic) would broaden the tool's creative reach. These enhancements would ensure the system evolves into a robust solution for end-to-end previsualization and content planning workflows.

Chapter 8

PLAGIARISM REPORT

Figure 8.1: **Plagiarism Report**

Chapter 9

SOURCE CODE & POSTER PRESENTATION

9.1 Source Code

```
import streamlit as st
import pandas as pd
import numpy as np
from diffusers import StableDiffusionPipeline
import torch
from PIL import Image
import os
import uuid
import sqlite3
import time
import chardet
import warnings
warnings.filterwarnings("ignore")

st.set_page_config(page_title="Minor Project 2", layout="wide", page_icon = "D:\ML_Minor2\icon2.png"
    , initial_sidebar_state="expanded")

#Helper function to create a connection to SQLite
def get_connection():
    conn = sqlite3.connect('users_data.db')  # This will create the database file
    return conn

# Helper function to create a users table
def create_users_table():
    conn = get_connection()
    conn.execute('''CREATE TABLE IF NOT EXISTS users (
                        username TEXT PRIMARY KEY,
                        password TEXT
                    );''')
    conn.commit()
    conn.close()

# Helper function to hash passwords
def hash_password(password):
    return hashlib.sha256(password.encode()).hexdigest()
```

```
35
36 # Save a new user's details into the database
37 def save_user_to_db(username, password):
38     conn = get_connection()
39     hashed_password = hash_password(password)
40     conn.execute("INSERT INTO users (username, password) VALUES (?, ?)", (username, hashed_password)
       )
41     conn.commit()
42     conn.close()
43
44 # Check if a user exists in the database
45 def is_user_exists(username):
46     conn = get_connection()
47     cursor = conn.execute("SELECT * FROM users WHERE username = ?", (username,))
48     user = cursor.fetchone()
49     conn.close()
50     return user
51
52 # Validate login credentials
53 def validate_login(username, password):
54     conn = get_connection()
55     hashed_password = hash_password(password)
56     cursor = conn.execute("SELECT * FROM users WHERE username = ? AND password = ?", (username,
           hashed_password))
57     user = cursor.fetchone()
58     conn.close()
59     return user
60
61 # Update the user's password in the database
62 def update_user_password(username, new_password):
63     conn = get_connection()
64     hashed_password = hash_password(new_password)
65     conn.execute("UPDATE users SET password = ? WHERE username = ?", (hashed_password, username))
66     conn.commit()
67     conn.close()
68
69 # Call the function to ensure the users table is created before any operations
70 create_users_table()
71
72
73 # Session state for login management
74 if "logged_in" not in st.session_state:
75     st.session_state.logged_in = False
76 if "signed_up" not in st.session_state:
77     st.session_state.signed_up = False
78 if "show_data" not in st.session_state:
79     st.session_state.show_data = False
80 if "reset_password" not in st.session_state:
81     st.session_state.reset_password = False
82
```

```
# Color schemes
st.markdown("""
    <style>
        .main { background-color: #f5f5f5; }
        .stButton button { background-color: #4CAF50; color: white; }
        .stTextInput input { background-color: #e8f0fe; }
    </style>
""", unsafe_allow_html=True)

def signup_page():
    st.title("Sign Up")

    with st.form(key='signup_form'):
        username = st.text_input("Enter a new username", "")
        password = st.text_input("Enter a new password", type='password')
        signup_button = st.form_submit_button("Sign Up")

        if signup_button:
            if is_user_exists(username):
                st.error("Username already exists. Please log in.")
            else:
                save_user_to_db(username, password)
                st.session_state.signed_up = True
                st.success("Account created! Redirecting to login...")
                time.sleep(1)
                st.session_state.logged_in = False #Ensure they go to login after signup
                st.rerun()

    st.markdown("<div style='text-align: center; margin-top: 20px;'>", unsafe_allow_html=True)
    st.write("Already have an account?")
    if st.button("Go to Login"):
        st.session_state.signed_up = False  # Toggle the signup page state
        st.rerun()

def reset_password_page():
    st.title("Reset Password")

    with st.form(key='reset_form'):
        username = st.text_input("Enter your username")
        new_password = st.text_input("Enter a new password", type='password')
        confirm_password = st.text_input("Confirm new password", type='password')
        reset_button = st.form_submit_button("Reset Password")

        if reset_button:
            if not is_user_exists(username):
                st.error("Username does not exist.")
            elif new_password != confirm_password:
                st.error("Passwords do not match.")
            else:
                update_user_password(username, new_password)
```

```
                st.success("Password has been reset! Redirecting to login...")
                time.sleep(1)
                st.session_state.reset_password = False
                st.rerun()

    st.markdown("<div style='text-align: center; margin-top: 20px;'>", unsafe_allow_html=True)
    st.write("Remembered your password?")
    if st.button("Go to Login"):
        st.session_state.reset_password = False
        st.rerun()

def login_page():
    st.title("Login")
    # Using form to help browsers detect login actions
    with st.form(key='login_form'):
        username = st.text_input("Username")
        password = st.text_input("Password", type='password')
        login_button = st.form_submit_button("Login")

        if login_button:
            user = validate_login(username, password)
            if user:
                st.session_state.logged_in = True
                st.success("Login successful!")
                time.sleep(1)
                st.rerun()  # Force re-render to move to the main app
            else:
                st.error("Incorrect username or password.")

    col1, col2, col3, col4 = st.columns([1, 2, 2, 1])
    with col1:
        st.markdown("<div style='text-align: center; margin-top: 30px;'>", unsafe_allow_html=True)
        st.write("Don't have an account?")
        if st.button("Go to Sign Up"):
            st.session_state.signed_up = True  # Toggle the signup page state
            st.rerun()

    with col4:
        st.markdown("<div style='text-align: center; margin-top: 30px;'>", unsafe_allow_html=True)
        st.write("Forgot your password?")
        if st.button("Reset Password"):
            st.session_state.reset_password = True
            st.rerun()



def toggle_data_visibility():
    st.session_state.show_data = not st.session_state.show_data

def is_date_column(column):
```

```
    try:
        pd.to_datetime(column)
        return True
    except (ValueError, TypeError):
        return False

# API token (safe to use local env or config)
HUGGINGFACE_TOKEN = os.getenv("HUGGINGFACE_TOKEN")  # Add your token to the environment

@st.cache_resource
def load_model():
    pipe = StableDiffusionPipeline.from_pretrained(
        "stabilityai/stable-diffusion-2-1",
        use_auth_token=HUGGINGFACE_TOKEN,
        torch_dtype=torch.float16,
        revision="fp16"
    )
    pipe = pipe.to("cuda" if torch.cuda.is_available() else "cpu")
    return pipe

pipe = load_model()

# User input
prompt = st.text_area("Enter your storyboard idea:", height=150,
                      placeholder="Example: A futuristic city at sunset, a robot detective walks
                          through neon-lit streets...")

generate = st.button("Generate Storyboard")

def generate_storyboard(prompt_text, num_images, seed_value, guidance_scale):
    torch.manual_seed(seed_value)
    images = []
    for i in range(num_images):
        prompt_scene = f"{prompt_text}, scene {i + 1}"
        image = pipe(prompt_scene, guidance_scale=guidance_scale).images[0]
        images.append(image)
    return images

# Main logic
if generate and prompt.strip():
    with st.spinner("Generating storyboard... this may take a minute..."):
        storyboard = generate_storyboard(prompt, num_scenes, seed, guidance)

        # Display images
        st.subheader("Your AI-Generated Storyboard")
        cols = st.columns(num_scenes)
        for idx, (img, col) in enumerate(zip(storyboard, cols)):
            img_id = uuid.uuid4().hex[:6]
            img_path = f"storyboard_scene_{img_id}.png"
            img.save(img_path)
```

```
            col.image(img, caption=f"Scene {idx + 1}", use_column_width=True)
            with col.expander("Download Image"):
                with open(img_path, "rb") as file:
                    col.download_button(
                        label="Download",
                        data=file,
                        file_name=img_path,
                        mime="image/png"
                    )

elif generate:
    st.warning("Please enter a prompt before generating.")

# Footer
st.markdown("---")
st.markdown("Built with Gen Ai using Stable Diffusion and Streamlit")
```

9.2 Poster Presentation

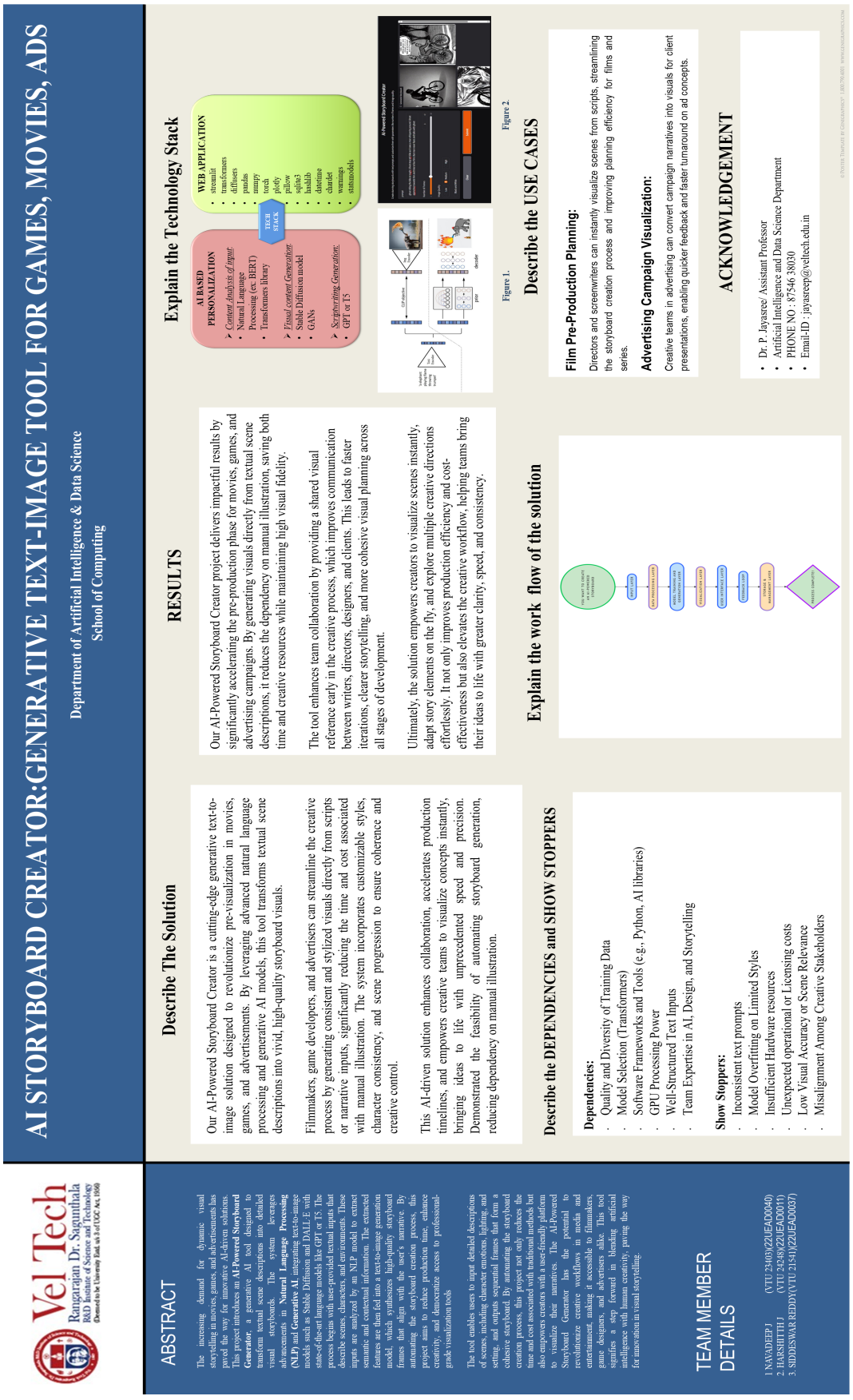

Figure 9.1: **Poster Presentation**

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