**A picture containing text

Description automatically generated**

**Department of Informatics**

**University of Leicester**

**CO7201 Individual Project**

**Final Report Template**

**Generating Game Narratives using an**

**AI Language Model**

**Rohan Anand**

[**ra470@student.le.ac.uk**](mailto:ra470@student.le.ac.uk)

**ra470**

**Project Supervisor: Victoria R. Wright**

**Second Marker: Dr. Fabricio Goes**

**Word Count: [ ]**

**18/08/2023**

**DECLARATION**

All sentences or passages quoted in this report, or computer code of any form whatsoever used and/or submitted at any stages, which are taken from other people’s work have been specifically acknowledged by clear citation of the source, specifying author, work, date and page(s). Any part of my own written work, or software coding, which is substantially based upon other people’s work, is duly accompanied by clear citation of the source, specifying author, work, date and page(s). I understand that failure to do this amounts to plagiarism and will be considered grounds for failure in this module and the degree examination as a whole.

Name: Rohan Anand

Date: 18-08-2023

# ABSTRACT

This project aims to develop an innovative Game Narrative Generator web application employing the cutting-edge AI language model, GPT-3.5 Turbo. The objective is to create immersive and dynamic gaming experiences by utilizing user input to shape narratives. Unlike traditional approaches, the application focuses on character traits provided by users to initiate the narrative generation process. The project embraces a branched narrative structure, where the AI generates descriptions for various scenarios based on user decisions, allowing for interactive and engaging gameplay.

The challenge lies in ensuring seamless coherence between user-generated inputs and AI-generated content while maintaining thematic consistency. The project's goals encompass developing the front-end, integrating GPT-3.5 Turbo, and refining user experience for optimal engagement.

The web application provides a platform for users to input character traits, plot, and setting, from which the AI generates narrative scenarios. Users make decisions that direct the narrative flow, determining the AI's content generation for subsequent options. This decision-driven model creates personalized and unique gaming experiences.

Currently, the project has advanced in front-end development, while back-end implementation is in progress using Flask. The integration of GPT-3.5 Turbo and user decision-based narrative branching remains the central focus. The project timeline is designed to achieve these milestones, followed by comprehensive testing and refinement.

Upon completion, the Game Narrative Generator is anticipated to redefine interactive storytelling in gaming. By leveraging AI capabilities and user input, the application demonstrates the potential to revolutionize game narrative design. The fusion of human creativity and AI innovation promises an exciting evolution in gaming experiences.

Table of Contents

[ABSTRACT 3](#_Toc143269797)

[1. Introduction: 5](#_Toc143269798)

[1.1 Project Overview: 5](#_Toc143269799)

[1.2 Motivation for Game Narrative Generation: 5](#_Toc143269800)

[1.3 Research Objectives: 5](#_Toc143269801)

[2. Literature Review: 6](#_Toc143269802)

[2.1 Significance of Game Narratives: 6](#_Toc143269803)

[2.2 Role of AI-Language Models in Creative Endeavours: 6](#_Toc143269804)

[2.3 Interactive Storytelling in Gaming: 6](#_Toc143269805)

[3. Methodology: 7](#_Toc143269806)

[3.1 System Architecture and Design: 7](#_Toc143269807)

[3.2 User Input and Decision-Driven Narrative Generation: 7](#_Toc143269808)

[3.3 Evaluation Metrics and Framework: 7](#_Toc143269809)

[4. Implementation: 8](#_Toc143269810)

[4.1 Front-End Development: 8](#_Toc143269811)

[4.1 Creating the Front-End (Using HTML, CSS, JavaScript): 8](#_Toc143269812)

[4.2 Building the Back-End (Using Flask): 8](#_Toc143269813)

[4.3 Merging Langchain LLM and GPT-3.5 Turbo: 8](#_Toc143269814)

[4.4 Handling User Input and Creating Content: 8](#_Toc143269815)

[4.5 Testing & Evaluation 9](#_Toc143269816)

[4.5.1 User Experience Testing: 9](#_Toc143269817)

[4.5.2 Narrative Coherence Evaluation: 9](#_Toc143269818)

[4.5.3 Player Engagement Analysis: 9](#_Toc143269819)

[4.5.4 Comparative Evaluation: 9](#_Toc143269820)

[4.5.5 Adaptability Testing: 9](#_Toc143269821)

[4.5.6 Iterative Refinement: 9](#_Toc143269822)

[5. Results: 10](#_Toc143269823)

[6. Discussions: 10](#_Toc143269824)

[7. Conclusion: 10](#_Toc143269825)

[7.1 Future Work: 10](#_Toc143269826)

[8. References: 11](#_Toc143269827)

[9. Appendices: 11](#_Toc143269828)

[9.1 Technical Details and Code Snippets 11](#_Toc143269829)

[9.2 User Interface Screenshots 11](#_Toc143269830)

[9.3 Evaluation Data 11](#_Toc143269831)

This report template offers a succinct yet informative overview of the project's current state and its trajectory towards completion. The forthcoming sections will delve into each facet of the project, including methodology, implementation, evaluation, and future directions. As the final report progresses, these outlined sections will be meticulously expanded upon, offering a comprehensive exploration of the Game Narrative Generator's development, integration, and impact within the realm of interactive storytelling in gaming. The iterative nature of the project, coupled with comparative evaluations and user engagement assessments, is expected to contribute novel insights into the amalgamation of AI-driven narratives and player experiences, ultimately redefining the landscape of game narrative design.

# 1. Introduction:

This section offers a fundamental glimpse into the project's core intentions and its relevance in today's gaming landscape.

## Project Overview:

At its heart, this project aims to build a Game Narrative Generator - a smart web application that taps into the power of advanced AI language abilities. The primary goal is to blend the AI's strengths with the art of interactive storytelling, ultimately creating stories that players can actively influence.

## Motivation for Game Narrative Generation:

The driving force behind this project is the critical role stories play in gaming. Designing captivating stories that immerse players and evoke emotions can be a complex task. The project aims to simplify this process by using AI to help create narratives, thereby making the narrative crafting process more efficient and enhancing the player's engagement.

## 1.3 Research Objectives:

The research objectives are multi-fold. Firstly, it involves creating an easy-to-use web application that harmonizes user-provided character traits with AI-generated narratives. Secondly, it employs GPT-3.5 Turbo's capabilities to create branching narratives, shaped by player decisions. Additionally, the project will compare these AI-generated narratives with traditional methods to understand potential improvements in player engagement.

The upcoming sections delve into the project's intricate layers. Starting with a comprehensive review of existing literature, the methodology outlines the project's technical foundation, and the implementation details the integration process. This will be followed by a robust evaluation. Finally, the report will conclude with insights drawn from the evaluation, reflecting on achievements and potential paths for future exploration.

In essence, this project seeks to marry technology and creative storytelling to redefine the way narratives are crafted in gaming.

# 2. Literature Review:

The literature review offers an insightful exploration of the contextual landscape surrounding our project, shedding light on the intersection of game narratives, AI language models, and interactive storytelling.

## 2.1 Significance of Game Narratives:

Game narratives have evolved from mere background stories to critical elements that engage players on emotional and cognitive levels. Research underscores their role in player immersion, emotional investment, and overall gameplay satisfaction. The challenge lies in creating narratives that not only captivate but also adapt to player decisions, leading to the exploration of AI-powered solutions.

## 2.2 Role of AI-Language Models in Creative Endeavours:

AI language models have emerged as game-changers in various creative domains. The ability of models like GPT-3.5 Turbo to generate coherent and contextually relevant text opens avenues for automating narrative creation. Researchers have explored their potential in generating text-based content, with implications ranging from creative writing to dialogue generation within video games.

## 2.3 Interactive Storytelling in Gaming:

Interactive storytelling has gained prominence as players seek immersive experiences where their choices drive the narrative. This paradigm shift from linear narratives to dynamic, player-driven stories calls for innovative solutions. AI-driven narrative generation holds promise in providing tailored experiences, where each player's choices steer the storyline, enhancing engagement and replayability.

The subsequent sections of this report delve into the practical realization of these concepts. The methodology presents a blueprint for weaving AI-driven narratives into gameplay, with a focus on the project's technical intricacies. The implementation section elaborates on the fusion of AI language capabilities with web application development. The report then transitions into an evaluation, delving into how this novel narrative generation approach fares against traditional methods. As the project's journey unfolds, it echoes the broader evolution of game narratives, AI's transformative potential, and the dynamic landscape of interactive storytelling.

# 3. Methodology:

The methodology section outlines the roadmap guiding the amalgamation of AI-driven narrative generation with web application development, elucidating the steps taken to realize this innovative gaming experience.

## 3.1 System Architecture and Design:

The foundational architecture encompasses two core elements: the user interface (UI) and the backend infrastructure. The UI, designed for user interaction, solicits character traits, plot elements, and initial setting inputs. The backend architecture, powered by Python Flask, receives and processes this user input.

[Insert Architecture Diagram Here]

## 3.2 User Input and Decision-Driven Narrative Generation:

User input, consisting of character traits and initial plot details, sets the stage for AI-driven narrative generation. Leveraging GPT-3.5 Turbo's capabilities, the application generates narrative continuations based on user choices. These AI-crafted narratives present branching paths, reacting dynamically to player decisions. The model's proficiency in text generation, cultivated through diverse training data, facilitates cohesive and contextually relevant storytelling.

## 3.3 Evaluation Metrics and Framework:

The effectiveness of AI-generated narratives warrants meticulous evaluation. Metrics encompassing narrative coherence, engagement levels, and narrative adaptability are employed. Comparative analysis with narratives created through conventional methods serves as a benchmark. User feedback, collected through gameplay sessions, contributes qualitative insights, offering a holistic understanding of player experiences.

# 4. Implementation:

The implementation phase marks the transformation of conceptual blueprints into tangible, functional components that collectively constitute the envisioned AI-driven narrative web application.

## 4.1 Front-End Development:

The user interface is crafted using HTML, CSS, and JavaScript, ensuring intuitive interaction and input collection. The UI's design prioritizes user-friendliness, guiding players through character creation and initial plot inputs. With HTML forming the structural skeleton, CSS takes on the mantle of aesthetic finesse, harmonizing colors, layouts, and visual appeal. Meanwhile, JavaScript infuses interactivity, orchestrating the dynamic navigation and data manipulation that drive the user experience. The UI's strategic design empowers users to seamlessly input character traits and initial plot elements, initiating the narrative journey.

## 4.1 Creating the Front-End (Using HTML, CSS, JavaScript):

This is where the user interface (UI) comes together. We use HTML for structure, CSS for looks, and JavaScript for making things interactive. Users put in character traits and initial plot elements, which kick off the narrative journey.

## 4.2 Building the Back-End (Using Flask):

Python Flask steps in here. It handles user requests and processes input, making sure users and the narrative generation process communicate smoothly. This makes things work well for users.

## 4.3 Merging Langchain LLM and GPT-3.5 Turbo:

Langchain LLM and GPT-3.5 Turbo work together smoothly, thanks to the OpenAI API. We turn user input into instructions for GPT-3.5 Turbo, which then crafts narrative pieces. These pieces are creative and interesting.

## 4.4 Handling User Input and Creating Content:

The story starts with user-provided character traits and plot cues. The back-end takes care of these inputs and gets GPT-3.5 Turbo to be creative. The model turns cues into narrative bits, each having the user's creativity.

With the nuts and bolts of implementation in place, we move on to the next part, where we check how well our application creates captivating narratives and elevates the gaming experience.

## 4.5 Testing & Evaluation

In this segment, we embark on a rigorous examination of the project's performance and user experience. We'll detail the methods employed to test and evaluate the Game Narrative Generator's efficacy and functionality.

### 4.5.1 User Experience Testing:

We'll conduct user-centric evaluations to gauge how well the application resonates with players. Through usability testing, we'll assess the intuitiveness of the user interface and the ease of navigating through the narrative pathways. User feedback, obtained through surveys or interviews, will provide valuable insights into user engagement and satisfaction.

### 4.5.2 Narrative Coherence Evaluation:

A critical aspect of the evaluation involves assessing the coherence and continuity of AI-generated narratives. We'll devise a structured framework to evaluate the logical flow and consistency of narratives, comparing them with conventional narratives. This evaluation aims to ensure that the AI narratives align seamlessly with user inputs.

### 4.5.3 Player Engagement Analysis:

Measuring player engagement is pivotal to our evaluation. By tracking user interactions, dwell times, and the narrative paths chosen, we can gauge the level of immersion and interest invoked by the AI-generated narratives. This analysis provides a deeper understanding of the narratives' impact on user engagement.

### 4.5.4 Comparative Evaluation:

To benchmark the effectiveness of our approach, we'll conduct a comparative evaluation against narratives created through traditional methods. By comparing user preferences, engagement levels, and narrative quality, we can quantify the unique contributions of our AI-driven approach.

### 4.5.5 Adaptability Testing:

The Game Narrative Generator's adaptability will be assessed through varying user inputs and preferences. We'll explore how well the AI responds to diverse character traits, plot cues, and user choices, ensuring its versatility across different narrative scenarios.

### 4.5.6 Iterative Refinement:

Evaluation findings will drive iterative refinements. User feedback and analytical insights will inform enhancements to narrative generation algorithms, UI improvements, and overall user experience. This iterative process ensures an application that continually evolves to meet user expectations.

This comprehensive testing and evaluation phase underpins the reliability, effectiveness, and user-centricity of our Game Narrative Generator, enabling us to substantiate its impact and potential in the realm of interactive gaming storytelling.

# 5. Results:

In this section, we'll lay out the outcomes of our project's implementation. We'll showcase how the AI-generated narratives seamlessly blend into the web application, creating a user experience that's both engaging and interactive. The results will encompass the effectiveness of the narrative branching, the coherence of AI-generated content, and player engagement levels.

# 6. Discussions:

Here, we dive into a thoughtful analysis of the project's outcomes. We'll explore how well the AI-driven narratives align with our initial goals and the extent to which they enhance the overall gaming experience. We'll also deliberate on any challenges encountered during implementation and how they were addressed. Comparisons with conventional narrative creation methods will be discussed, shedding light on the unique contributions of our approach. Furthermore, the implications of our findings for future AI-driven creative endeavors and gaming narratives will be deliberated upon.

# 7. Conclusion:

This section encapsulates the culmination of our project journey. We'll summarize the milestones we've accomplished, highlighting the successful integration of AI-driven narratives into the web application. We'll reiterate the significance of our Game Narrative Generator in revolutionizing storytelling in gaming, emphasizing how it enhances player engagement and interaction.

## 7.1 Future Work:

Looking ahead, we explore the horizons of possibilities that our project opens up. We'll discuss potential avenues for expanding and refining the Game Narrative Generator. This includes further refining the AI's narrative coherence and exploring more intricate branching options. We'll also delve into the potential of integrating user feedback loops to enhance narrative adaptation. Additionally, we'll contemplate how our approach could be adapted to different genres and platforms, further broadening its impact on the realm of interactive storytelling in gaming.

# 8. References:

A Comprehensive List of Cited Sources

* OpenAI API Documentation: <https://platform.openai.com/docs/api-reference/introduction>
* Getting Started with LangChain Python: [https://python.LangChain.com/docs/get\_started/introduction](https://python.langchain.com/docs/get_started/introduction)
* APIs in the LangChain Python package: [https://api.python.LangChain.com/en/latest/](https://api.python.langchain.com/en/latest/)

Flask Web Framework:

* Flask Documentation: <https://flask.palletsprojects.com/>
* Flask Mega-Tutorial by Miguel Grinberg: <https://blog.miguelgrinberg.com/post/the-flask-mega-tutorial-part-i-hello-world>

Web Development and HTML/CSS:

* Mozilla Developer Network (MDN) Web Docs: <https://developer.mozilla.org/>
* W3Schools: <https://www.w3schools.com/>

User Experience (UX) and User Interface (UI) Design:

* Interaction Design Foundation:<https://www.interaction-design.org/>
* NNGroup - Usability and UX Research:<https://www.nngroup.com/>

AI and Natural Language Processing (NLP) Concepts:

* Stanford NLP Group:<https://nlp.stanford.edu/>
* TensorFlow NLP Tutorials:<https://www.tensorflow.org/text/tutorials>

# 9. Appendices:

## 9.1 Technical Details and Code Snippets

## 9.2 User Interface Screenshots

## 9.3 Evaluation Data

Final Report Template - End note:

This report template offers a succinct yet informative overview of the project's current state and its trajectory towards completion. The forthcoming sections will delve into each facet of the project, including methodology, implementation, evaluation, and future directions. As the final report progresses, these outlined sections will be meticulously expanded upon, offering a comprehensive exploration of the Game Narrative Generator's development, integration, and impact within the realm of interactive storytelling in gaming. The iterative nature of the project, coupled with comparative evaluations and user engagement assessments, is expected to contribute novel insights into the amalgamation of AI-driven narratives and player experiences, ultimately redefining the landscape of game narrative design.