**RPG Game Auto-Generation Project Report**

**1. Project Objective**

The goal of this game is to generate an RPG game through text commands, including but not limited to game storyline, character design, background scenes, and game mechanics. This allows for a highly customizable game development experience.

**2. Analysis of GPT’s Limitations**

In the A1 version, due to GPT’s limitations in image processing and generation, the game characters were still composed of simple rectangles and blocks, lacking detail and individuality. This constraint resulted in a visually simple game lacking appeal.

Additionally, in terms of storyline design, the GPT-generated game experience was too linear, lacking diverse character interactions and scene transitions. As a result, the overall immersive experience of the RPG was significantly limited.

**3. Major Enhancements**

**3.1 Character Artwork Optimization: Sprite Sheet Dataset Construction and LoRA Training**

To address the limitations in character design, I spent the past two weeks experimenting with sprite sheet generation using Stable Diffusion and ComfyUI, but the results were unsatisfactory. As a solution, I manually collected and organized sprite sheet resources and utilized Python scripts generated by GPT to batch-process these images.

To optimize sprite sheet processing, I implemented the following methods:

* **Frame Splitting**: Each sprite sheet was split into individual frames to enable more precise labeling.
* **Label Analysis**: An AI model was used to generate tags for each frame, which were then merged into the original sprite sheet’s metadata.
* **Character Mode Classification**: Specific labels were assigned based on modes such as attack, walk, and death.
* **Dataset Construction**: I compiled a dataset containing 1,081 sprite sheets.
* **LoRA Fine-Tuning**: Using the Illustration XL Base model, I trained a LoRA fine-tuned model that allows for sprite sheet generation with minimal prompts. (Since the model is still in training and fine-tuning, it has not yet been applied to the game. The current assets in the game were generated using a different model previously.)

**3.2 Character Dialogue System and Scene Transition**

In the A1 version, the gameplay was too simplistic. To address this, I introduced a character dialogue system and scene transitions to enrich the storytelling aspect of the game. Although the dialogue system is currently basic, I have established a well-structured mechanism that allows for easy customization and expansion.

* **Dialogue System**:
  + Dialogues are stored in JSON format, making them easy to manage and modify.
  + The system supports multiple speakers with dynamic UI updates.
  + Future plans include adding branching dialogue choices to enhance player interaction.
* **Scene Transition System**:
  + The game’s background now changes dynamically as the storyline progresses.
  + Future improvements will integrate AI-generated backgrounds to create immersive environments.

**3.3 High-Resolution Character Portraits**

Currently, detailed character portraits are generated using refined prompts extracted from the sprite sheet and processed with high-quality anime models.

* **Background Removal**:
  + A Python script was used to remove solid backgrounds, improving adaptability.
  + Future improvements will include automatic background adaptation for better visual coherence.
* **Character Personalization**:
  + I plan to develop a custom GPT for generating pixel-character-specific prompts.
  + By integrating facial expression variation models, the game will feature automated portrait generation with dynamic emotions.

**3.4 Background Image Generation**

Although background image generation has not yet started, I have optimized the code to facilitate easy integration with the dialogue system for seamless scene transitions.

* **Future Plans**:
  + Train a specialized background generation model to support storytelling.
  + Implement dynamic transitions for time-of-day and environment changes.
  + Generate AI-powered backgrounds that align with the game’s artistic style.

**4. Conclusion**

With these improvements, the overall game experience has been significantly enhanced:

* **More Detailed Characters**: LoRA fine-tuning enables the rapid generation of RPG-style sprite sheets.
* **Richer Storyline**: JSON-based dialogue management enhances flexibility and scalability.
* **Improved Scene Transitions**: Future AI-generated backgrounds will create an immersive atmosphere.
* **Optimized Code Structure**: The RPG framework is now more modular, allowing for easy adjustments and expansion.

In future iterations, I will continue refining character animations, implementing automatic background adaptation, and improving gameplay mechanics to achieve a more complete and high-quality RPG gaming experience.