

# Project Proposal: Science Fiction Text Generation with GPT-2

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## 1 Project Goals

The goal of this project is to generate science fiction text using GPT-2. This project will train the GPT-2 model on a large corpus of science fiction text and fine-tune it to produce imaginative and coherent stories. The objective is to create science fiction stories that are indistinguishable from those written by human authors. The results of this project will have important implications for the NLP community and practical applications for creative writing, content creation, and technology industries. The project will be of interest to NLP researchers, creative writers, and technology companies.

## 2 NLP Task Definition

The NLP task defined in this project is a text generation task. The input to the system will be a prompt text, such as a starting sentence or a scenario, and the output will be a sci-fi story generated by the model. The goal is to generate stories that are coherent, imaginative, and engaging. The model will be trained on a dataset of existing sci-fi stories to learn patterns and structures that are commonly found in the genre.

## 3 Data

The training dataset is the SFGram dataset consists of a collection of science fiction texts available on GitHub (<https://github.com/nschaetti/SFGram-dataset>). This dataset includes a variety of science fiction genres and includes texts from classic and contemporary authors. As the entire dataset is huge, I plan to initially sample about 100 texts with over 200,000 words and a size of 10 MB and increase the size according to the performance of model. Example science fictions from the dataset include:

- "Dune" by Frank Herbert.
- "The Hitchhiker's Guide to the Galaxy" by Douglas Adams.

- "Ender's Game" by Orson Scott Card.

## 4 Related Work

There has been significant work in the field of text generation using deep learning models, including various variations of recurrent neural networks (RNNs) and transformers. OpenAI's GPT-3 (Brown et al., 2020) is a large-scale transformer-based language model trained on a massive corpus of text data. Generative Adversarial Networks (GANs) (Nie et al.; Yang et al., 2020) have been used to generate realistic and diverse text samples. In this project, we will use OpenAI's open-sourced GPT-2 (Radford et al., 2019) as the base model for our text generation task.

## 5 Evaluation

In this project, we will evaluate the generated science fiction text in terms of Perplexity and BLEU Score.

- Perplexity: This measures the likelihood of the generated text given the input. A low perplexity score indicates that the generated text is similar to the training data and is therefore of high quality.
- BLEU Score: The BLEU score is a common evaluation metric for NLP tasks that measures the similarity between the generated text and a reference corpus. A high BLEU score indicates that the generated text is semantically and grammatically similar to the reference text.

We will also conduct a human evaluation study to evaluate the consistency of the generated text with the science fiction genre. Participants will be asked to rate the generated text based on its consistency with the science fiction genre on a scale of 1 to 5, where 1 indicates that the text is not consistent

with the genre and 5 indicates that the text is highly consistent with the genre.

## 6 Work Plan

1. Data preparation: Clean and preprocess the sci-fi text data.
2. Fine-tuning GPT-2: Fine-tune the GPT-2 model on the sci-fi text data.
3. Model evaluation: Evaluate the model on the metrics of coherence and novelty.
4. Results analysis: Analyze the results of the evaluation and discuss the performance of the model in generating new and coherent sci-fi text.

## References

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