

Assignment: Exploring Transformers with Pretrained Text Generation Models

Introduction

What are Transformers and why are they important in AI?

Transformers are important in AI because they are a class of deep learning models that have revolutionized natural language processing (NLP) by enabling powerful sequence modeling capabilities for tasks like text translation, summarization, and image generation. Transformers process data using self-attention mechanisms that allow them to focus on the most important parts of a sequence unlike earlier models like RNNs or LSTMs. They also use positional encoding to add a sense of structure to the data, and use parallelization to be able to process entire sequences at once. This leads to improved efficiency, making training faster and more scalable.

Experiment Summary

What model and tool did you use?

For this project, I used the GPT-2 model from Hugging Face's `transformers` library, accessed via the `pipeline("text-generation")` interface. I ran the project in a Jupyter Notebook environment, locally through VS Code.

What kinds of prompts did you try?

The initial prompt used was "In the future, education will" and I also used prompts "The impact of AI on the future of work" and "Once upon a time, there was a kingdom".

Observations

Compare at least 3 generated outputs.

1. Temperature: 0.7, Max length: 50

In the future, education will allow us to move beyond an educational system that assumes that we are 'just' children, and to recognize that we are not just children. We are adults. Our children are adults. We can't simply walk into an auditorium and say, "I'm a child," and have no idea what to do with my own kids." The future of education is, indeed, a future that teaches us that we are, in fact, adults...

2. Temperature: 0.8, Max length: 50

The impact of AI on the future of work and life is likely to be felt by young people of all ages. But young people today are also more optimistic than underdeveloped in many of the areas that AI is most likely to influence...

3. Temperature: 0.6, Max length: 100

Once upon a time, there was a kingdom of darkness and a kingdom of light. And now it is the day that the Lord has revealed to the world its will. So there is a day of great joy and a day of great sorrow, and a day of great sorrow, and a day of great joy, and a day of great sorrow. If you have not read the book of the Law, you must not be misled by it...

What changed when you adjusted temperature or prompt type?

Lower temperatures yield more deterministic and factual outputs while higher values promote creativity and unpredictability.

Reflection

What did you learn about how Transformers generate text?

I learned that prompt wording and temperature settings significantly influence the style and substance of the generated text.

What surprised you? What limitations did you notice?

What surprised me most was the model's ability to maintain grammar and thematic consistency even over longer sequences. However, I also noticed limitations where outputs would sometimes drift off-topic and repeat phrases.