AI-Powered Tweet Generation: Leveraging GPT-2 for Contextual and Mood-Based Tweet Creation

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Introduction to the problem statement

- **Tweet Generation**: Refers to the automatic creation of short, concise posts for social media, specifically Twitter.
- **Engagement**: Tweets need to be engaging, contextually relevant, and align with the 280-character limit of Twitter.
- **Advanced NLP Techniques**: The process leverages advanced Natural Language Processing (NLP) techniques.
- **Generative AI Models**: Uses Generative AI models to craft meaningful and coherent text autonomously.
- **Purpose**: The goal is to generate tweets that are both relevant and appealing for social media platforms.

Literature Review towards "Problem Statement"

Rule based System

- **Overview:** Rule-based systems generate tweets using predefined templates, which are dynamically filled with input data such as topics, keywords, and predefined phrases.
- **Strengths:** These systems are simple, fast, and predictable, ensuring quick content generation, but they lack creativity and are unable to engage effectively with the dynamic nature of social media.
- **Relevance:** Rule-based systems were foundational in the early stages of automated content generation, but their lack of flexibility and creativity has made them obsolete in favor of more advanced models.

Transformer-based Models (e.g., GPT-2, GPT-3, GPT-4)

- **Overview:** Transformer-based models like **GPT-2** and **GPT-3** generate fluent and contextually relevant text using self-attention mechanisms, revolutionizing NLP tasks with minimal input.
- **Strengths:** These models produce coherent, high-quality text and are versatile across various NLP applications, such as text completion and summarization.
- **Relevance:** Transformer models are central to modern NLP, powering applications like content generation, chatbots, and virtual assistants.

Fine-tuning Pre-trained Models

- **Overview:** Fine-tuning involves adapting pre-trained models like **GPT-2** and **GPT-3** to specific domains by further training them on smaller, domain-specific datasets (e.g., Twitter data), enhancing their performance for specialized tasks like tweet generation.
- **Strengths:** Fine-tuning enables models to specialize in niche tasks, improving their accuracy and relevance in generating context-aware content for specific domains or industries.
- **Relevance:** Fine-tuning has become a key technique for leveraging the power of pre-trained models while tailoring them to the needs of particular applications, such as social media content generation.

- **Input Definition:** The task begins by defining the objective of the tweet, including the topic and optional mood or tone. For example, "Excited Tweet about technology" is the input prompt.
- **Tokenization and Attention Mask:** The input prompt is tokenized using the GPT-2 tokenizer, converting the text into numerical tokens. An attention mask is also created to guide the model's focus on relevant parts of the input.
- **Text Generation:** The pre-trained GPT-2 model is used to generate the tweet, with parameters like maximum length, no-repeat n-gram size, and sampling techniques (top-k and top-p) controlling the output's coherence and diversity.
- **Post-processing:** The generated text is decoded back to human-readable form. The initial prompt is removed, leaving only the generated tweet, ensuring it is concise, relevant, and contextually appropriate.

Block Diagram for "Problem statement"

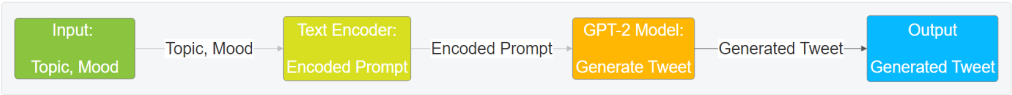

Figure 1: Block Diagram Illustrating the Workflow of a Tweet Generation Model Using GPT-2

```
topic = input("Enter the topic: ")
mood = input("Enter the mood (optional): ")
tweet = generate_tweet(topic, mood)
print(f"\nGenerated Tweet:\n{tweet}")
```

```
Enter the topic: Fitness
Enter the mood (optional): Funny

Generated Tweet:
"I'm a fitness junkie. I'm not a gym rat. But I do love to eat healthy and exercise.
```

Figure 2: Generated Tweet on Fitness with a Funny Twist

- The tweet, *"I'm a fitness junkie, not a gym rat,"* humorously contrasts the speaker's passion for fitness with the stereotype of a "gym rat."
- It suggests that the speaker enjoys fitness but does not conform to the intense or obsessive image associated with gym culture.
- The playful tone effectively reflects the topic of "Fitness" and the mood of "Funny," blending humor with fitness-related themes.

References

- **Vaswani, A., et al.** (2017). Attention is all you need. *Proceedings of NeurIPS*.
- **Radford, A., et al.** (2019). Language Models are Unsupervised Multitask Learners. *OpenAI Blog*.
- **Brown, T., et al.** (2020). Language Models are Few-Shot Learners. *OpenAI*.