



**KLE** Technological  
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Creating Value  
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School  
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Electronics and Communication Engineering

Project Report  
on  
**AI-Powered Tweet Generation: Leveraging  
GPT-2 for Contextual and Mood-Based  
Tweet Creation**

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SCHOOL OF ELECTRONICS AND COMMUNICATION  
ENGINEERING

## CERTIFICATE

This is to certify that project entitled “ **AI-Powered Tweet Generation: Leveraging GPT-2 for Contextual and Mood-Based Tweet Creation** ” is a bonafide work carried out by the student team of **Pralhad R Yadawad (01fe21bec186)**, **Pradeep Laxmanrao Pawar (01FE21BEC360)**. The project report has been approved as it satisfies the requirements with respect to the course project work prescribed by the university curriculum for BE (VII Semester) in School of Electronics and Communication Engineering of KLE Technological University for the academic year 2024-2025.

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## ABSTRACT

The rapid growth of social media has highlighted the need for automated systems capable of generating engaging and contextually relevant content, such as tweets. This project focuses on the development of an advanced tweet generation system leveraging state-of-the-art transformer-based models, including GPT-2, GPT-3, and GPT-4. These models utilize self-attention mechanisms to generate high-quality, diverse, and contextually appropriate tweets based on input prompts. The system is designed to provide dynamic and creative tweet generation that can adapt to the informal tone and trends prevalent on platforms like Twitter. Additionally, the project explores the process of fine-tuning pre-trained models on domain-specific datasets, such as Twitter data, to enhance the relevance and engagement of the generated tweets. This methodology aims to bridge the gap between rule-based systems and modern deep learning models, offering a solution that is both scalable and capable of producing engaging content tailored to social media users' preferences. Through this approach, the project contributes to the advancement of automated content creation, enabling more efficient and impactful communication on social media platforms.

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# Chapter 1

## Introduction

**Tweet Generation** is the process of automatically creating short, engaging posts (tweets) for social media platforms, with a particular focus on Twitter. It leverages advanced **Natural Language Processing (NLP)** and **Generative AI** models to generate contextually relevant, concise, and engaging content. This process is becoming increasingly important in today's digital landscape, where social media presence is essential for individuals, brands, and organizations aiming to maintain visibility, drive engagement, and connect with their target audiences.

With over **330 million monthly active users**, Twitter has become one of the most popular social media platforms worldwide. Its character limit of **280 characters** makes it an ideal space for brief, impactful, and real-time communication. However, creating tweets that are both engaging and concise while staying relevant to ongoing trends or topics presents a significant challenge. It requires a deep understanding of language, context, and audience engagement, making the process of tweet generation an exciting yet complex task for AI researchers and developers.

Traditionally, tweet generation relied on **rule-based systems** that used predefined templates to craft posts. While these systems were simple to implement, they lacked creativity and engagement, producing monotonous and unoriginal content. The development of **transformer-based models**, such as **GPT-2** and **GPT-3**, has significantly advanced the field of automated text generation. These models, powered by deep learning techniques, are capable of generating highly coherent, contextually aware, and creative tweets that align with the tone, trends, and topics relevant to users. The ability of these models to adapt to different topics and styles makes them ideal candidates for tweet generation.

A key advancement in this area is the **fine-tuning** of pre-trained language models. Fine-tuning involves adapting large models like GPT-3 to specific domains or platforms by training them on specialized datasets, such as Twitter data. This allows the models to better capture the unique language nuances, tone, and trends of social media communication. Fine-tuning models to reflect current events or particular themes enhances their ability to generate engaging and relevant content, thus optimizing the tweet generation process.

The goal of **Generative AI-based Tweet Generation** is to build systems that can autonomously create content that resonates with the audience. These systems aim to overcome challenges such as brevity, relevance, and engagement while ensuring that the generated tweets stay within the character limit and reflect current trends. By leveraging **AI models** like **GPT-2** and **GPT-3**, businesses, influencers, and individuals can automate their social media presence, saving time while maintaining high-quality content that connects with their audience.

In this report, we explore the methods and technologies used in tweet generation, focusing on **Generative AI** models like GPT-2, GPT-3, and the process of **fine-tuning** for tweet-specific tasks. We also address the challenges of maintaining creativity, relevance, and engagement in automatically generated content. This project aims to develop an AI-based solution capable of generating contextually appropriate, high-quality tweets for any given topic, ensuring that the generated content is optimized for user engagement, trends, and real-time communication on Twitter.

## 1.1 Motivation

The increasing need for consistent and engaging social media presence has motivated the development of automated systems for content creation. With the vast amount of information shared daily on platforms like Twitter, generating relevant and engaging tweets manually can be time-consuming and resource-intensive. By leveraging Generative AI models like GPT-2 and GPT-3, we can automate tweet generation, ensuring that individuals, brands, and organizations maintain an active and engaging presence without the constant effort of manual content creation. This project is motivated by the potential of AI to simplify and enhance social media engagement, providing a scalable solution for content generation while preserving creativity, relevance, and audience engagement.

## 1.2 Objectives

- To develop a system capable of **generating relevant and high-quality tweets** using Generative AI models (e.g., GPT).
- The goal is to **automate content creation** while preserving creativity, relevance, and audience engagement.



## 1.3 Problem Statement

Develop a Generative AI-based solution to produce contextually relevant, engaging tweets, ensuring that the content aligns with the given topics, trends, and tone.

# Chapter 2

## Implementation details

This chapter, contains the detail of the system architecture that we implemented along with the specifications, algorithm and the flow chart.

### 2.1 Specifications and final system architecture

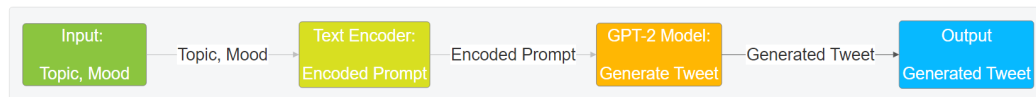


Figure 2.1: Block Diagram Illustrating the Workflow of a Tweet Generation Model Using GPT-2

The methodology for generating tweets involves leveraging the capabilities of a pre-trained GPT-2 language model to produce concise, contextually relevant, and coherent text based on user-provided inputs. The process begins by defining the task's objective, which is to create a tweet that reflects a specific topic and, optionally, a desired mood or tone. These inputs serve as the guiding parameters for the text generation process.

The first step is the construction of a textual prompt, which combines the optional mood and the given topic into a coherent and meaningful sentence fragment. For instance, if the topic is "technology" and the mood is "excited," the prompt might read: *"Excited Tweet about technology:"*. This prompt acts as the seed for the model to generate contextually relevant text that aligns with the desired theme and tone.

The prompt is then tokenized using a tokenizer associated with the GPT-2 model. Tokenization involves converting the input text into a sequence of numerical tokens, which represent the input in a format the model can process. Alongside tokenization, an attention mask is created, indicating which parts of the input the model should focus on during text generation. This ensures that the model pays attention to the full context of the prompt without neglecting any critical information.

Once the input is prepared, the pre-trained GPT-2 model, operating in evaluation mode, is used to generate text. Running the model in evaluation mode ensures that training-specific operations such as dropout are disabled, providing stable and consistent outputs. During text

generation, the process is governed by specific parameters to ensure the output is both coherent and diverse. For example, the *\*maximum length\** parameter limits the length of the generated text to prevent overly long responses. The *\*no-repeat n-gram size\** ensures that repetitive phrases are avoided, maintaining fluency in the output. Additionally, sampling techniques like *\*top-k filtering\** and *\*top-p (nucleus) sampling\** are employed to strike a balance between randomness and determinism. These methods help the model select words based on their probabilities while avoiding overly predictable or nonsensical text.

After the model generates the text, it is decoded from tokenized format back into human-readable language. To refine the final output, the initial prompt is removed from the generated text, leaving only the completed tweet. The result is a concise, contextually appropriate tweet that reflects the user's input while maintaining a natural and engaging tone.

Overall, this methodology ensures that the generated tweets are syntactically correct, semantically meaningful, and tailored to the given topic and mood. By leveraging the pre-trained GPT-2 model's understanding of language and applying controlled text generation techniques, the process effectively produces high-quality, relevant content suitable for social media or similar platforms.

## Chapter 3

# Results and Discussions

This chapter discuss about the results along with inference obtained through our project.

### 3.1 Experimental Results

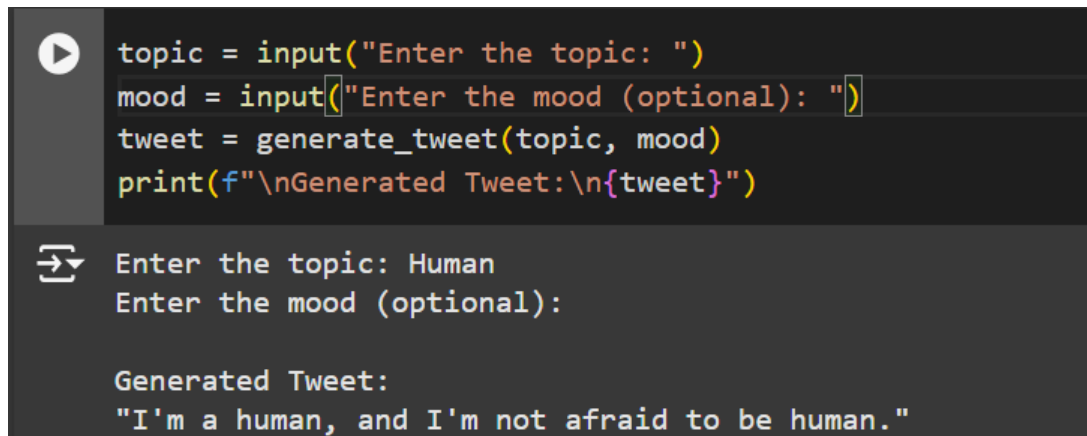
```
topic = input("Enter the topic: ")
mood = input("Enter the mood (optional): ")
tweet = generate_tweet(topic, mood)
print(f"\nGenerated Tweet:\n{tweet}")

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 3.1: Generated Tweet on Fitness with a Funny Twis

The generated tweet, "I'm a fitness junkie, not a gym rat," effectively reflects the topic of "Fitness" and the mood of "Funny." The tweet humorously contrasts the speaker's identity as a "fitness junkie" with the common stereotype of a "gym rat," which refers to someone who spends an excessive amount of time in the gym, often in a very serious or obsessive way. By stating that they are a "fitness junkie" but not a "gym rat," the tweet lightheartedly suggests that while the person is passionate about fitness, they don't conform to the more extreme or intense image associated with gym culture. The use of humor here adds a playful tone, showing that fitness enthusiasts can enjoy their passion without being overly committed or stereotypically associated with the gym-going community. This tweet is a perfect example of how a language model like GPT-2 can generate contextually relevant and mood-appropriate content, blending both fitness-related themes and a humorous twist in a brief, engaging manner.

A terminal window with a dark background. The top section shows Python code being executed, indicated by a play button icon. The code defines a function to generate a tweet based on a topic and mood. The bottom section shows the user inputting 'Human' for the topic and an empty string for the mood, followed by the output of the generate\_tweet function, which is a tweet about being human.

```
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: Human
Enter the mood (optional):

Generated Tweet:
"I'm a human, and I'm not afraid to be human."
```

Figure 3.2: Generated Tweet on Humanity

The generated tweet, "I'm a human and I'm not afraid to be a human," speaks to the essence of self-acceptance and individuality. Its directness makes it stand out as a simple yet profound declaration of embracing one's true self. On Twitter, this tweet could spark a wave of engagement, as many users may resonate with the theme of not succumbing to societal pressures or expectations. The statement reflects a growing trend on social media where users celebrate authenticity and encourage others to be unapologetically themselves. Given its universal message, the tweet could foster discussions around self-empowerment, mental health, and societal norms, making it highly shareable and relatable. It serves as a reminder to be proud of being human, flaws and all, encouraging a positive and open dialogue among Twitter users.

# Chapter 4

## Conclusions and Future Scope

### 4.1 Conclusion

In this project, we implemented a system for generating tweets using the GPT-2 language model. By taking user inputs such as the topic and mood, the model generates contextually relevant and creative tweets. The system utilizes the power of transformer-based language models, specifically GPT-2, to produce high-quality, human-like text. The project demonstrates the potential of AI in natural language generation, offering insights into how neural networks can be applied to real-world applications like social media content generation.

### 4.2 Future scope

The future scope of this project is vast, with several potential directions for improvement and expansion. One possible extension is the fine-tuning of the GPT-2 model on a more specific dataset to make the generated tweets more tailored and relevant to particular industries or audiences. Additionally, incorporating sentiment analysis could further refine the mood-based tweet generation process, allowing users to specify more complex emotional tones. Another enhancement could be the integration of real-time data, such as trending topics or current events, to generate tweets that are up-to-date and more engaging. Moreover, exploring other language models, such as GPT-3 or fine-tuned domain-specific models, could lead to even more coherent and contextually aware tweet generation.

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