College Name: VIT BHOPAL
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Text Generation and Summarization Using Transformers

Phase 2: Project Execution and Demonstration

1. Project Title:

Text Generation and Summarization System Using Transformers

2. Objective Recap:

The objective of the project is to create an interactive web application that utilizes the strength of AI for text generation and summarization. Based on pre-trained models from the transformers library, the application enables users to enter text for summarization and generation and get the generated or summarized text as output in a welcoming Gradio interface. It is intended to offer an easy-to-use tool for users to experiment and leverage AI functionality in content summarization and creative writing.

3. Technologies Used:

- Python
- HuggingFace Transformers
- Gradio (for web interface)
- Google Colab (Runtime v2-8 TPU for better performance)
- Pre-trained GPT-2-XL Model for larger computing performance
- Facebook BART model pipeline

4. Full Code Implementation:

Step 1: Install Required Libraries

```
!pip install gradio
!pip install transformers
!pip install tensorflow
!pip install tf-keras --upgrade
```

Step 2: Import Required Libraries

```
import gradio as gr
from transformers import pipeline, TFGPT2LMHeadModel, GPT2Tokenizer
import tensorflow as tf
```

Step 3: Load the Pretrained GPT-2-XL Model for Text generation

```
tokenizer = GPT2Tokenizer.from_pretrained("gpt2-xl")
model = TFGPT2LMHeadModel.from_pretrained("gpt2-xl",
pad_token_id=tokenizer.eos_token_id)
```

Step 4: Define text Generation Functions

```
def generate_text(input):
```

```
  input_ids = tokenizer.encode(input, return_tensors='tf')
  beam_output = model.generate(input_ids, max_length=2000, num_beams=10,
no_repeat_ngram_size=2, early_stopping=True)
  output = tokenizer.decode(beam_output[0], skip_special_tokens=True,
clean_up_tokenization_spaces=True)
  return '.'.join(output.split('.')[:-1]) + '.'
```

Step 5: Link pipeline of pretrained model Text Summarization

```
summarizer = pipeline("summarization", model="facebook/bart-large-cnn")
```

Step 6: Define Text Summarization Function

```
def summarize_text(text):
  summary = summarizer(text, max_length=100, min_length=30,
do_sample=False)[0]['summary_text']
  return summary
```

Step 7: Define combined function

```
def combined_function(text_to_generate, text_to_summarize):
  generated_text = generate_text(text_to_generate)
  summarized_text = summarize_text(text_to_summarize)
  return generated_text, summarized_text
```

Step 8: Create Gradio Interface

```
summary_input = gr.Textbox(lines=5, placeholder="Enter text to summarize
here...")
summary_output = gr.Textbox()
output_text = gr.Textbox()

iface = gr.Interface(
    fn=combined_function,
    inputs=[
        gr.Textbox(lines=2, placeholder="Enter your text here..."),
        summary_input
    ],
    outputs=[output_text, summary_output],
    title="Text Generation and Summarization",
    description="Generate text and summarize text using AI. \n Harness the
power of AI to generate human-like text from any prompt. Whether you're
crafting stories, summarizing content, or building dialogues, this tool
uses advanced language models to deliver coherent and creative results.")
```

Step 9: Launch the Interface

```
iface.launch(debug=True)
```

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5. Output Screenshots:

- Text Generation

```
text="Artificial Intelligence is revolutionizing the world of healthcare by enabling faster diagnoses, personalized treatments,"
generate_text(text)
```

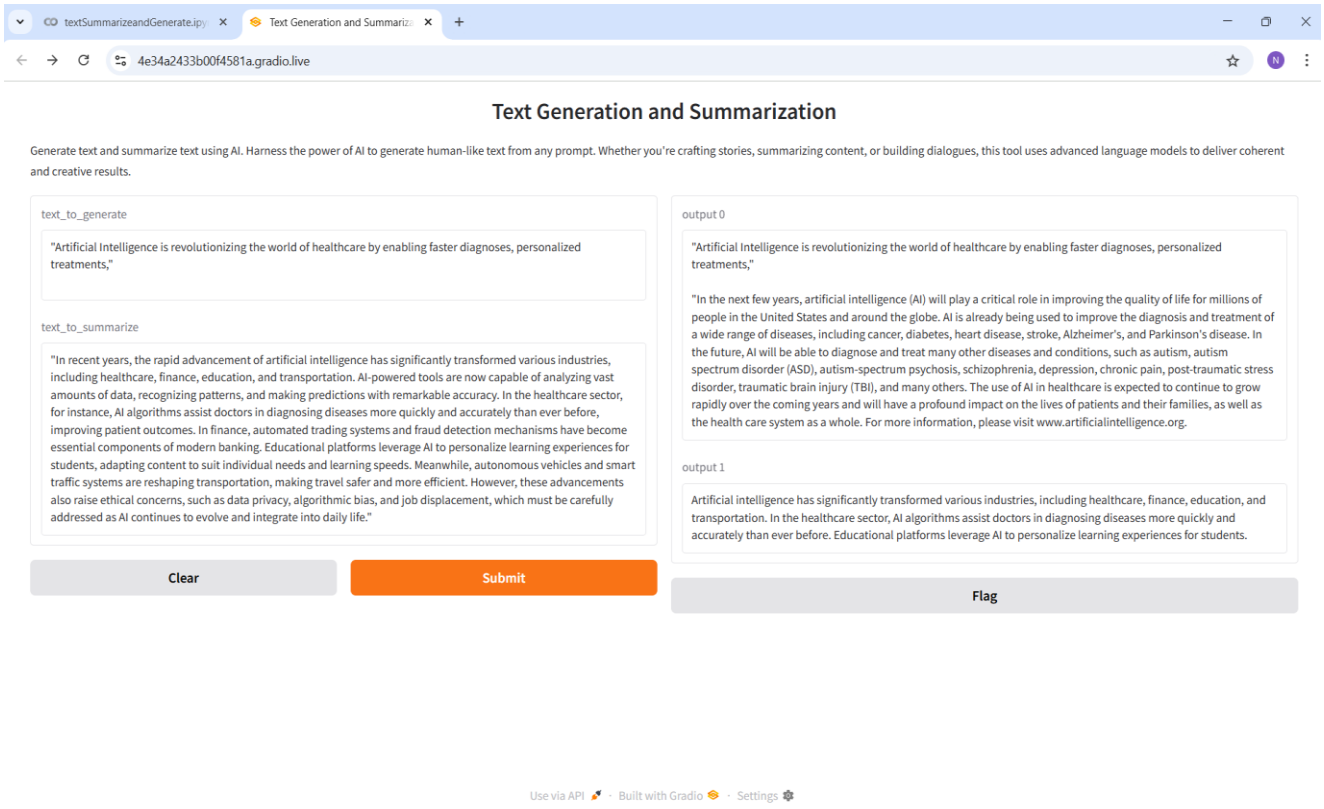
```
'Artificial Intelligence is revolutionizing the world of healthcare by enabling faster diagnoses, personalized treatments, and better outcomes for patients and their families."\n
\n"We are excited about the potential of artificial intelligence to improve the quality of life for millions of people in the United States and around the globe. We look forward to
working with the Department of Health and Human Services (HHS) and other federal agencies to advance the use of AI in health care," said Dr. John Holdren, Assistant to the Presiden
t and Director of the White House Office of Science and Technology Policy.'
```

- Text Summarization

```
text="In recent years, the rapid advancement of artificial intelligence has significantly transformed various industries, including healthcare, finance, education, and transportat
summarize_text(text)
```

```
'Artificial intelligence has significantly transformed various industries, including healthcare, finance, education, and transportation. However, these advancements also raise ethi
cal concerns, such as data privacy, algorithmic bias, and job displacement.'
```

- Gradio UI Interface



6. Conclusion:

This project demonstrates the real-world application of AI for text generation and summarization with the help of GPT-2 and BART models. Through a simple-to-use Gradio interface, users can easily generate creative text from inputs and get a summary of long texts. This demonstration indicates the ability of AI to transform content creation and information processing and offers an opportunity for future research and development of sophisticated NLP applications.

7. References:

- Hugging Face Transformers: https://huggingface.co/docs
- PyTorch: https://pytorch.org
- OpenAI GPT-2 Research and API: https://openai.com/index/gpt-2-1-5b-release/
- Gradio Documentation: https://www.gradio.app/docs
- Facebook BART Research Paper: https://huggingface.co/facebook/bart-large-cnn
- Research Papers: https://arxiv.org/abs/1706.03762