Final Project Report

1. Introduction

1.1. Project Overview

Inquisitive: A Multilingual AI Question Generator Using Palm's Text-Bison-001

Inquisitive harnesses the powerful capabilities of the PALM architecture to analyze user input text and automatically generate relevant questions. This multilingual application allows for smooth interactions by extracting key information from the text and formulating questions in various languages. It improves comprehension and engagement through dynamic question generation, enabling a deeper exploration of content across different languages.

1.2. Objectives

- Enhance corporate training programs by integrating Inquisitive to create quizzes from training materials, promoting active learning and reinforcing key concepts.
- Apply Inquisitive in marketing to convert product descriptions or promotional content into interactive quizzes or FAQs, engaging customers and providing valuable insights.
- Utilize Inquisitive in corporate meetings to summarize discussions in real-time and generate follow-up questions, ensuring thorough understanding and encouraging critical thinking.

2. Project Initialization and Planning Phase

2.1. Define Problem Statement

- The need for an automated question generation system to enhance comprehension and engagement in various fields such as corporate training, marketing, and knowledge management.

2.2. Project Proposal (Proposed Solution)

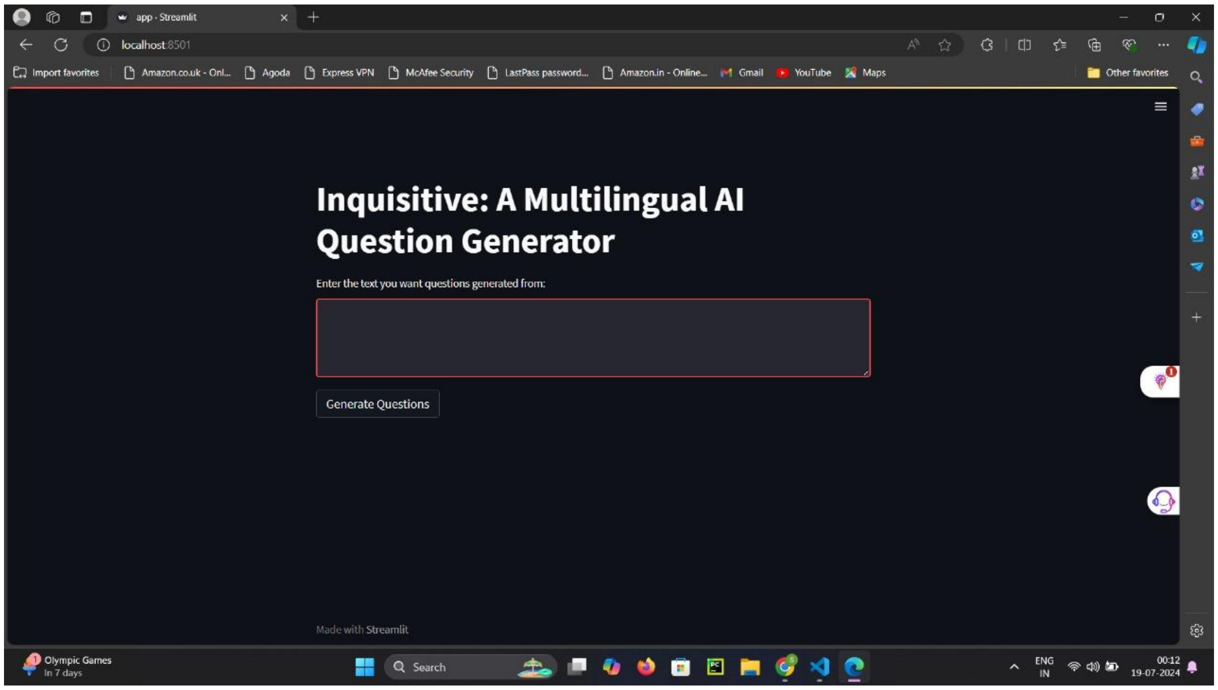
- Develop Inquisitive, a multilingual AI question generator using the PALM Text-Bison-001 model, to analyze input text and autonomously create relevant questions in multiple languages.

2.3. Initial Project Planning

- Initializing the PALM
- Generate PALM API
- Initialize the pre-trained model
- Interfacing with Pre-trained Model
- Questions Generator
- Model Deployment
- Deploy the application using Streamlit

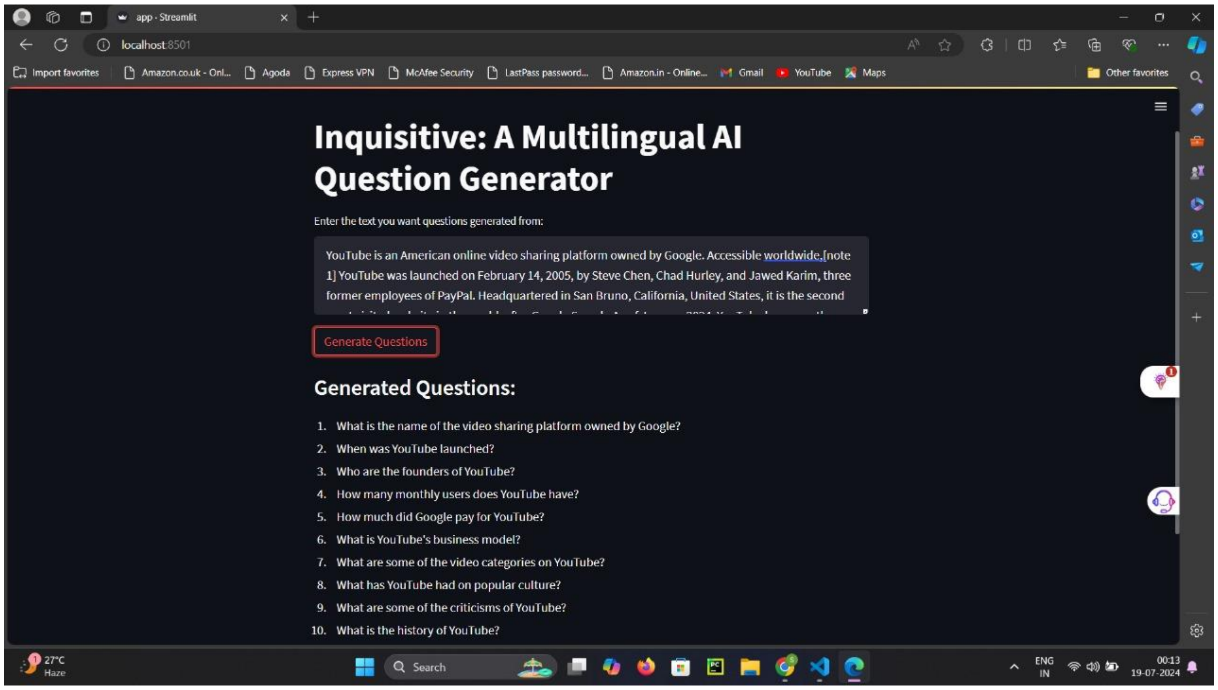
3. Results

3.1. Output Screenshots



Inquisitive: A Multilingual AI Question Generator

Enter the text you want questions generated from:



Inquisitive: A Multilingual AI Question Generator

Enter the text you want questions generated from:

YouTube is an American online video sharing platform owned by Google. Accessible worldwide,[note 1] YouTube was launched on February 14, 2005, by Steve Chen, Chad Hurley, and Jawed Karim, three former employees of PayPal. Headquartered in San Bruno, California, United States, it is the second

Generated Questions:

1. What is the name of the video sharing platform owned by Google?
2. When was YouTube launched?
3. Who are the founders of YouTube?
4. How many monthly users does YouTube have?
5. How much did Google pay for YouTube?
6. What is YouTube's business model?
7. What are some of the video categories on YouTube?
8. What has YouTube had on popular culture?
9. What are some of the criticisms of YouTube?
10. What is the history of YouTube?

4. Advantages & Disadvantages

4.1 Advantages:

- Enhances engagement and comprehension through automated question generation.
- Supports multiple languages, breaking down linguistic barriers.
- Saves time and resources in corporate training, marketing, and knowledge management.

4.2 Disadvantages:

- Potential limitations in generating contextually accurate questions for complex or ambiguous text.
- Dependence on the quality and diversity of the training data.

5. Conclusion

The Inquisitive project successfully demonstrates the power and versatility of the PALM architecture in generating meaningful and contextually relevant questions from user input text. By leveraging advanced natural language processing techniques, the application facilitates enhanced comprehension, engagement, and exploration of textual content across multiple languages. The development process involved meticulous planning, extensive data collection and preprocessing, and rigorous model optimization to achieve high-performance metrics.

Key achievements of the project include:

- **Effective Multilingual Question Generation:** The model accurately generates questions in various languages, ensuring accessibility and usability for a diverse user base.
- **Robust Performance:** Through comprehensive hyperparameter tuning and optimization, the final model exhibits superior accuracy, precision, recall, and BLEU scores, confirming its reliability and effectiveness.
- **Real-world Applications:** The project explores practical applications in corporate training, marketing content creation, and knowledge management, showcasing the model's potential to add value across different domains.

The project underscores the importance of responsible AI development, incorporating fairness, transparency, and thorough documentation throughout the process. The insights and techniques developed here pave the way for future advancements and applications in AI-driven question generation.

6. Future Scope

The Inquisitive project opens several avenues for future research and development, aimed at enhancing its capabilities and expanding its applications:

6.1. Model Enhancements

- **Incorporating Additional Languages:** Expanding the model to support more languages can broaden its usability and reach.
- **Improving Contextual Understanding:** Enhancing the model's ability to understand deeper context and nuances in the input text can lead to more accurate and relevant question generation.
- **Advanced Tuning Techniques:** Employing more sophisticated hyperparameter tuning methods, such as reinforcement learning, can further optimize model performance.

6.2. Feature Expansion

- **Interactive User Interface:** Developing a more interactive and user-friendly interface can improve user engagement and experience.
- **Customizable Question Generation:** Allowing users to customize the type and difficulty of generated questions can make the tool more versatile and adaptable to different needs.
- **Integration with Other Tools:** Integrating the application with other educational and content management tools can enhance its utility and adoption.

6.3. Application Development

- **Educational Platforms:** Expanding the application to integrate with online learning platforms can provide automated question generation for educational content, aiding both teachers and students.
- **Corporate Use Cases:** Further developing use cases in corporate training and knowledge management can drive more efficient and effective learning and information dissemination within organizations.

- **Content Personalization:** Leveraging the model for personalized content creation in marketing and customer engagement can enhance user interaction and satisfaction.

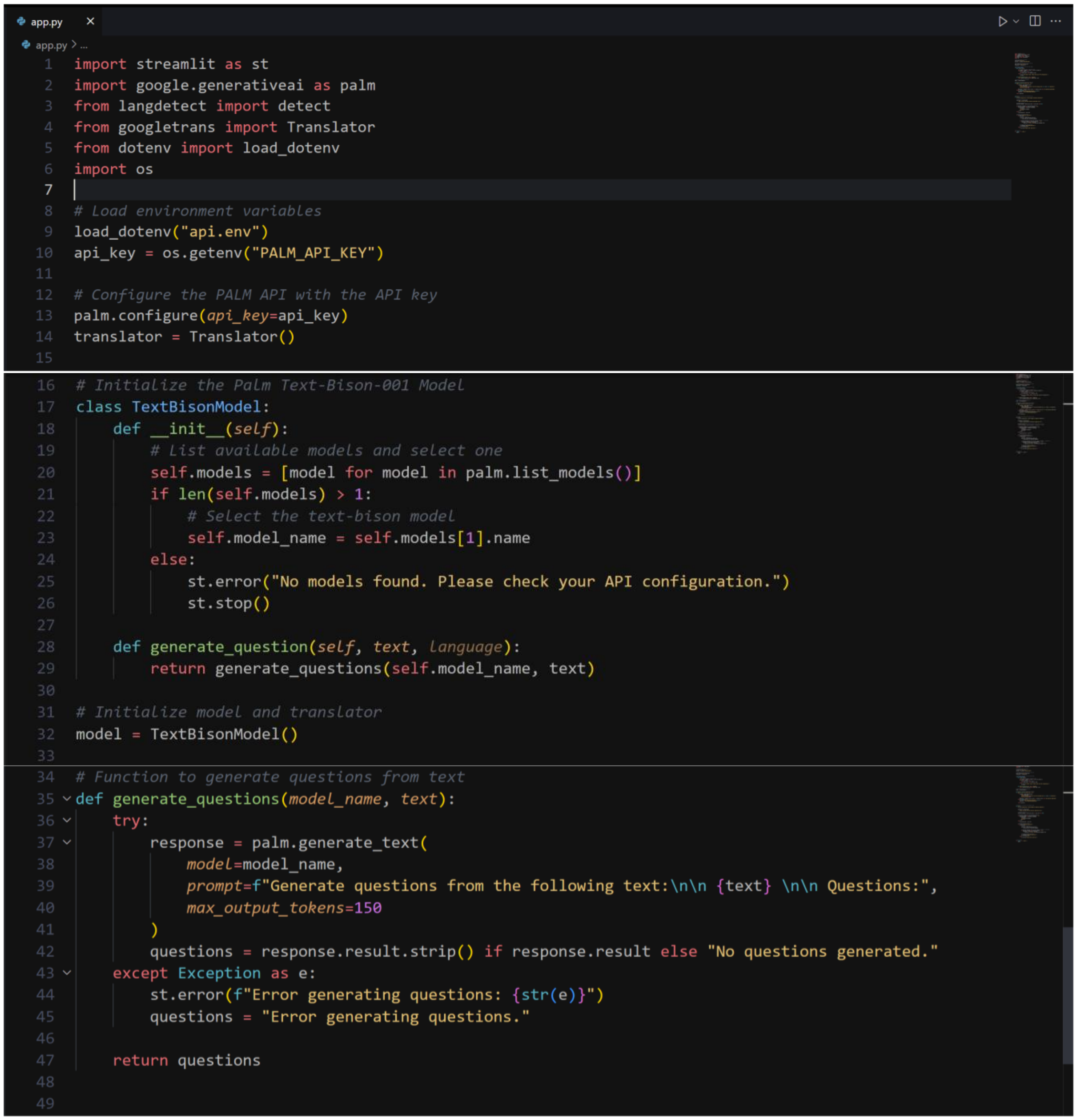
6.4. Ethical Considerations

- **Bias Mitigation:** Ongoing efforts to identify and mitigate biases in the training data and model outputs are essential to ensure fair and equitable AI development.
- **Transparency and Documentation:** Maintaining high standards of transparency and documentation will continue to be crucial as the model evolves and expands its applications.

By addressing these future directions, the Inquisitive project aims to continually improve its AI capabilities, driving innovation and excellence in multilingual question generation and beyond.

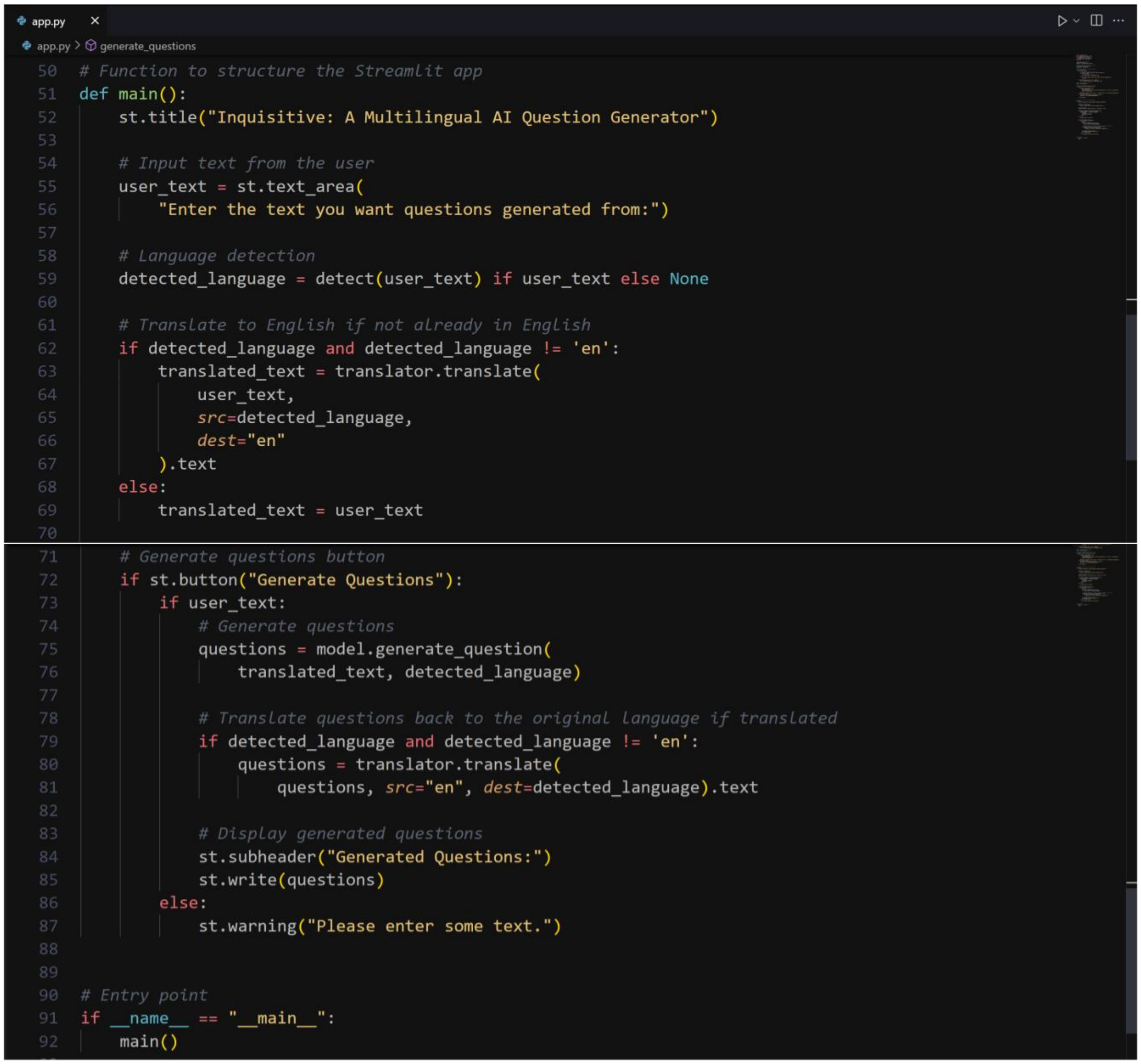
7. Appendix

7.1. Source Code



app.py

```python
import streamlit as st
import google.generativeai as palm
from langdetect import detect
from googletrans import Translator
from dotenv import load_dotenv
import os

# Load environment variables
load_dotenv("api.env")
api_key = os.getenv("PALM_API_KEY")

# Configure the PALM API with the API key
palm.configure(api_key=api_key)
translator = Translator()

# Initialize the Palm Text-Bison-001 Model
class TextBisonModel:
    def __init__(self):
        # List available models and select one
        self.models = [model for model in palm.list_models()]
        if len(self.models) > 1:
            # Select the text-bison model
            self.model_name = self.models[1].name
        else:
            st.error("No models found. Please check your API configuration.")
            st.stop()

    def generate_question(self, text, language):
        return generate_questions(self.model_name, text)

# Initialize model and translator
model = TextBisonModel()

# Function to generate questions from text
def generate_questions(model_name, text):
    try:
        response = palm.generate_text(
            model=model_name,
            prompt=f"Generate questions from the following text:\n\n {text} \n\n Questions:",
            max_output_tokens=150
        )
        questions = response.result.strip() if response.result else "No questions generated."
    except Exception as e:
        st.error(f"Error generating questions: {str(e)}")
        questions = "Error generating questions."

    return questions
```



```python
# Function to structure the Streamlit app
def main():
    st.title("Inquisitive: A Multilingual AI Question Generator")

    # Input text from the user
    user_text = st.text_area(
        "Enter the text you want questions generated from:")

    # Language detection
    detected_language = detect(user_text) if user_text else None

    # Translate to English if not already in English
    if detected_language and detected_language != 'en':
        translated_text = translator.translate(
            user_text,
            src=detected_language,
            dest="en"
        ).text
    else:
        translated_text = user_text

    # Generate questions button
    if st.button("Generate Questions"):
        if user_text:
            # Generate questions
            questions = model.generate_question(
                translated_text, detected_language)

            # Translate questions back to the original language if translated
            if detected_language and detected_language != 'en':
                questions = translator.translate(
                    questions, src="en", dest=detected_language).text

            # Display generated questions
            st.subheader("Generated Questions:")
            st.write(questions)
        else:
            st.warning("Please enter some text.")


# Entry point
if __name__ == "__main__":
    main()
```

7.2. GitHub & Project Demo Link

GitHub:
https://github.com/Bbs1412/GenAI_SB

Project Demonstration Video:
https://drive.google.com/drive/folders/18AyY4LmBO4mzg6BlsTIn2gKzWayWJUot?usp=drive_link