Interactive AI Math Tutor for Elementary Learners

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Advanced Uses of Generative AI

Project Overview

- **Objective:** Develop an AI-powered chatbot to assist elementary students with math questions.
- **Approach:** Fine-tune GPT-3.5-turbo on a curated dataset of elementary math problems.
- **Outcome:** A user-friendly Streamlit web application for interactive math tutoring.

Model Training and Fine-Tuning

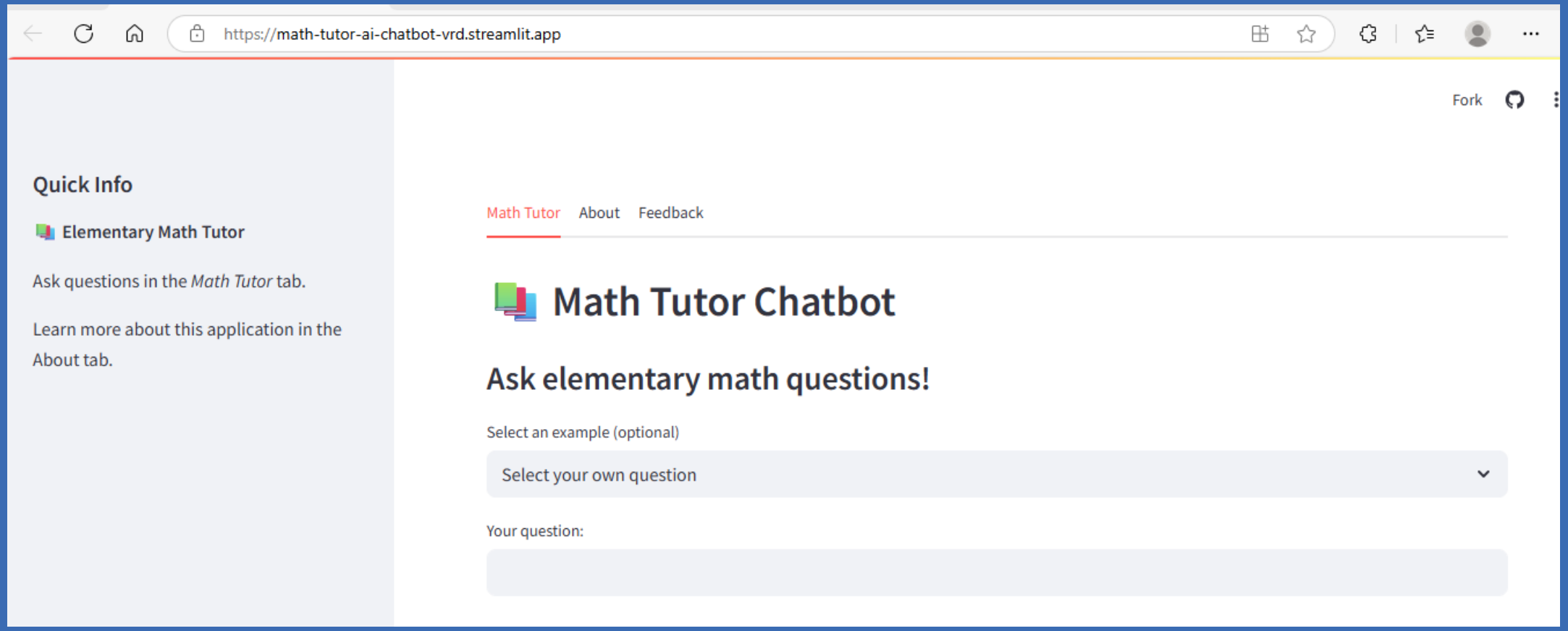
- Utilized Custom dataset comprising elementary-level math problems and solutions
- Fine-tuned GPT-3.5-turbo using OpenAI API.
- Focused on clarity, friendliness, and age-appropriate language.

Application Features

- **Interactive Q&A**: Users can input math questions and receive instant answers.
- **Example Questions:** Predefined questions to guide users.
- **Model Comparison:** Option to compare responses from the fine-tuned and base models.
- **Feedback Mechanism:** Users can provide feedback on the chatbot's performance.

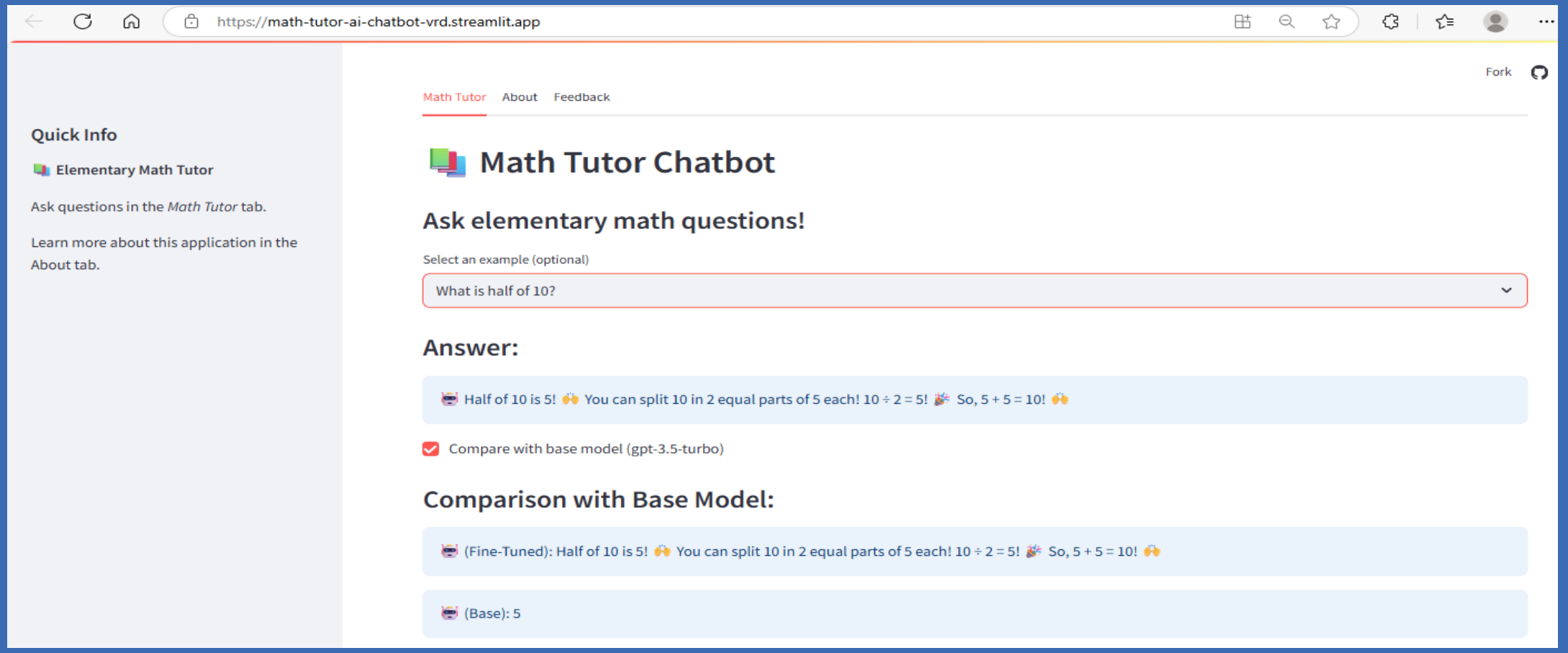
Demo - Math Tutor Tab (Landing View)

- Users can type their own math question or select from example questions.
- Simple, kid-friendly interface to encourage exploration.



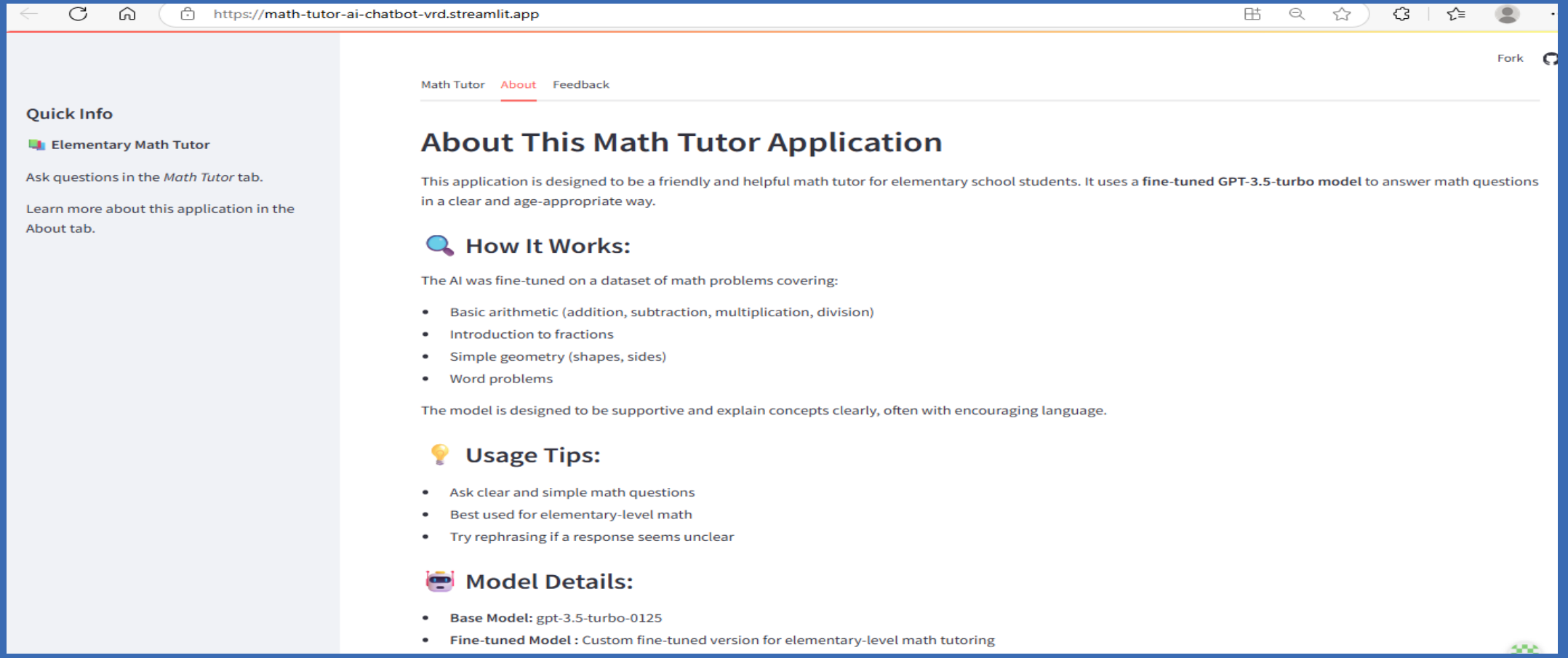
Demo - Math Tutor Tab (Answer View)

- Displays AI-generated math explanation tailored for elementary students.
- Option to compare answers with base GPT-3.5 model for performance insight.



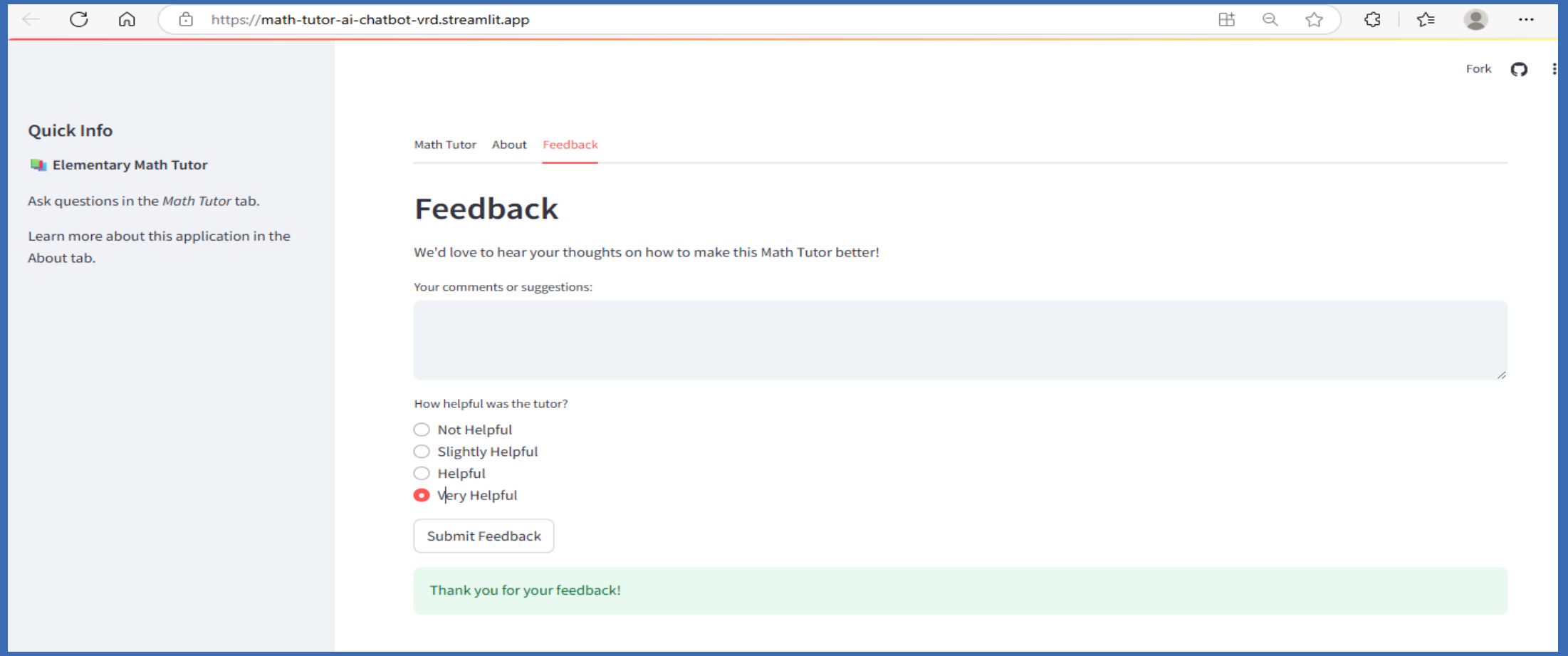
Demo - About Tab

- Explains the purpose and scope of the AI math tutor
- Provides usage tips and model details for user context



Demo - Feedback Tab

- Feedback form showing rating stars, comments box, and submit button
- Collects user feedback to improve the chatbot's performance



Key Learnings

- Fine-tuning requires carefully structured prompts.
- Prompt-response formatting improves output quality.
- Tokenization impacts cost and performance balance.
- Human evaluation is critical beyond standard metrics.
- Streamlit provides an effective platform for real-time AI applications.

Conclusion

- Successfully developed a fine-tuned AI chatbot for elementary math tutoring.
- The app offers accessible learning for young students.
- Future work could expand the dataset for broader topics; enhance the user interface; implement more robust evaluation metrics.

References

- Streamlit Docs. (n.d.). https://docs.streamlit.io/
- https://platform.openai.com/docs/models
- https://platform.openai.com/docs/guides/fine-tuning