ScienceTutor

AC215, December 2023

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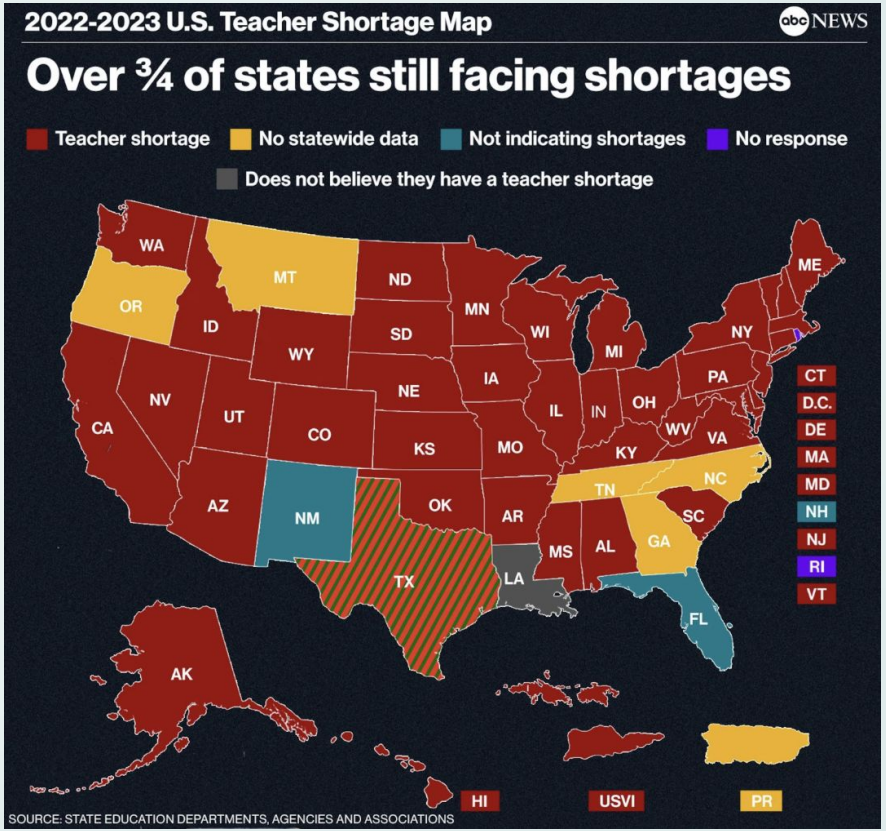
Project Motivation

Challenges in Current Education

1. Teacher vacancy



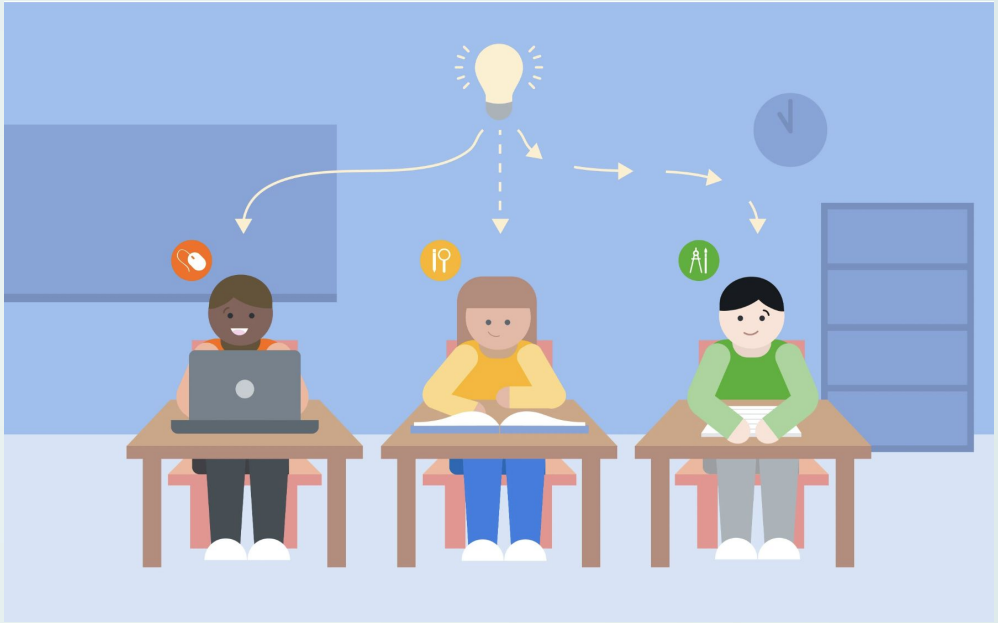
Challenges in Current Education

1. Teacher vacancy

2. Student Frustration

Challenges in Current Education

1. Teacher vacancy
2. Student Frustration
3. Demand for personalized experience



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Traditional Search Engine

❌Primarily text-based

❌Results vary in quality, depth, relevance

❌Lacks interactive chatbot capabilities

❌Not designed for children

❌Many distractions

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ScienceTutor

✅**Tailored** to provide expert-level responses to **science** questions

✅Support **multimodalities**

✅Easy to incorporate **child-centric** design and **education-purpose** function, such as age-appropriate language and quiz function

✅Aims for **worldwide accessibility**, promoting science education

User Case Scenario

02

Use Case: Interact with Chatbot

The application allows users to send text and/or image and get instant response from the chatbot.

Primary Actor

User: young children interested in science

Trigger

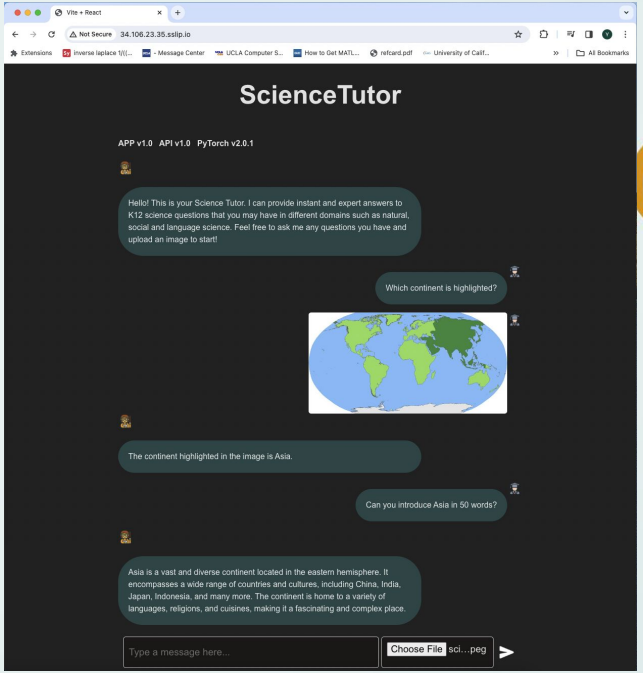
User sends a prompt (text) and/or an image

Major Inputs

- Question (Free-Text)
- Image (Optional)
- New Question Asked

Major Outputs

- Answer (Free-Text)
- New Answer



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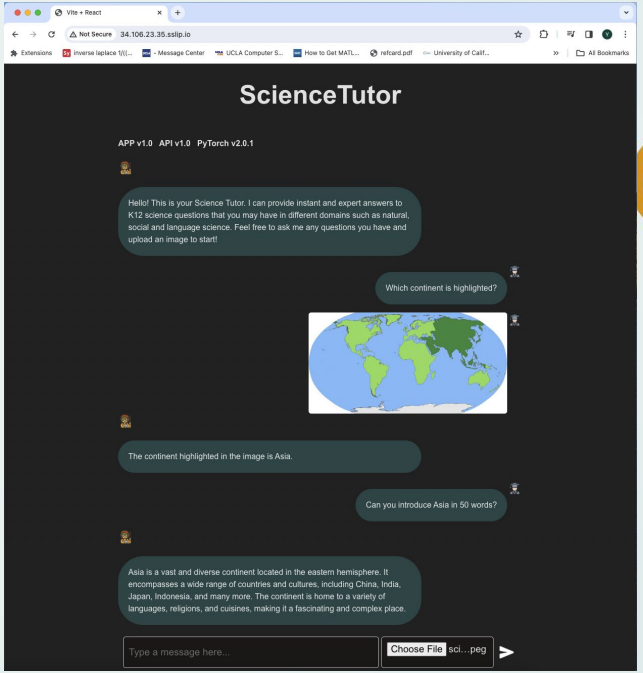
Majors Steps		Information Required
1. User enters question to ask. ↓ Text ↓ Image	←	Question (Free-Text Prompt)
	←	Image (Optional)
2. Application receives input (text &/or image) from user and sends response to user.	→	Answer (Free-Text Response)
3. User enters new question to ask.	←	New Question Asked
	→	New Answer Provided



Other Potential Use Cases

- Generates a quiz (5 random multiple-choice questions)
- User clicks on “Quiz Me!”

Quiz on Science Questions

- Translates conversation from English to a target language
- User clicks on “Translate”

Translate the Chat Page

- Reads the chat conversation out loud
- User clicks on horn icon

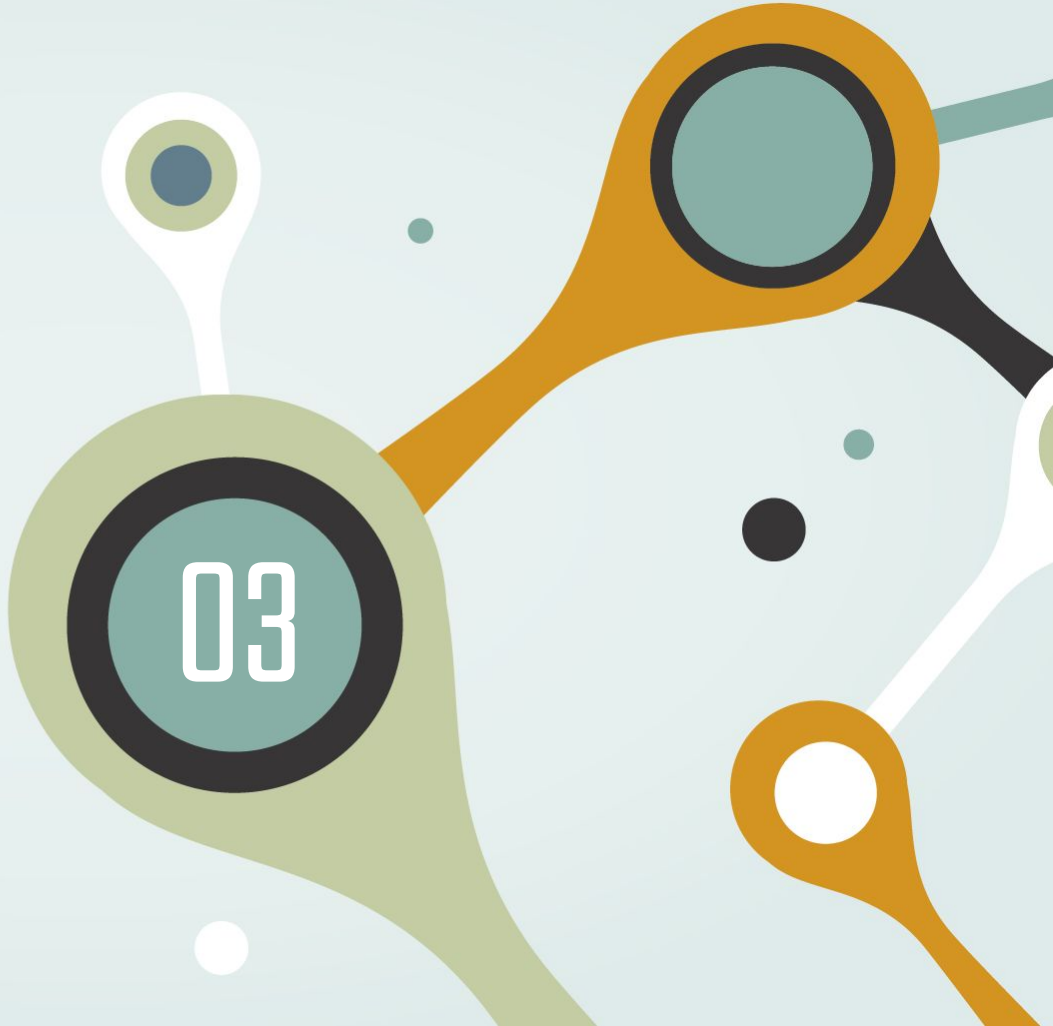
Read the Chat

- Recommends educational blog posts and online courses
- User clicks on “Recommend”

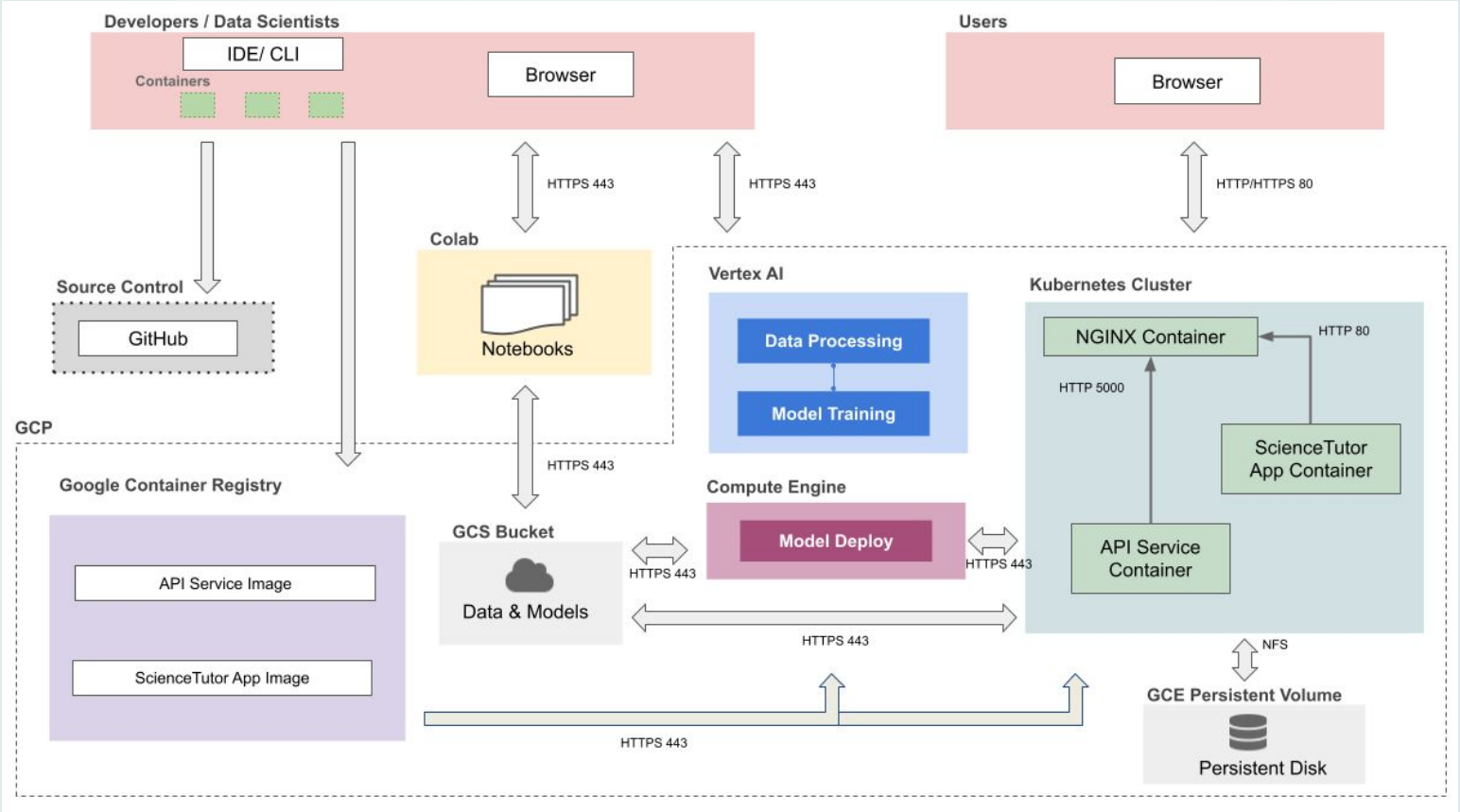
Recommend Resources

Technical Aspects

03



Technical Architecture



Challenges

01

Optimization

LLaVA-7B's computational demands may hinder real-time interactions, especially in resource-constrained environments.

02

Scalability

High concurrent user loads may strain the system, leading to delays in processing requests, slower loading times, or even system errors.

03

User Friendly

ScienceTutor should allow users to ask follow-up questions based on submitted image and previous conversations.

Innovative Approaches

01

Optimization

Utilize the 4 bit-quantization technique to reduce model size and response time while maintaining acceptable accuracy.

02

Scalability

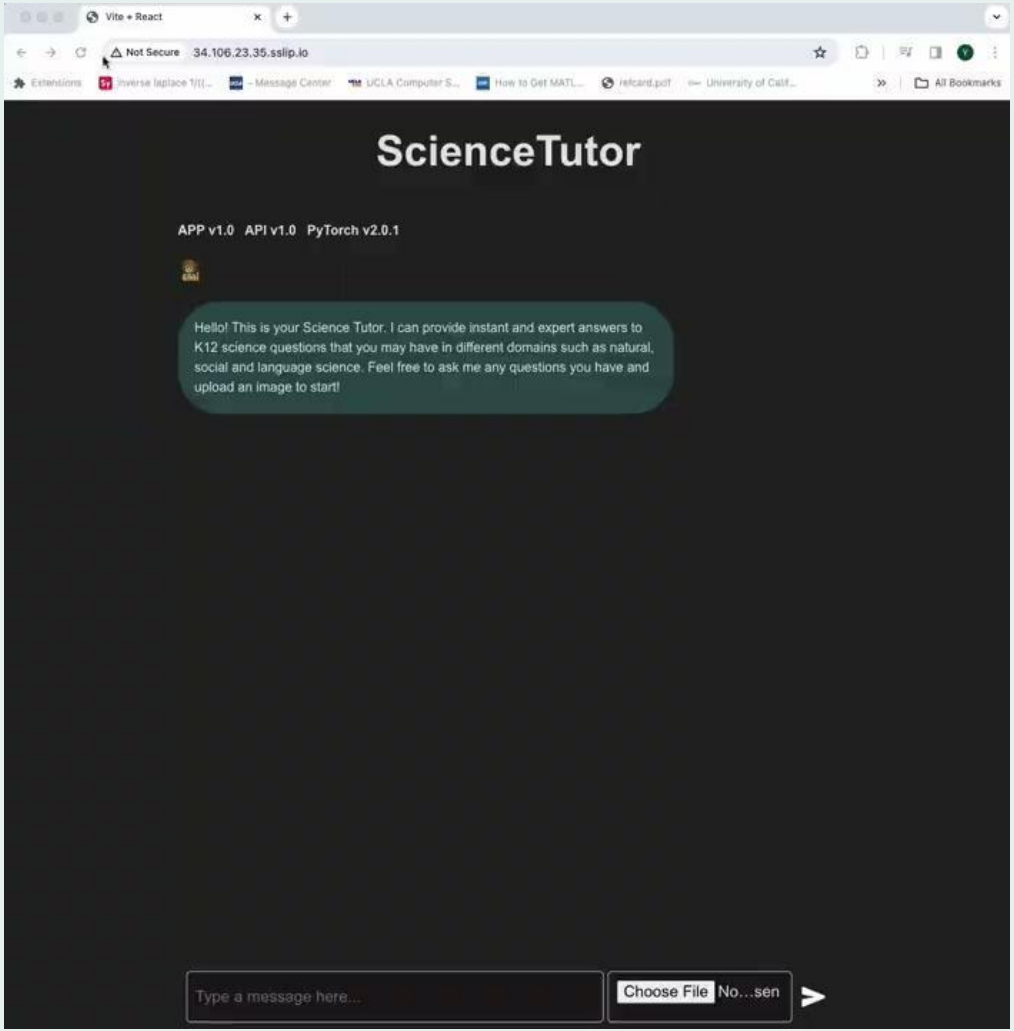
Containerized deployment using Kubernetes Cluster and automation with Ansible and GitHub Actions, enhancing robustness and scalability.

03

User Friendly

The frontend sends chat history to the backend to incorporate history during model inference, ensuring smooth interactions.

App Demo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Thank You!

Do you have any questions?