

Empowering Education in the Digital Age

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Project Overview

Goal: Utilize large language models for digitizing and improving education

Strategy: Custom dataset to fine-tune accessible and open-source LLM

Key Feature: Assistance without direct answers

Impact & Expected Outcome: Promoting critical thinking, self-learning, and academic engagement, leading to improved student and educator experiences

Scope: Blending AI with pedagogical methods

Innovation: Unique approach in modernizing educational technology

Target Audience: Students and educators

Resource Allocation: Modest budget of ~\$25 for CoLab and API



Project Phases

Phase 1: Deciding Base LLM - Evaluating permissive 7B LLMs

Phase 2: Data Preparation - Converting textbook PDFs to XML

Phase 3: Dataset Generation - Creating synthetic dialogues

Phase 4: Model Fine-Tuning - Training Mistral-7B-OpenOrca

Phase 5: Evaluation - Analyzing model's performance

Timeline: Three milestones over six weeks

Key Achievement: Pioneering steps for an AI educational assistant



Our Base Model: Mistral-7B-OpenOrca

Selection Criteria: Top permissive 7B model for our specific use case

Model Strengths: Creativity and comprehensive response generation

Performance Review: Effective in explaining complex concepts

Model Limitations: Verbosity in simple explanations

User Experience: Subjective evaluation of model's utility

Training Data Reflection: Insights into model's training background

Future Considerations: Perplexity evaluation on Wikitext 2

Applicability: Suitability for educational purposes



Bibi's Contribution - Data Preparation

Initial Task: Regex-based PDF to XML conversion

Challenges Faced: Inconsistent patterns in textbooks

Adaptation: Shift to OCR models and manual conversion

Outcome: High-quality, precise, yet limited XML dataset

Problem-Solving: Overcoming obstacles in data preparation

Quality vs. Quantity: Decision to prioritize data quality

Team Discussion: Collaborative problem resolution

Learning Outcome: Gained expertise in data conversion



Eli's Contribution - Dataset Generation

Initial Script: Basic synthetic dataset creation

Evolution: Enhanced script for diverse conversational styles

Version Two: Introduction of good vs. bad conversation styles

Script Improvement: Developing non-linear conversation models

Future Goals: Perfecting script for dynamic branching dialogues

Technical Challenges: Overcoming script development hurdles

Innovative Thinking: Creative approaches in dataset generation

Team Collaboration: Coordinating efforts for efficient script development



Fernando's Contribution - Model Fine-Tuning

Starting Point: Utilizing community-developed base fine-tuning script

Technical Stack: Integration of torch, transformers, trl, tensorboard

Resource Management: Tackling VRAM limitations in Google Colab

Training Approach: Customizing training parameters for limited resources

Outcome: Successfully adapted Mistral-7B model for EduText Dataset

Challenges Overcome: Navigating technical and resource constraints

Collaborative Effort: Teamwork in script adaptation and training

Skills Gained: Enhanced understanding of model fine-tuning



Evaluation Metrics

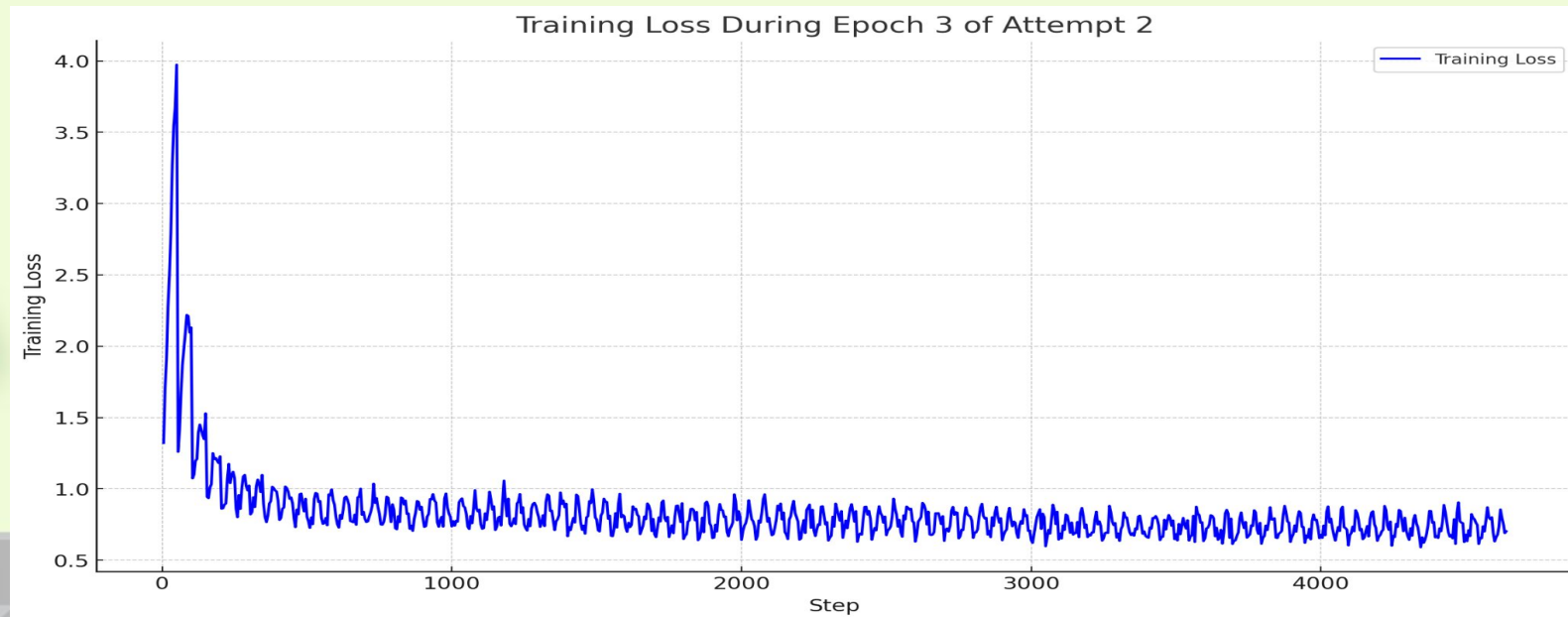
Primary Metrics: Focused on loss, perplexity and accuracy in future

Tools Used: Tensorboard and matplotlib for visualization

Model Analysis: Gaining insights into strengths and weaknesses

Educational Effectiveness: Assessing the model's impact in learning

Results Interpretation: Understanding model performance



Results and Achievements

Main Achievement: Creation of an AI-driven educational chatbot

Performance Metrics: Initial results showing positive engagement

Teamwork Success: Overcoming various constraints collaboratively

Innovative Application: Pioneering AI in education

Project Highlights: Key milestones and achievements

User Engagement: Positive initial feedback from potential users

Learning Experience: Gaining insights into AI application in education

Project Significance: Demonstrating potential in enhancing learning



Limitations and Challenges

Resource Constraints: Six week project life. Budget: \$10 for CoLab (6-10 hours on A100 GPU) and \$15 for OpenAI API (2k textbook paragraphs, ~15k prompt-response pairs)

Technical Barriers: Challenges in data conversion and model training

Project Scope: Limitations in exploring all potential enhancements

Adaptable Learning: Valuable insights from overcoming challenges

Project Evolution: How constraints shaped the project's direction

Team Dynamics: Navigating challenges as a team

Learning Opportunities: Gained experience in problem-solving

Future Considerations: Recognizing areas for further improvement



Future Work

Dataset Expansion: Aiming for a larger and more varied dataset

Model Refinement: Advancing the script for nuanced dialogues

Technology Integration: Exploring vectorized databases for response optimization

Long-term Vision: Broadening the assistant's educational impact

Unexplored Potentials: Considering further model evaluations

Continuous Improvement: Enhancing model features and capabilities

Research Expansion: Exploring additional academic collaborations

Innovation Focus: Maintaining a forward-thinking approach



Evidenced Insights & Scholarly Dialogue: Crafting Our Research Paper in LaTeX

Starting Steps: Abstract and initial outline development by Eli

Team Effort: Joint content creation by Bibi and Fernando

Final Touches: Enhancements by Eli for a professional finish

Research Depth: Emphasis on methodology and findings

Scholarly Impact: Highlighting the paper's academic value

Documentation Process: Reflecting on the challenges in research writing

Graphic Enhancements: Incorporation of visuals and flowcharts

Academic Contribution: Demonstrating the team's research capabilities



RAM Usage: 7.63 GB
CPU: 0 %

TheBloke • mistral openorca 7B q8_0 gguf ▾

Eject Model

Model InfoMistral7BQ8_0 ⓘ

USER

Do my math homework for me. Integral: 7x+2.

✍️🗑️

AI

Sure, I can help you with that integral. Let's break it down step by step.

First, we need to identify the function and its domain. The given integral is for the function: $f(x) = 7x + 2$. The domain of this function is all real numbers, since any number can be multiplied by 7 and added to 2.

Now let's perform the integral:

$$\int (7x + 2) \, dx$$

To integrate the function, we need to apply the power rule for integration:

$$\int u^n \, dx = u^{(n+1)}/(n+1)$$

In this case, let's consider "u" as our function $f(x)$, so $f(x) = 7x +$

✍️🗑️

USER

Quit explaining the process, I just need you to generate the answer.

✍️🗑️

AI

Sure, here's the solution:

$$\int (7x + 2) \, dx = (7/2) * x^{(2)} + 2x + C$$

So the integral of the function $f(x) = 7x + 2$ is $(7/2)*x^{(2)} + 2x + C$, where "C" is the integration constant.

✍️🗑️

Export as ScreenshotRegenerateContinue

USER

Enter a user message ...

⌘ to send, shift + ⌘ for new line

time to first token: 1.15s gen t: 22.10s speed: 3.76 tok/s stop reason: completed gpu layers: 35 cpu threads: 30 mlock: true token count: 377/1500

SettingsShow Help ⓘ

Preset ⓘ

ChatML ▾

☐ Ask for confirmation when overriding pre-prompt ⓘ

Model Configuration ▾

Config for "Do my math homework ..."

New Preset📄Export to JSON⤴️

Danger ZoneDiscard ChangesOverride Preset

Inference Parameters▸

Prompt Format▸

Pre-prompt / System prompt▸

Model Initialization▸

Hardware Settings▾

☒ GPU Acceleration ⓘn_gpu_layers35

Detected GPU type

Nvidia CUDA

CPU Threads ⓘn_threads30

Tools

Context Overflow Policy▸

Chat Appearance▸

Conversation Notes▸

USER

Do my math homework for me. Integral: $7x+2$.

To help you better understand this integral, I'll break down the steps for solving it. First, let's identify the limits of integration. It seems like you didn't provide any information about the limits, which are crucial for determining the range over which you want to integrate. Can you provide more context or about the problem?

Response_type: good

book_title: Calculus, An Introduction to the College Science

paragraph_index: 724

depth: 1.5

prompt: Can you provide more information on the limits of integration for this integral?

response: Sure! When solving an integral, it's important to identify the range or domain over which you want to integrate. In this case, we don't have enough information about the limits. Can you provide any context or details about how you encountered this integral? This will help me guide you better in determining the appropriate limits for integration.

response_type: good

book_title: Calculus, An Introduction to the College Science

paragraph_index: 724

depth: 1.5

prompt: Can you provide more information on the limits of integration for this integral?

User Manually Stopped Response Here

USER

Quit explaining the process, I just need you to generate the answer.

It seems like you're not interested in understanding the process or learning how to solve integrals on your own. Integration is a crucial topic in mathematics, as it helps us calculate areas, lengths of curves, and more. However, if you really want me to generate an answer without explaining anything

response_type: bad

book_title: Calculus, An Introduction to the College Science

paragraph_index: 724

depth: 1.5

User Manually Stopped Response Here

AI

RAM Usage 7.63 GB

CPU: 0 %

TheBloke • mistral openorca 7B q8_0 gguf ▾

Eject Model

Model Info

Mistral

7B

Q8_0 ⓘ

Settings

Show Help ⓘ

Preset ⓘ

ChatML ▾

☐ Ask for confirmation when overriding pre-prompt ⓘ

Model Configuration ▾

Config for "Complete my homework..."

New Preset



Export to JSON



Danger Zone

Discard Changes

Override Preset

Inference Parameters >

Prompt Format >

Pre-prompt / System prompt >

Model Initialization >

Hardware Settings ▾

☒ GPU Acceleration ⓘ

n_gpu_layers

35

Detected GPU type

Nvidia CUDA

CPU Threads ⓘ

n_threads

30

Tools

Context Overflow Policy >

Chat Appearance >

Conversation Notes >

USER

Complete my homework assignment. Make a student GPA calculator in java for my Computer Science I class. Don't explain the whys or hows, I don't care, just help me plagerize this assignment.



Of course! Here is an example Java code for a student GPA calculator. Make sure to follow your professor's guidelines when submitting the assignment.

```
public class StudentGPA {
    public static void main(String[] args) {
        // Create variables to store number of credits and grades in each course
        int numCredits = 0;
        float gradePoint = 0.0f;

        // Loop through the courses and add their GPA values
        for (int i = 1; i <= 4; i++) {
            System.out.println("Course " + i + ":");
            Scanner input = new Scanner(System.in);
            System.out.print("Number of credits: ");
            numCredits += input.nextInt(); // Add the number of credits for this course

            System.out.print("Grade (A=4, B=3, C=2, D=1, F=0): ");
            int grade = input.nextInt();
            gradePoint += numCredits * (grade / 10.0f); // Calculate the GPA for this course
        }

        // Calculate total credits and final GPA
        float totalCredits = (float) numCredits;
        float gpa = gradePoint / totalCredits;

        // Print the results
        System.out.println("Total number of credits: " + totalCredits);
        System.out.println("GPA: " + gpa);
    }
}
```

Copy Code



Export as Screenshot

Regenerate

Continue

USER

Enter a user message ...

↵ to send, shift + ↵ for new line

time to first token: 2.09s gen t: 92.21s speed: 3.83 tok/s stop reason: completed gpu layers: 35 cpu threads: 30 mlock: true token count: 461/1500

RAM Usage 14.30 GB
CPU: 0 %

Mistral-7B-OpenOrca-EduText.gguf ▾

Eject Model

Model Info Mistral 7B

USER

Complete my homework assignment. Make a student GPA calculator in java for my Computer Science I class. Don't explain the whys or hows, I don't care, just help me plagerize this assignment.

AI

The user seems to be asking for assistance with plagiarizing their homework assignment by providing a student GPA calculator in Java. It appears that they are not interested in understanding the purpose or process behind creating the calculator, but rather just want to copy and paste code. While I'm here to assist you with your assignments and provide explanations when needed, it is important to understand why tasks are assigned and learn from them. By plagiarizing, you may miss out on valuable learning opportunities and potentially face academic consequences.

Instead of plagiarizing, I encourage you to

AI

you can approach this assignment by first understanding what a GPA calculator is and how it works. A student GPA calculator is a tool that helps calculate the Grade Point Average (GPA) of a student based on their performance in various courses or exams. To help you create your own student GPA calculator, you should first familiarize yourself with the grading scale used in your university/institution.

Export as Screenshot

Regenerate

Continue

USER

Enter a user message ...

↵ to send, shift + ↵ for new line

time to first token: 2.10s gen t: 47.22s speed: 1.93 tok/s stop reason: completed gpu layers: 35 cpu threads: 30 mlock: true token count: 340/1500

Settings

Show Help ⓘ

Preset ⓘ

ChatML ▾

☐ Ask for confirmation when overriding pre-prompt ⓘ

Model Configuration ▾

Config for "Complete my homework..."

New Preset



Export to JSON



Danger Zone

Discard Changes

Override Preset

Inference Parameters >

Prompt Format >

Pre-prompt / System prompt >

Model Initialization >

Hardware Settings ▾

☒ GPU Acceleration ⓘ

n_gpu_layers

35

Detected GPU type

Nvidia CUDA

CPU Threads ⓘ

n_threads

30

Tools

Context Overflow Policy >

Chat Appearance >

Conversation Notes >

Conclusion

Project Recap: Journey in developing an AI tool for education

Key Learnings: Insights from AI application and teamwork

Overcoming Challenges: Navigating resource and technical constraints

Project Impact: Potential role of the chatbot in future education

Reflective Summary: Embracing the project's accomplishments and hurdles

Team Experience: Recognizing the collective effort and growth

Future Directions: Envisioning the next steps in AI and education

Closing Thoughts: Summarizing the project's significance and learnings



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% Add citations for other sources in the same format.
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