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AI Calculator App

Enhancing Problem Solving Strategy



Overview of My Project



AI Calculator App

An advanced AI-powered calculator with a digital board UI, offering multiple pencil colors for an interactive experience. The app can analyze board images to solve mathematical and aptitude questions accurately. It also functions as an AI assistant, answering general queries. Built using FastAPI and Google's Generative AI, it ensures fast and efficient problem-solving with a user-friendly interface.



Problem Statement

Current scenario:

- Traditional calculators are limited to numerical inputs, requiring users to manually type equations, which can be inefficient for complex problem-solving.
- Students and professionals often solve problems on physical or digital whiteboards but lack an intuitive way to directly interpret and solve them using AI.
- To address this, I developed an AI-powered calculator that:
- Analyzes handwritten mathematical and aptitude questions from a digital board interface.
- Allows users to write naturally using different pencil colors.
- Instantly interprets and solves queries using AI.
- Functions as a smart assistant, answering general questions.
- This makes the app a versatile tool for learning and problem-solving.



Tech Stack



Frontend(NextJs+React)

- Next.js & React for fast performance and SEO-friendly rendering.
- Mantine & Tailwind CSS for a modern, responsive UI.
- Axios for API communication.
- Better React MathJax for rendering mathematical equations.
- React Draggable & Toastify for enhanced user interaction.
- TypeScript & ESLint for code quality and maintainability



Backend(FastAPI/AI model)

- FastAPI for high-performance API handling.
- Google Generative AI for solving math and answering queries.
- Pillow for image processing and board analysis.
- NumPy & Pandas for mathematical data handling.
- Uvicorn for running the backend efficiently.



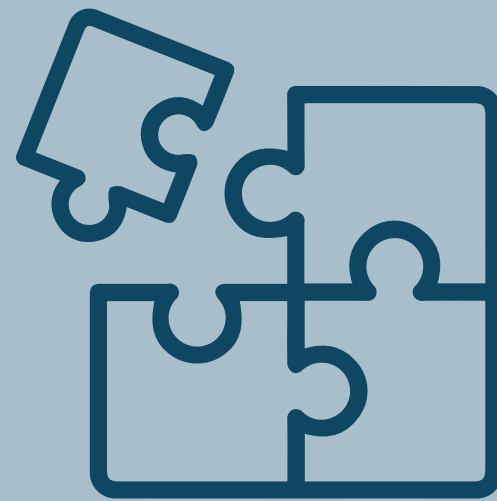
Customer Feedback:

Project Objectives



Intuitive interaction

Allow users to write/draw equations and questions naturally on a digital board with multi-color pencils. Conduct a SWOT analysis of existing sales strategy.



AI-driven Solutions

- AI-Driven Solutions: Leverage OCR and AI to interpret handwriting for solving mathematical and aptitude problems.



Efficiency & Versatility

Provide instant, accurate results for both calculations and general queries.

High Level Information

1. User Interface (Frontend):

- Canvas Board: Allows natural drawing/writing with multi-color pencils.
- Input Handling: Supports text, handwriting, and image uploads with real-time feedback.

2. AI Processing Layer (Backend):

- Image Processing (Pillow): Extracts handwriting, shapes, and symbols.
- OCR Module: Converts handwritten input to text.
- AI Q&A (Google Generative AI): Solves aptitude questions.
- Math Module (NumPy/Pandas): Handles complex numerical calculations.

3. API Handling:

- FastAPI: Asynchronous, efficient data flow.

Problem Solved:

- Enables natural drawing instead of typing.
- Combines handwriting recognition & AI for intuitive problem-solving.
- Offers instant results for math & general queries.
- Enhances efficiency for students & professionals.



Challenges I Faced



- Handwriting Recognition: Ensuring accurate translation of messy handwritten equations.
- Color Stroke Segmentation: Differentiating strokes by color for better context understanding.
- Real-Time Performance: Reducing latency in image processing and AI computation.
- Complex Math Computation: Handling advanced calculations (e.g., calculus, matrices) efficiently.
- AI Integration: Tuning Google Generative AI for precise and context-aware answers.
- Deployment & Scaling: Managing high memory usage during concurrent sessions.
- User Experience (UX): Simplifying the canvas tool for intuitive interaction.

Conclusion



The AI Calculator transforms traditional problem-solving by enabling natural handwriting input with real-time AI processing. By integrating OCR, image processing, and powerful computation, it solves complex math and aptitude questions efficiently. This innovative approach enhances learning and productivity for students and professionals alike.





Thank you

