**SocraI Advanced Tutor Synopsis**

**Abstract**:

The SocrAI Advanced Tutor is a single-file web application that brings the Socratic method into an AI-driven learning environment. It uses a FastAPI backend for reasoning and interaction management, paired with a Streamlit frontend that provides an intuitive, chat-style interface. The system engages learners in critical dialogues on complex philosophical or ethical topics, guiding them toward deeper reasoning rather than supplying direct answers.`

**Problem Statement:**

Current AI learning tools primarily deliver information rather than foster critical thinking. Learners often receive direct answers instead of being guided to question, analyze, and reason independently. This limits the development of deep intellectual and ethical understanding. The SocraI Advanced Tutor (v2) addresses this gap by transforming AI into a Socratic mentor that cultivates reflective reasoning through dialogue, logic analysis, and personalized feedback.

**Core Features:**

1. Socratic Dialogue Generation: The AI, powered by OpenAI’s GPT models, analyzes the student’s claim and responds exclusively with open-ended, context-aware questions. It uses personas (e.g., Socrates, Plato, Modern Philosopher, AI Ethicist) and Socratic modes (Gentle, Challenging, Philosophical) to adapt tone and questioning style.

2. Reasoning Trace Mapping: Each dialogue turn is logged as a reasoning trace, including detected logical issues or fallacies, confidence estimation (0–100), interpretation, and follow-up questions. This enables visualization of reasoning flow and argument consistency. 3. Fallacy & Confidence Detection: The backend detects common logical fallacies and estimates how confident the AI is in the soundness of a student’s reasoning. Results are presented transparently to foster self-assessment.

4. Feedback & Summary System: At the end of a session, the AI summarizes the student’s reasoning progress, identifies logical flaws, and generates a 'Reasoning Consistency Score.' The feedback is constructive and growth-oriented.

5. Concept Mastery Tracking: The tutor automatically extracts key terms and abstract concepts from student input to track conceptual engagement and progress over time.

6. Visualization & Export: Interactive tools include a reasoning map (via streamlit-agraph) to visualize dialogue flow, and session export features in JSON or text format for study or review.

7. Personalization & Theme Control: Users can adjust persona, style, and visual theme (colors, fonts, sizes). All data (conversation, reasoning trace, and concept counts) persist within a session.

**Educational Impact:**

The SocrAI Tutor transforms an LLM from a content provider into a critical thinking mentor. It challenges assumptions, surfaces contradictions, and nurtures reflective reasoning. By modeling Socratic questioning at scale, it addresses the limitations of traditional e-learning and fosters genuine intellectual growth.