AI-Powered Smart Document Assistant: An Advanced RAG System

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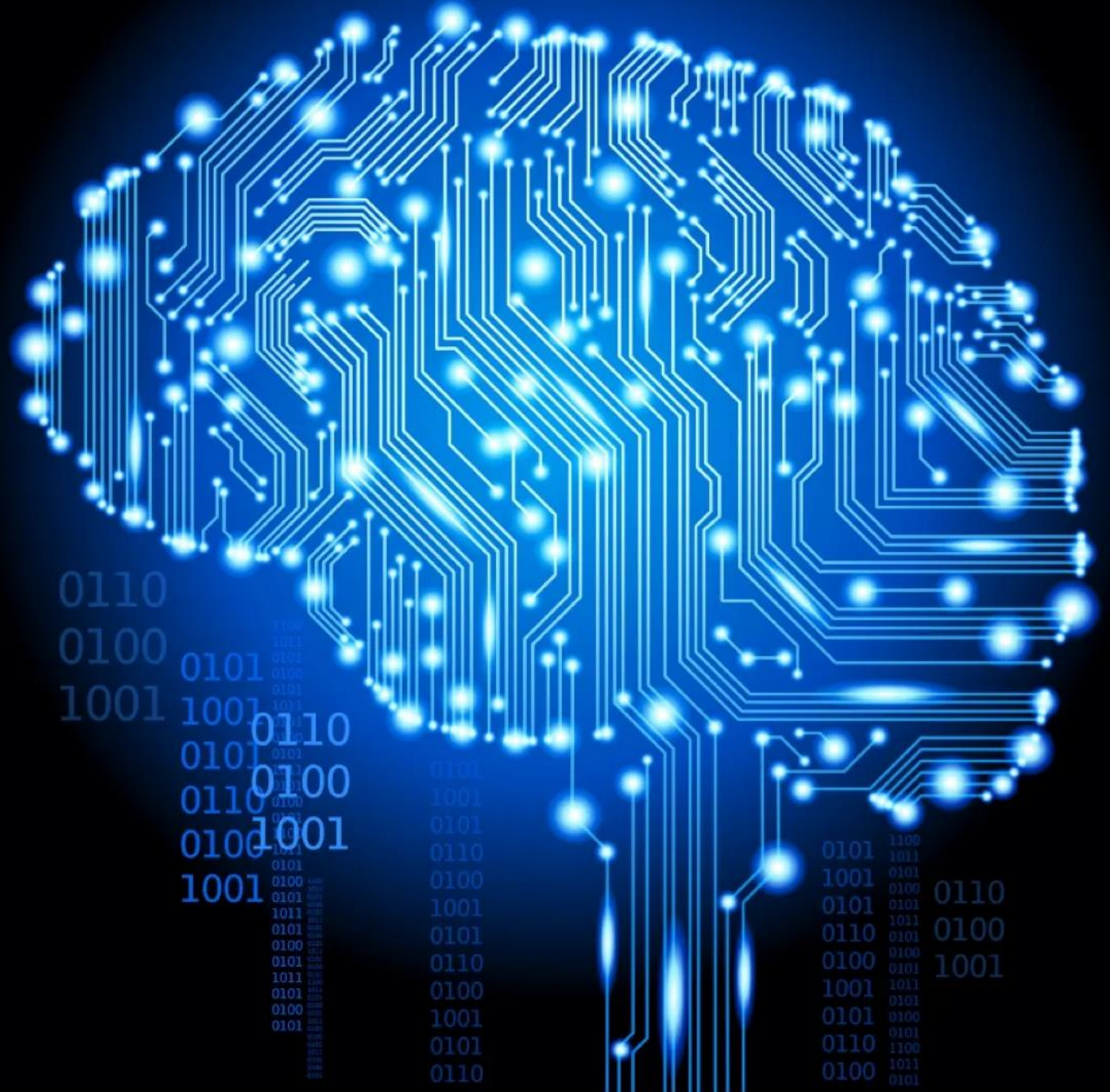
Problem Statement & Objectives

- **PROBLEM**:

- Information retrieval from documents is time-consuming and inefficient, often leading to missed insights.

- **OBJECTIVES**:

- Develop an AI-powered document assistant using Retrieval Augmented Generation

- Enable natural language queries across multiple documents

- Enable web search responses if answer is not found in documents

- Provide accurate answers with source citations

- Create an intuitive user interface for document management and interaction
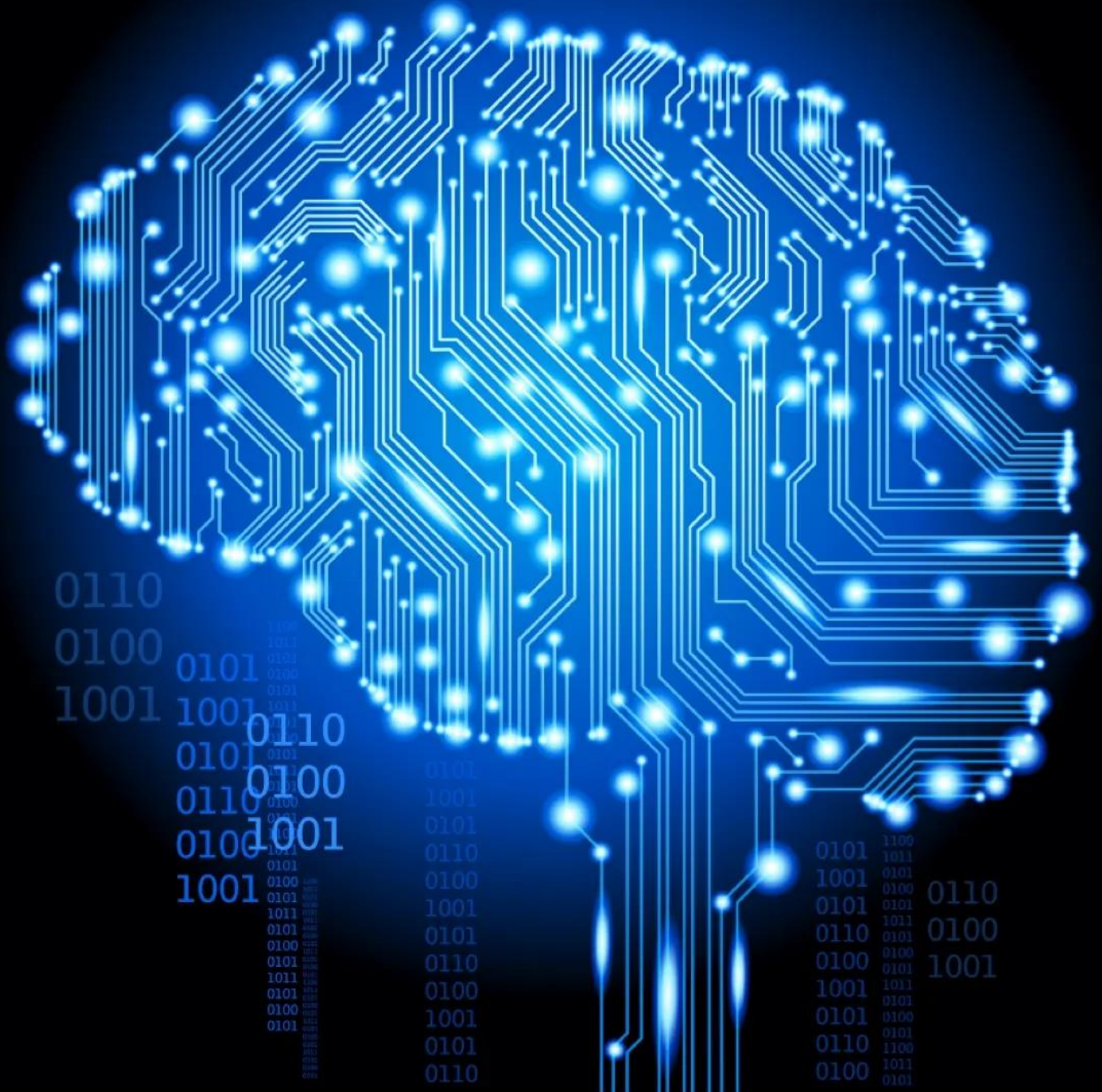
Key features & System Architecture

Key features:
- Secure user authentication and robust file management
- PDF document upload, processing, and analysis
- Multiple query modes: document-only, Wikipedia-only, and hybrid (document + web knowledge)
- Conversational chat interface with context preservation and memory
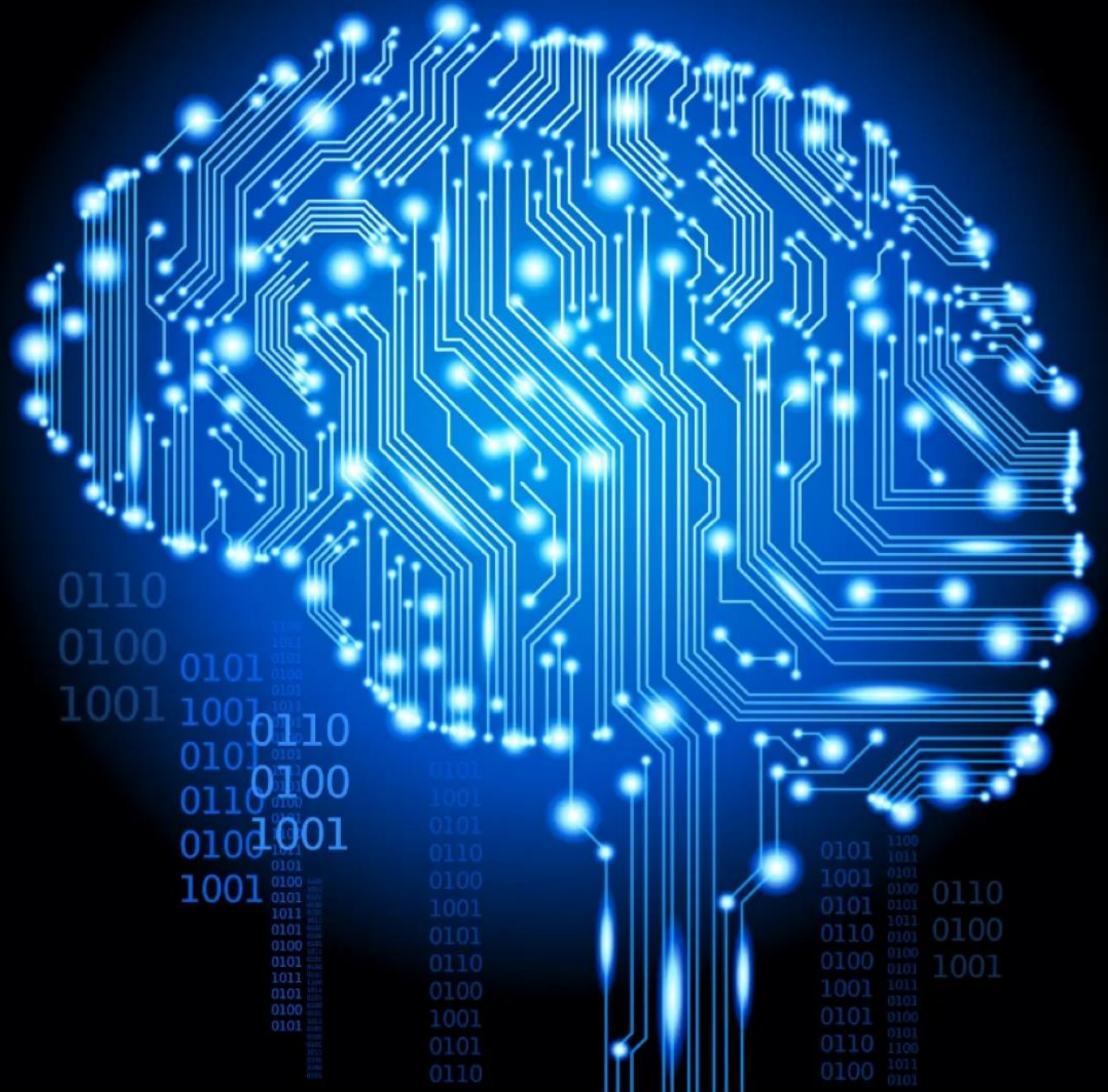- Accurate source citation for all responses

System Architecture:
- **Frontend**: Interactive UI with Express.js & EJS templates
- **Backend**: FastAPI services for auth, documents, and RAG processing
- **Database**: SQLite with SQLAlchemy ORM
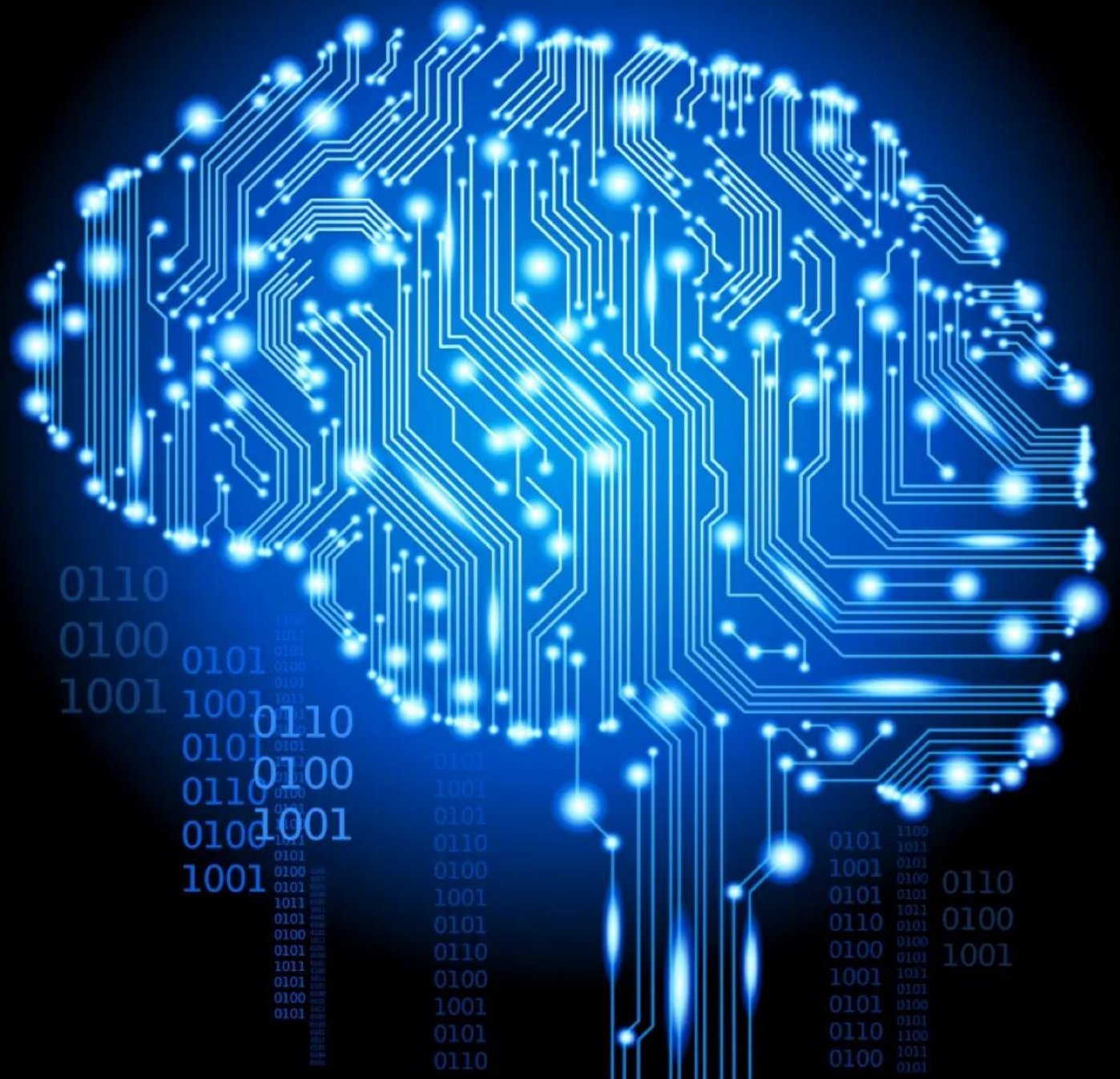- **AI Engine**: LangChain components with Groq LLM integration

RAG Implementation

- **1. Document Processing:** Upload → Extract → Chunk → Embed → Generate summary

- **2. Query Processing:** User Question → Decision Node → Vector Search → Context Retrieval

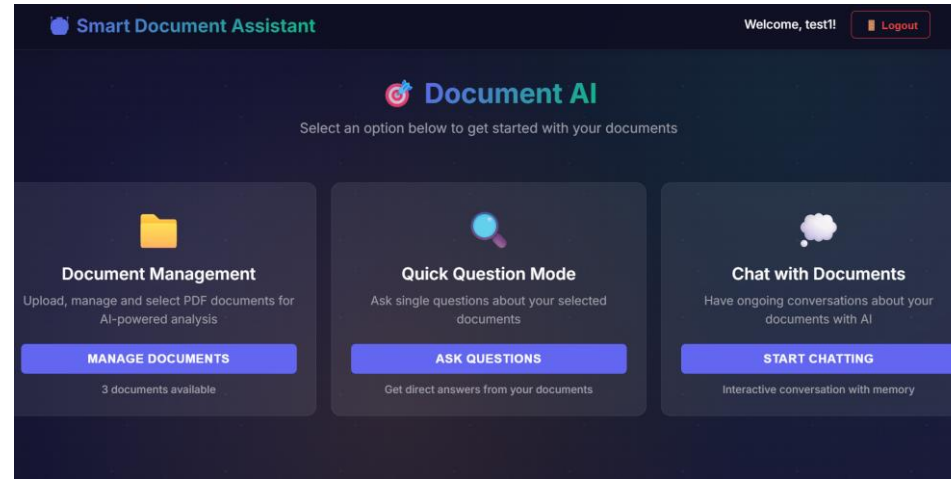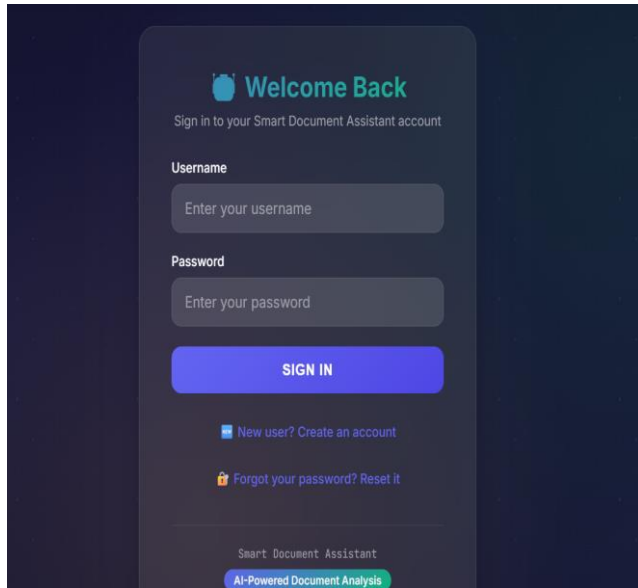- **3. Response Generation**: Context + Query → LLM Generation → Source Citation

Technology Stack

- **Frontend:**
  - Node.js + Express.js
  - EJS Templates
  - Responsive CSS

- **Backend:**
  - FastAPI
  - SQLAlchemy ORM & Alembic versions
  - JWT Authentication

- **AI Components:**
  - LangChain & LangGraph Framework
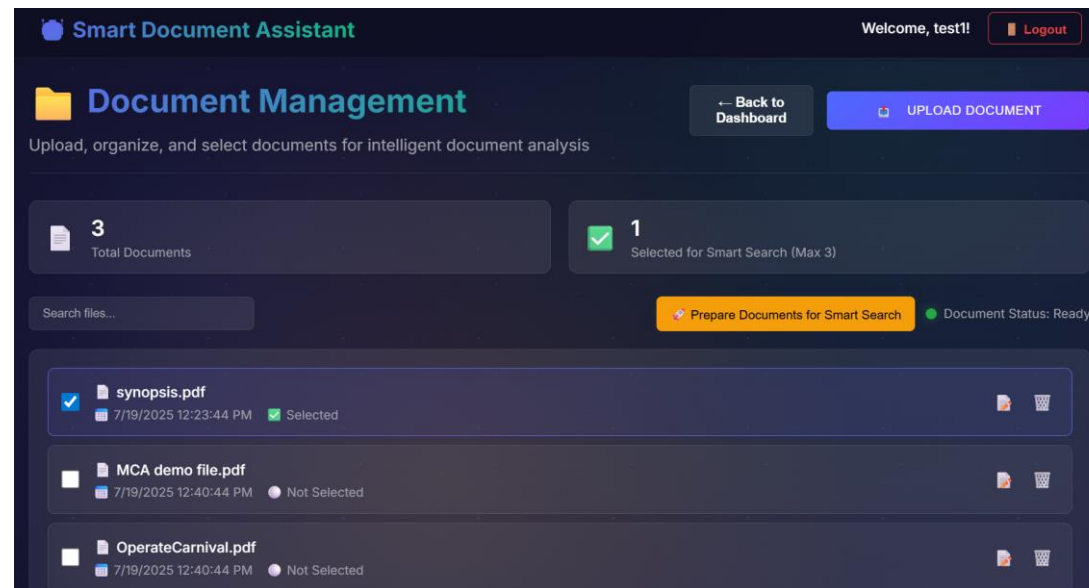 - FAISS Vector Database
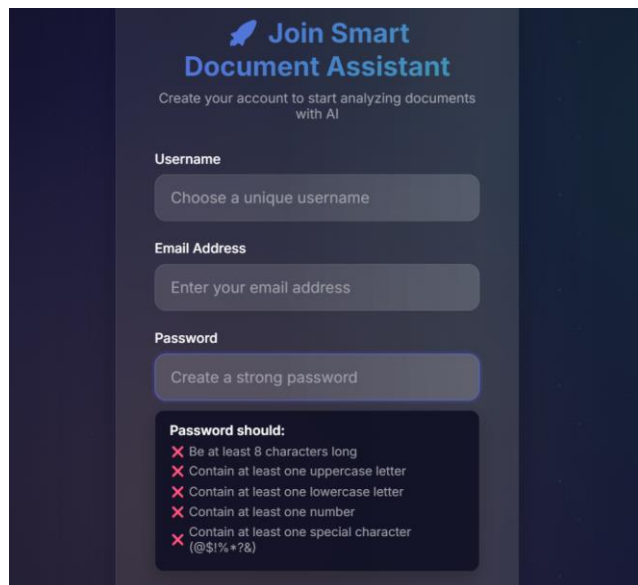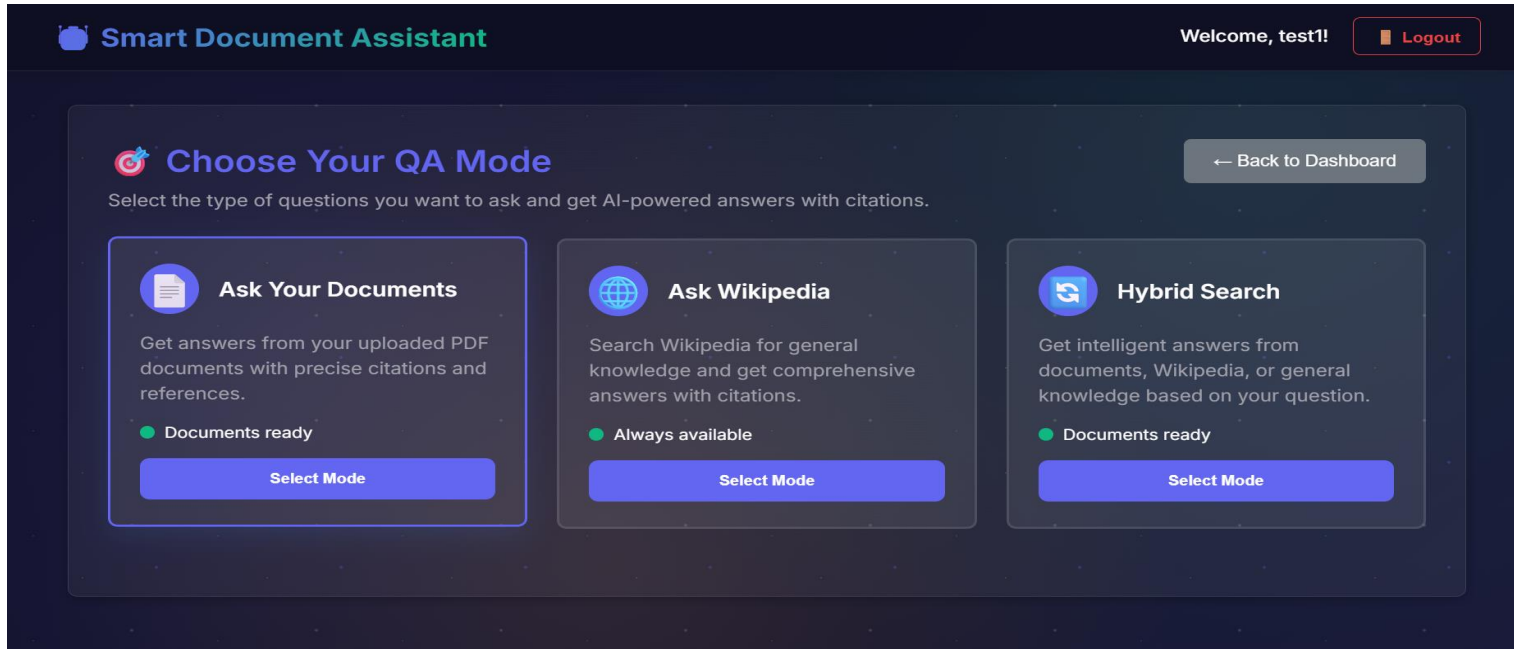 - Groq API Integration
  - HuggingFace Embeddings

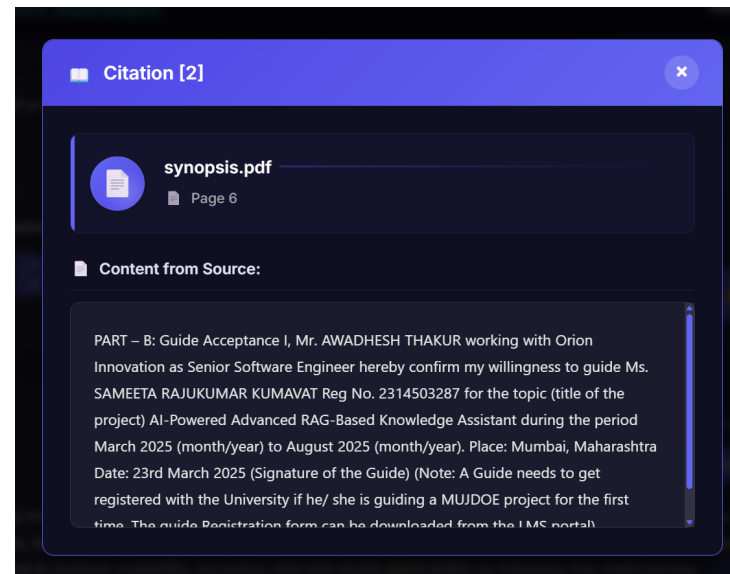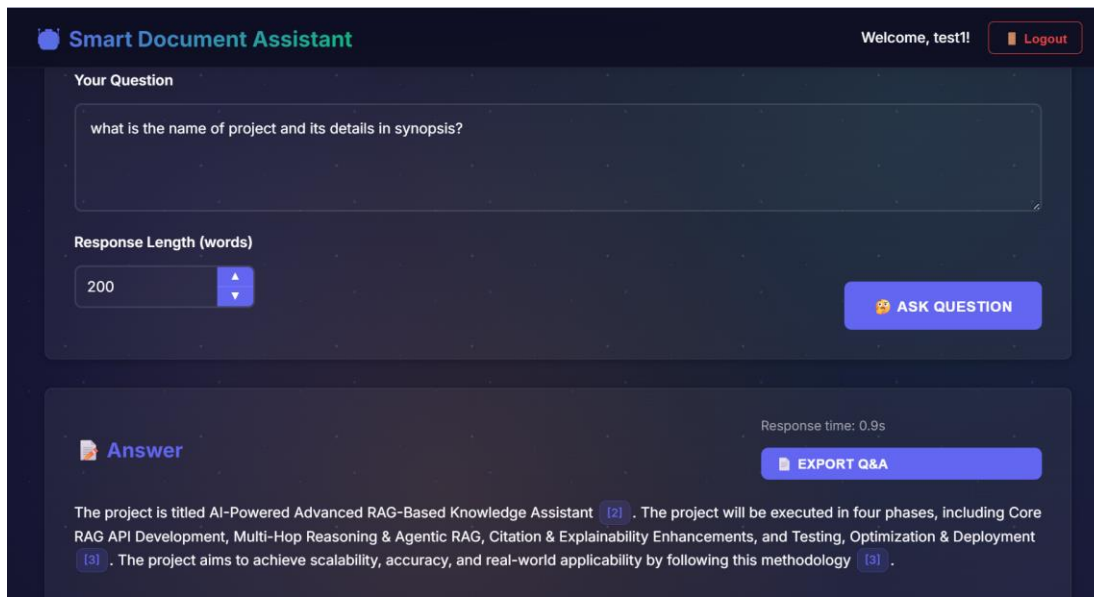# UI Screenshots - Authentication & File Management

- Secure authentication with JWT tokens
- Interactive dashboard for better functionality and usability
- Intuitive document upload with drag-and-drop
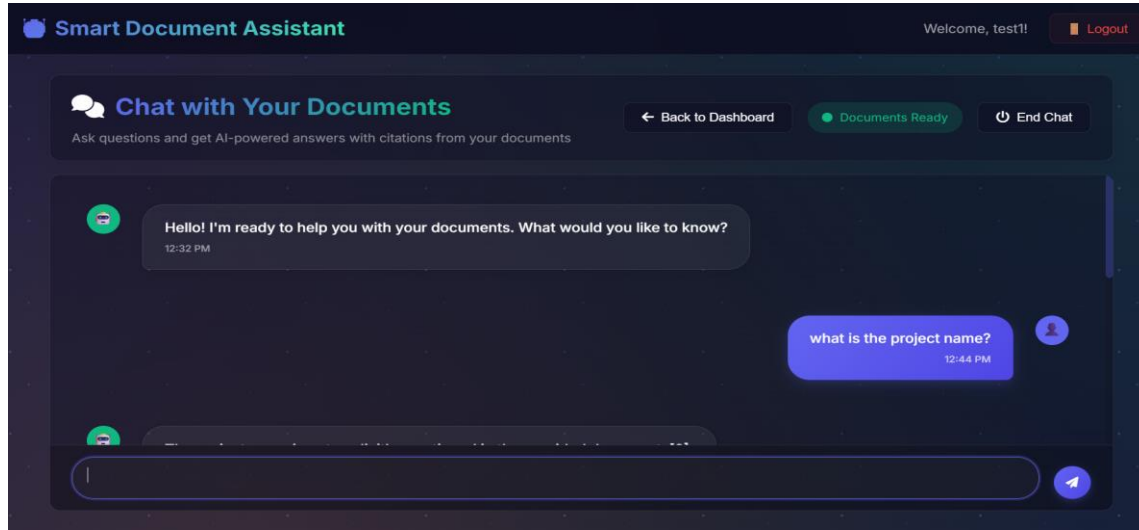- Document selection with auto-generated summaries

UI Screenshots – Single shot QA with precise citations

Smart Document Assistant

Welcome, test1! 🚪 Logout

🎯 Choose Your QA Mode

← Back to Dashboard

Select the type of questions you want to ask and get AI-powered answers with citations.

📄 Ask Your Documents

Get answers from your uploaded PDF documents with precise citations and references.

● Documents ready

Select Mode

🌐 Ask Wikipedia

Search Wikipedia for general knowledge and get comprehensive answers with citations.

● Always available

Select Mode

🔄 Hybrid Search

Get intelligent answers from documents, Wikipedia, or general knowledge based on your question.
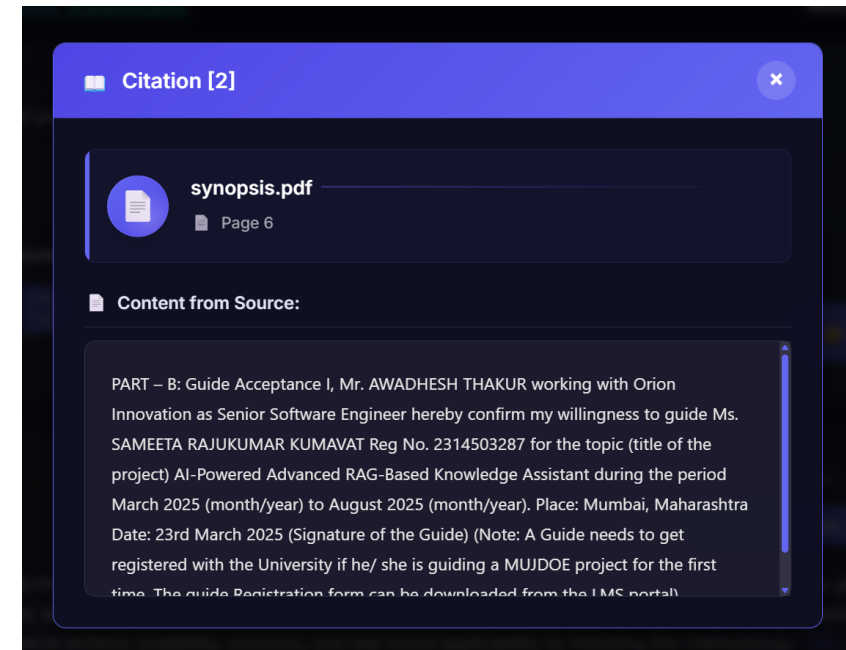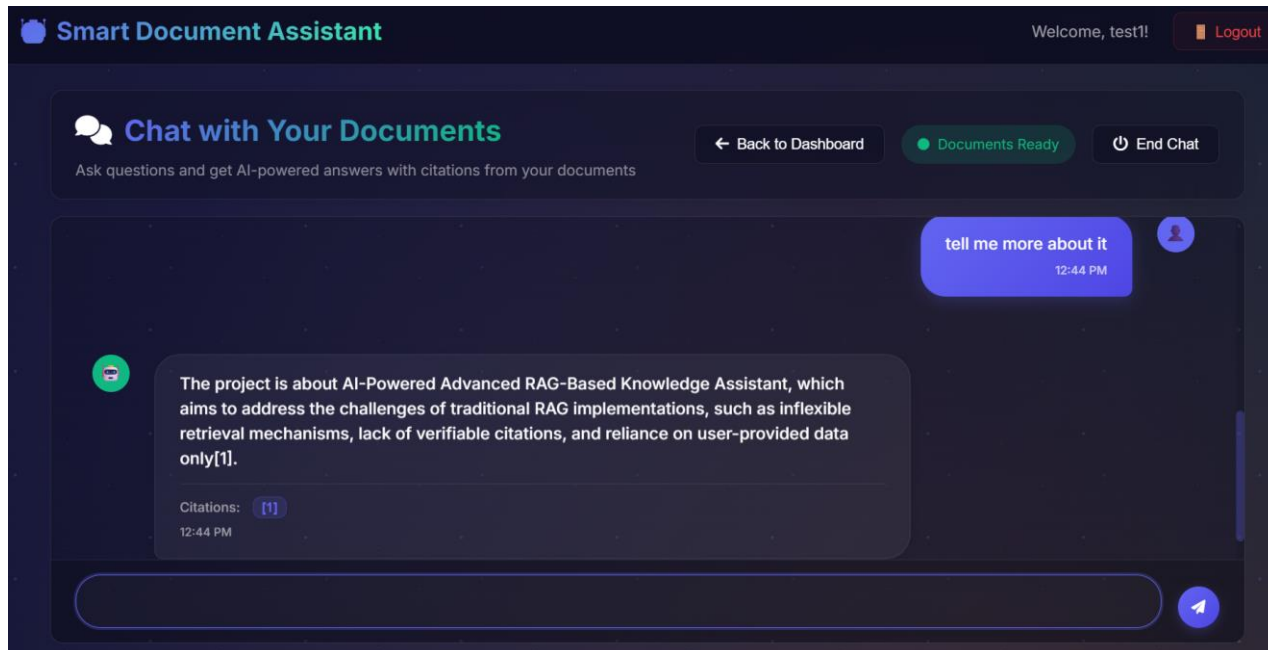
● Documents ready

Select Mode

- Multiple query modes: document-only, Wikipedia-only, and hybrid (document + web knowledge)
- Natural language query interface
- User-friendly responses with source citations
- Citations with detailed content and page number used from document for answer

Smart Document Assistant

Welcome, test1! 🚪 Logout

Your Question

what is the name of project and its details in synopsis?

Response Length (words)

200

🤔 ASK QUESTION

📝 **Answer**

Response time: 0.9s

📄 EXPORT Q&A

The project is titled AI-Powered Advanced RAG-Based Knowledge Assistant [2] . The project will be executed in four phases, including Core RAG API Development, Multi-Hop Reasoning & Agentic RAG, Citation & Explainability Enhancements, and Testing, Optimization & Deployment [3] . The project aims to achieve scalability, accuracy, and real-world applicability by following this methodology [3] .

📖 **Citation [2]**

✕

📄 **synopsis.pdf**
  📄 Page 6

📄 **Content from Source:**

PART – B: Guide Acceptance I, Mr. AWADHESH THAKUR working with Orion Innovation as Senior Software Engineer hereby confirm my willingness to guide Ms. SAMEETA RAJUKUMAR KUMAVAT Reg No. 2314503287 for the topic (title of the project) AI-Powered Advanced RAG-Based Knowledge Assistant during the period March 2025 (month/year) to August 2025 (month/year). Place: Mumbai, Maharashtra Date: 23rd March 2025 (Signature of the Guide) (Note: A Guide needs to get registered with the University if he/ she is guiding a MUJDOE project for the first time. The guide Registration form can be downloaded from the LMS portal)

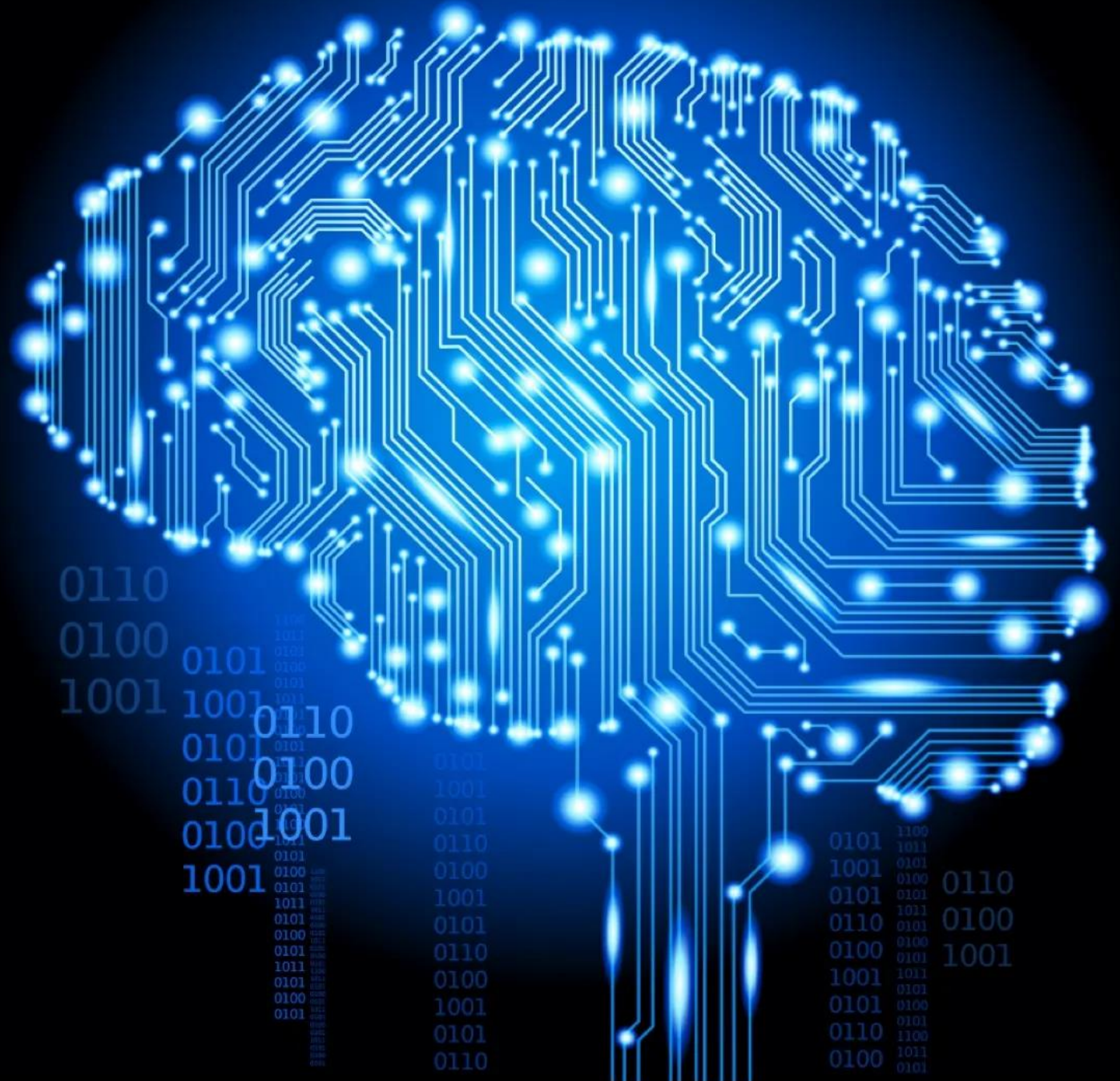# UI Screenshots – Chat with documents with citations

- Natural language query handling and support for follow-up questions
- User-friendly responses with source citations with detailed content and page number used from document for answer
- Export functionality to get user-ai chats in excel format with citations
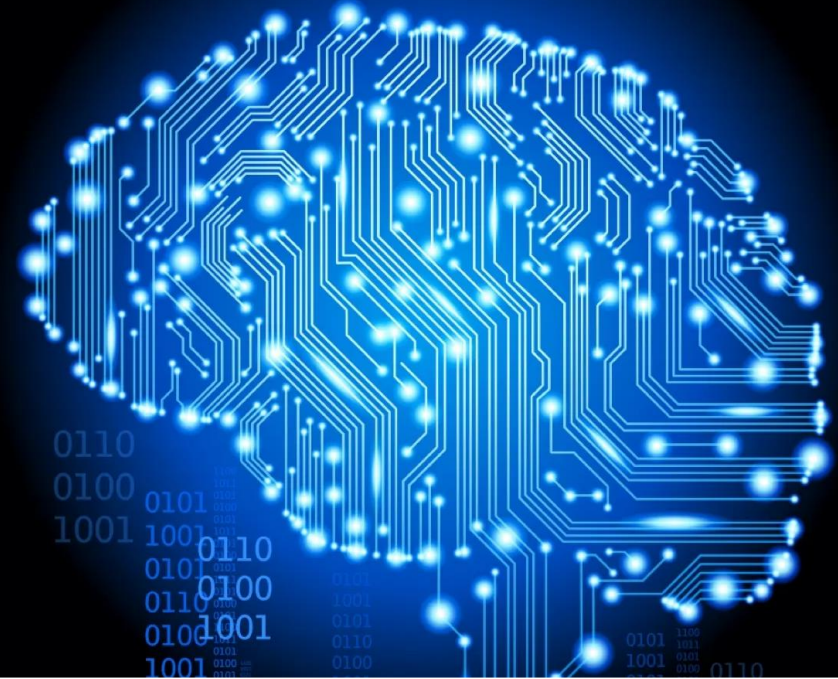
Future Enhancements

- Multi-format document support (DOCX, XLSX, images with OCR)

- Hybrid retrieval combining vector and keyword search

- Multi-lingual document support

- Implementation of domain-specific fine-tuning to improve response quality for specialized use cases

- Integration with multiple LLM providers (OpenAI, Anthropic, local models) to select the most appropriate model for different query types

- Implementation of user feedback mechanisms to improve retrieval and response quality

Code repo and Demo

- Github link:
  sameetakumavat/Advanced_RAG

- Demo video link:
  Advanced_RAG/GMT20250720-
  085618_Recording_1920x1128.mp4 at
  main ·
  sameetakumavat/Advanced_RAG

THANK YOU