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AI KNOWLEDGE HUB 2.0

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ABSTRACT

The AI Knowledge Hub is an interactive application that enables users to access and analyze multimedia content like PDFs, YouTube videos, and images. It uses advanced AI models and natural language processing to extract relevant information from these sources. The system extracts text from PDFs using PyPDF2, retrieves video transcripts via the YouTube Transcript API, and processes images using Optical Character Recognition (OCR). The extracted text is processed using LangChain and stored in FAISS, a vector database optimized for fast similarity searches. The Gemini AI model analyzes user queries, generating context-aware responses. The application supports multilingual translation using Googletrans and a text-to-speech (TTS) feature powered by gTTS. The intuitive Streamlit-based interface allows for quick navigation. The AI Knowledge Hub is designed for real-time processing, making it useful for students, researchers, and professionals. Future enhancements include support for additional file formats, cloud storage integration, advanced video analysis, offline processing capabilities, and compatibility with voice assistants like Alexa and Google Assistant.

Keywords: AI, PyPDF2, TTS

I. INTRODUCTION

AI Knowledge Hub is an innovative tool that allows users to interact with PDFs, YouTube videos, and local video files using natural language. It leverages Generative AI, NLP, Google Gemini, YouTube Transcript API, and LangChain to provide real-time, accurate, and context- aware responses. This makes it a one-stop solution for extracting key insights, summarizing content, and answering queries efficiently.

Built with Streamlit, the application offers a smooth and user-friendly web interface for seamless interaction. It is designed to help students extract key points from research papers, professionals analyze tutorials, and content creators summarize videos effortlessly. Its ability to process diverse multimedia sources makes it a versatile and valuable tool.

A key highlight of AI Knowledge Hub is its multilingual support, allowing users to engage with the system in their preferred language. Additionally, its text-to-speech feature enhances accessibility by converting AI-generated responses into audio, making information consumption more convenient. These features make it an essential tool for learning, research,now it has been upgraded to include:

ATS Integration: Seamlessly analyze resumes against job descriptions using AI-powered Applicant Tracking System logic. This enables users to receive instant feedback on resume match scores, keyword optimization, and alignment with job criteria.

CSV Data Analysis: Upload and interact with CSV files for insightful data exploration. Users can query datasets using natural language, extract summaries, generate statistical insights, and visualize trends without writing code.

Visual Medical Analysis: Leverage AI to assist in medical diagnostics through data visualization and pattern recognition. Users can upload medical records or datasets and get AI-powered visual interpretations and suggestions, aiding healthcare professionals in better decision-making.

II. LITERATURE SURVEY

[1] Lewis et al., *"Retrieval-Augmented Generation (RAG)"*, 2020

- **What it is**: Combines search (retrieval) and generation (LLMs) to answer questions.
- **Why it matters**: It helps answer questions from large documents by first finding relevant parts and then generating answers using AI.
- **Use in your project**: This idea powers the **"Chat with Documents"** feature to give accurate answers based on the uploaded files.

[2] Johnson et al., *"FAISS: Fast Vector Search"*, 2021

- **What it is**: A system for quickly finding similar pieces of text using vector embeddings.
- **Why it matters**: Speed and scale – it works fast even with huge datasets.
- **Use in your project**: Helps retrieve the most relevant document chunks for answering user queries.

[3] Madan & Arora, *"AI in Resume Screening"*, 2021

- **What it is**: Reviews how AI matches resumes to job descriptions using skills, keywords, and semantics.
- **Why it matters**: Saves time in recruitment by automatically checking how well a candidate fits.
- **Use in your project**: Your **Smart ATS Resume Analyzer** uses this concept to match resumes to job roles.

[4] Reynolds & McDonell, *"Prompt Engineering"*, 2021

- **What it is**: Research on how to ask questions to AI in a way that gives the best results.
- **Why it matters**: Good prompts lead to better, more accurate answers from AI.
- **Use in your project**: You use this in both **resume analysis** and **document chat** to guide the AI's responses.

[5] Irvin et al., *"CheXpert Dataset – Medical AI"*, 2019

- **What it is**: A dataset for AI models that analyze chest X-rays and help diagnose medical conditions.
- **Why it matters**: AI models need a lot of quality medical data to work correctly.
- **Use in your project**: Your **Visual Medical Assistant** follows a similar process with Gemini Vision to analyze medical images.

[6] Obermeyer et al., *"Bias in Medical AI"*, 2019

- **What it is**: A study showing how some health AI systems showed racial bias in predictions.
- **Why it matters**: AI must be fair, especially in healthcare.
- **Use in your project**: Warns to interpret results from the Visual Medical Assistant cautiously and ethically.

[7] Google Cloud, *"Text-to-Speech API"*, 2023

- **What it is**: Converts written text into natural-sounding speech.
- **Why it matters**: Makes the app more accessible (helps users who prefer listening).
- **Use in your project**: You use **gTTS** to read out answers in different Indian languages.

[8] Python Software Foundation, *"googletrans Library"*, 2023

- **What it is**: A Python tool that uses Google Translate to convert text into other languages.
- **Why it matters**: Helps users interact with AI in their native language.
- **Use in your project**: Adds **multilingual support** in **Chat with Documents**, **YouTube**, etc., especially for Indian languages.

III. METHODOLOGY

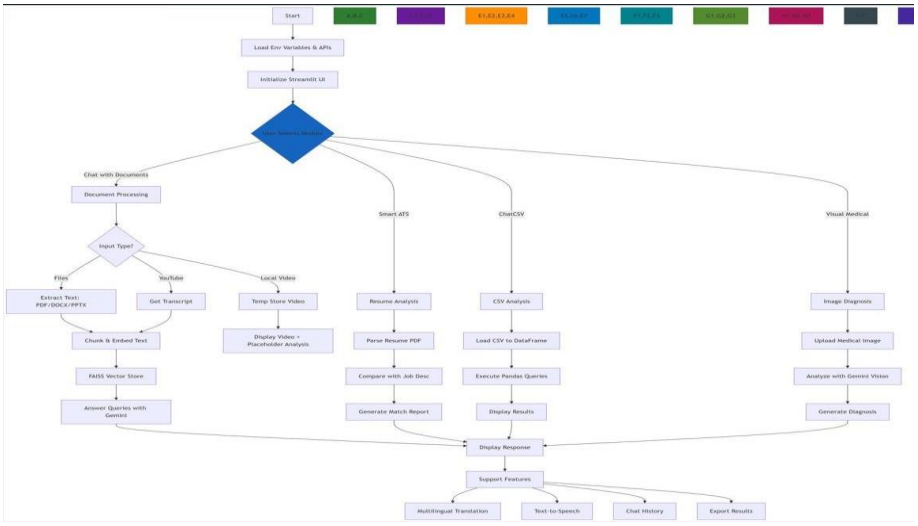


Fig 5.1:Methodology of AI Knowledge Hub

Workflow of the Application

Methodology and workflow Here's a step-by-step explanation of how your AI Knowledge Hub 2.0 works, based on the actual code flow:

1. Initialization Phase

What Happens:

1. Environment Setup

2. UI Rendering

2. Module Execution Flow

A. Chat with Documents *(Most Complex Workflow)*

Step-by-Step:

1. Input Handling

2. Text Processing
3. Question Answering
4. Post-Processing

B. Smart ATS (Resume Analysis)

Workflow:

1. Input → Resume (PDF) + Job Description (text)

2. Text Extraction → `PyPDF2` extracts resume text

3. Analysis → Sends to Gemini with structured prompt: python

4. Output → Displays match %, missing keywords, and summary

C. ChatCSV

Workflow:

1. Upload CSV → Loads into Pandas DataFrame

2. Query Execution → Safely evaluates Pandas commands: python
   eval(query, {"__builtins__": {}}, {"df": df, "pd": pd})
3. Output → Displays results as tables or raw text

IV. ADVANTAGES AND DISADVANTAGES

1. Multi-Modal Input Support

- Accepts PDFs, DOCX, PPTX, YouTube links, and local videos.
- Makes it versatile for different types of learning materials.

2. AI-Powered Text Understanding

- Uses Gemini Pro and Google Embeddings for deep understanding.
- Provides context-aware and accurate answers.

3. Fast Information Retrieval

- FAISS-based vector storage enables quick similarity search even in large datasets.

4. Multilingual Capabilities

- Supports 14+ Indian languages via googletrans and gTTS.
- Makes the tool inclusive and region-friendly.

5. Voice Output

- Converts AI responses to audio using gTTS.
- Helps visually impaired users and enhances learning through auditory feedback.

6. Visual Insights

- Uses t-SNE + Plotly for document visualization.
- Aids in understanding document structure.

7. Smart ATS Module

- Offers resume-job match analysis with Gemini.
- Provides JSON-based actionable feedback.

8. Security & Custom Queries

- Restricted eval for ChatCSV ensures safe execution of queries.
- Allows interactive CSV exploration.

9. Centralized Learning Hub

- All modules (document Q&A, CSV, resume analysis, medical assistant) in one platform.
- Reduces dependency on multiple tools.

Disadvantages

1. Dependence on External APIs

- Relies heavily on youtube_transcript_api, Google Generative AI, and googletrans.
- May break or limit functionality if APIs change or quota limits are exceeded.

2. Performance Bottlenecks

- Large documents or long videos may slow down embedding and retrieval processes.

3. Limited Offline Functionality

- Most features need internet connectivity.
- No local LLM fallback support yet

4. Basic UI Limitations

- Built on Streamlit, which may lack interactivity compared to full-fledged web frameworks like React.

5. Security Risks in CSV Module

- Although eval() is restricted, there's always a small risk if not tightly controlled.

6. Medical Assistant Limitations

- AI-generated medical analysis should not replace real doctor consultation.
- May raise ethical and legal concerns if used irresponsibly.

V. POSSIBLE OUTCOME

1**All-in-One AI Learning & Analysis Platform**

- Integrates **documents (PDF, DOCX, PPTX)**, **YouTube videos**, **CSV files**, **resumes**, and **medical images** into a single intelligent hub.

Modular and Extensible Architecture

- Includes 4 smart modules:
    - **Chat with Documents**: Context-aware Q&A, summarization, multilingual, and voice support.
    - **Smart ATS**: AI-based resume-job match analysis with structured insights.
    - **ChatCSV**: Interactive exploration and querying of CSV data using natural and Pandas language.
    - **Visual Medical Assistant**: AI-based image understanding for healthcare diagnostics.

Use of Cutting-Edge Technologies

- Google Gemini Pro, Gemini Vision, FAISS, LangChain, gTTS, and Google Translate API.

Multilingual & Accessible

- Supports **14+ Indian languages** and voice output, promoting inclusion.

User-Friendly Interface

- Streamlit-based interface for easy interaction without requiring technical expertise.

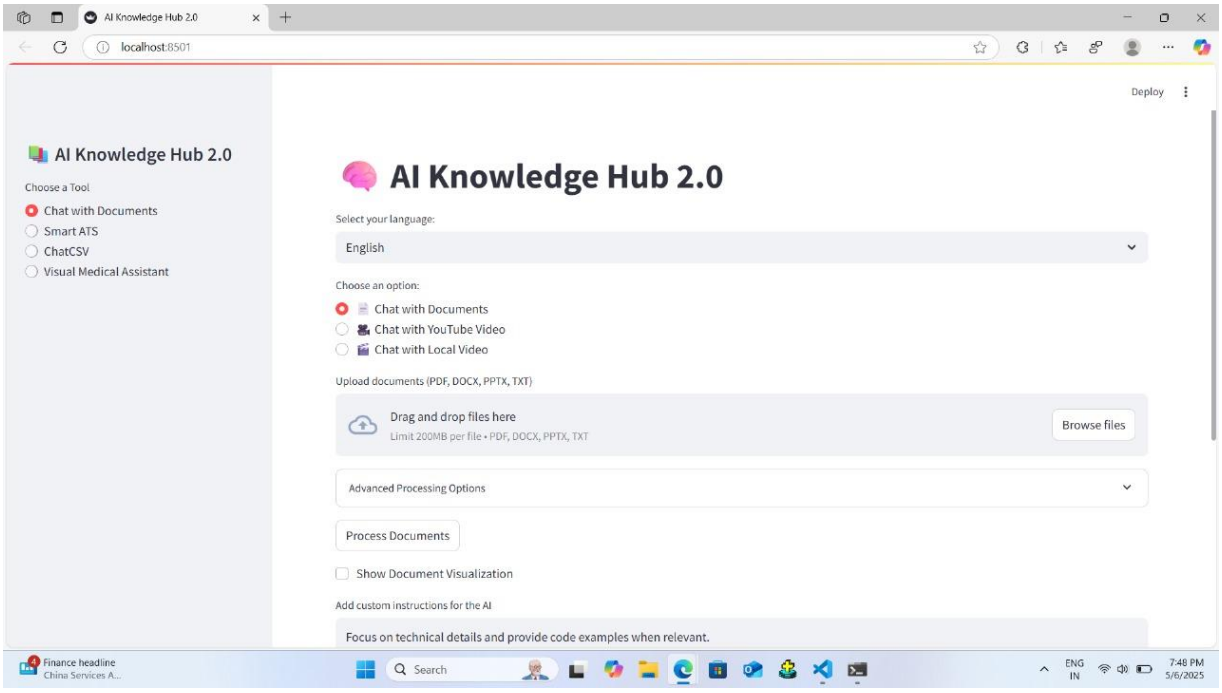
Real-World Use Cases

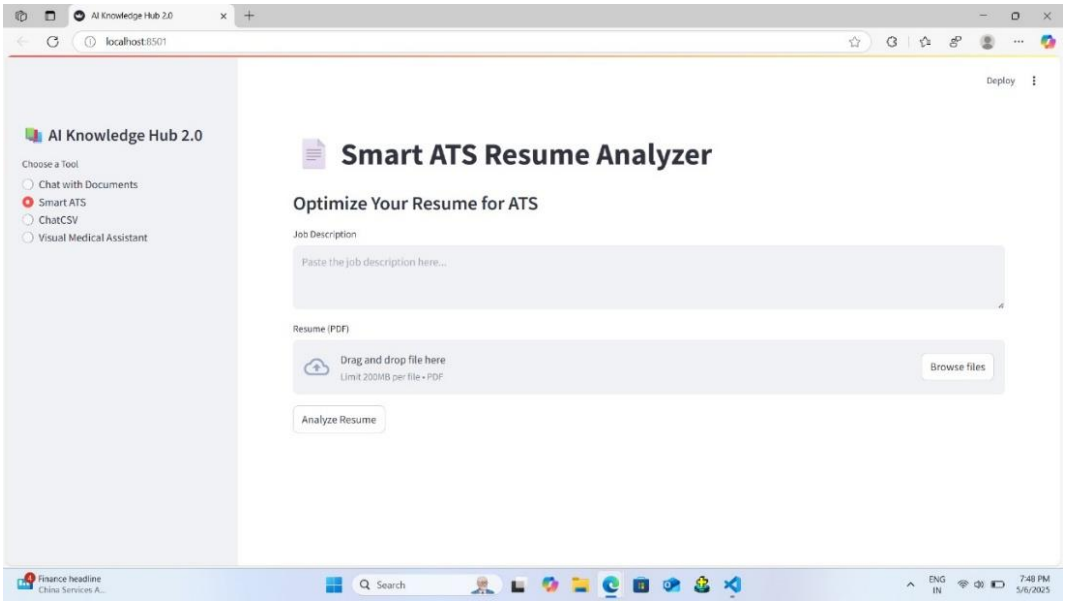
- Helpful in education, recruitment, healthcare, data analysis, and multilingual environments.

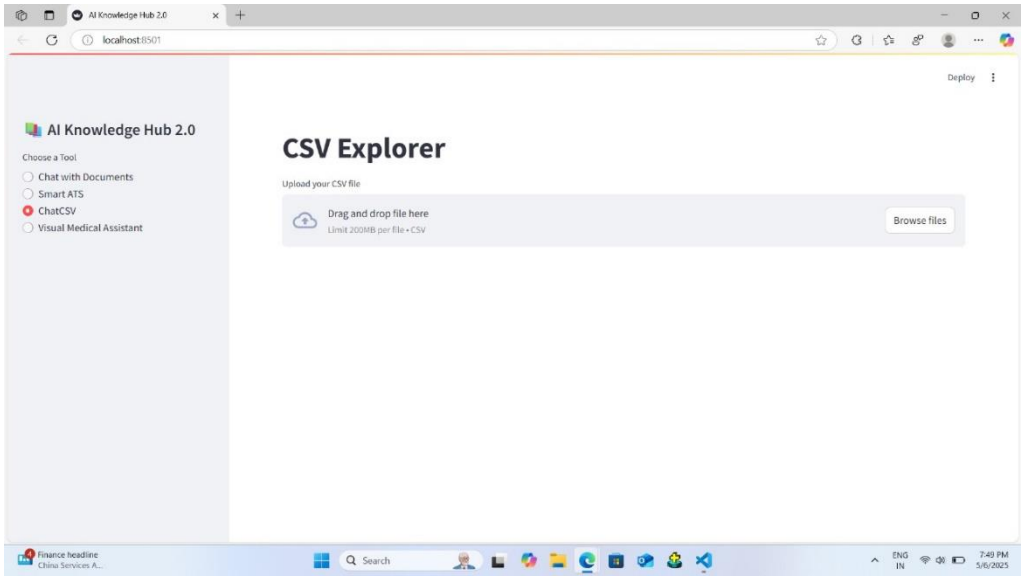
Enhanced Productivity and Decision-Making

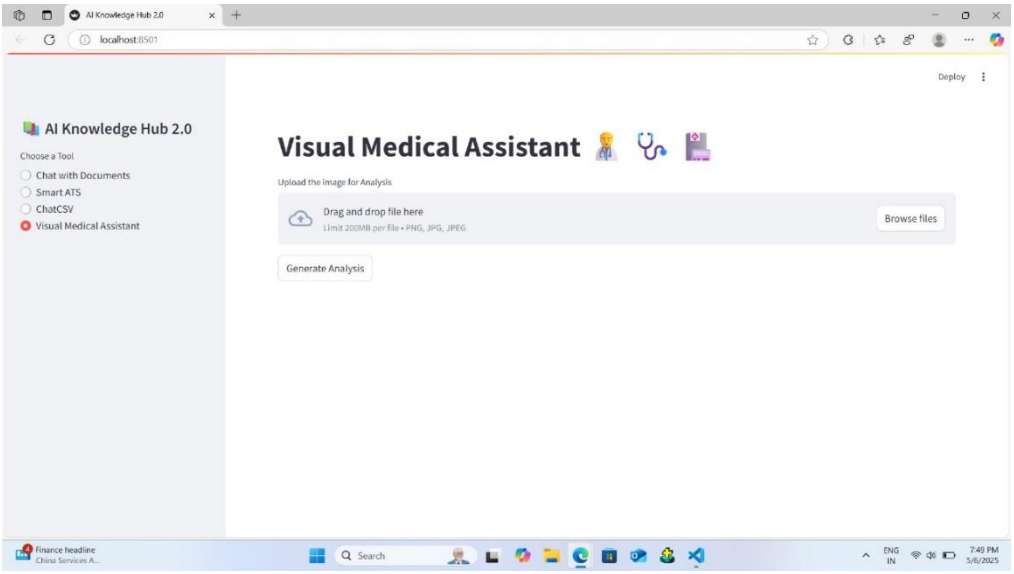
- Saves time by automating document search, resume screening, data interpretation, and medical insights.

RESULTS




AI Knowledge Hub 2.0
localhost:8501
Deploy
AI Knowledge Hub 2.0
Choose a Tool
Chat with Documents
Smart ATS
ChatCSV
Visual Medical Assistant
Smart ATS Resume Analyzer
Optimize Your Resume for ATS
Job Description
Paste the job description here...
Resume (PDF)
Drag and drop file here
Limit 200MB per file • PDF
Browse files
Analyze Resume


AI Knowledge Hub 2.0
localhost:8501
Deploy
AI Knowledge Hub 2.0
Choose a Tool
Chat with Documents
Smart ATS
ChatCSV
Visual Medical Assistant
CSV Explorer
Upload your CSV file
Drag and drop file here
Limit 200MB per file • CSV
Browse files



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