CAPSTONE PROJECT

College Admission Agent

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OUTLINE

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Problem Statement

Students often face difficulties accessing clear, accurate, and timely information about college admissions.

Institutional websites and FAQs are not personalized and often lead to delays in understanding eligibility, courses, fees, and deadlines.

Manual inquiries create inefficiencies for both students and colleges. There is a need for an intelligent assistant that simplifies the admission process.

Proposed Solution

The proposed College Admission Agent is a conversational AI system designed to simplify the student admission process by delivering accurate, real-time responses to common queries. Built using IBM Watsonx, Granite LLM, and Retrieval-Augmented Generation (RAG), the system enables students to interact naturally and receive personalized guidance.

◆ **Key Components:**

1. **Data Collection**

Collect admission-related documents such as eligibility criteria, brochures, course details, and FAQs from official college sources. These are uploaded and indexed using IBM's Vector Database.

2. **Data Preprocessing**

Clean and format the documents to ensure they are structured for retrieval. Relevant sections (e.g., DSE eligibility, fee structure) are tagged for better accuracy.

3. **LLM & RAG Integration**

Use Prompt Templates and Granite LLM to generate context-aware answers. The RAG technique ensures that responses are based on real, trusted documents rather than generic AI output.

4. **Deployment**

Deploy the assistant using IBM Watsonx Assistant (Actions Interface). The solution runs on IBM Cloud Lite, making it accessible via a simple web interface or chatbot window.

5. **Evaluation & Feedback**

Continuously test responses for clarity and correctness. Improve the assistant using feedback from real user queries and institutional updates.

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System Approach

Hardware:

- Intel i5 or above, 8 GB RAM, 10 GB storage, internet connection

Software:

- Python 3.8+, IBM Cloud Lite account, Watsonx.ai access, Git

Libraries Required

- transformers, sentence-transformers, faiss-cpu, torch – For RAG and LLM integration
- pandas, numpy, pdfplumber – Data handling and PDF processing
- ibm-watson-machine-learning, ibm-cloud-sdk-core – IBM service integration

Algorithm & Deployment

Algorithm

◆ **Algorithm Selection**

- The project uses a Retrieval-Augmented Generation (RAG) architecture combined with IBM Granite (a Large Language Model) for delivering accurate and context-aware answers. RAG is ideal for this problem as it retrieves relevant information from institutional documents before generating a response, ensuring both accuracy and factual grounding—crucial in admission-related guidance.
- Unlike traditional chatbot models, RAG supports dynamic knowledge injection from trusted data sources, making it perfect for FAQs, policy documents, and course brochures that frequently change.

◆ **Data Input**

- The model processes the following types of inputs:
- User queries in natural language (e.g., "What is the eligibility for B.Tech?")
- Institutional data, such as:
- Admission policies (PDFs, text files)
- Course details (CSV)
- FAQs
- Deadlines and fee structures
- These inputs are chunked, embedded, and indexed to be efficiently retrieved when a question is asked.
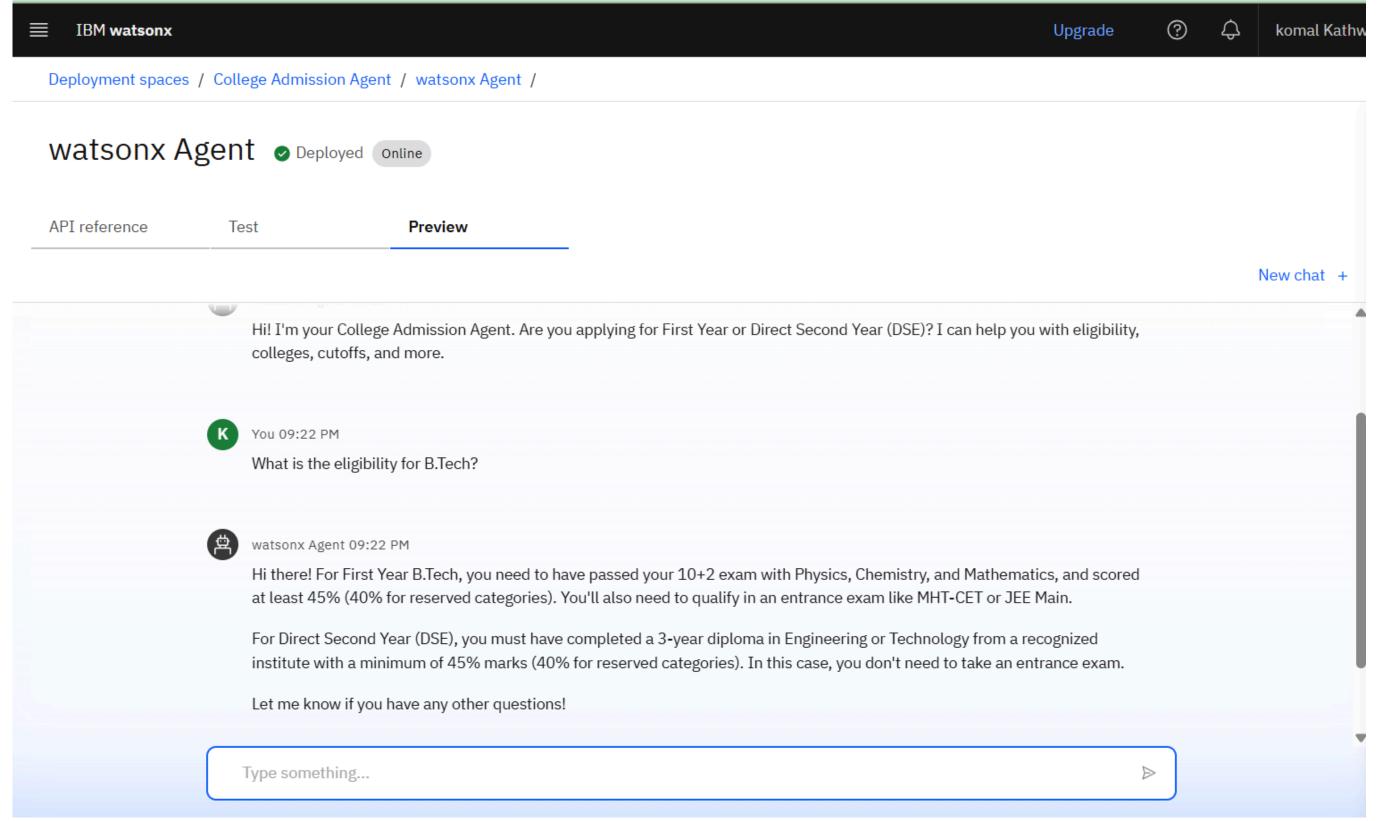
◆ Training Process

- This solution does not require traditional model training, as it uses a pre-trained IBM Granite LLM. However, the pipeline involves:
- Preprocessing and chunking text data from official documents
- Generating embeddings using an embedding model
- Storing vectors in a vector database like FAISS
- Mapping user queries to relevant document chunks using semantic search
- Feeding both query and context to the LLM for generation
- Prompt tuning and Watsonx prompt lab can be used to improve answer formatting and accuracy.

◆ Prediction Process

- When a student asks a question:
- The system retrieves top-k most relevant chunks from stored embeddings
- These chunks, along with the question, are passed to IBM Granite
- Granite LLM generates a coherent, factual answer based on context
- The result is shown to the user via UI (chatbot or API)
- The agent supports real-time data updates, making it ideal for evolving admission criteria and deadlines.

Result

Conclusion

- The College Admission Agent, powered by Retrieval-Augmented Generation (RAG) and IBM Granite, successfully demonstrates how artificial intelligence can streamline and enhance the student admission process. By retrieving and summarizing critical admission information from trusted sources, the system provides accurate, real-time responses to prospective students' queries.

- This intelligent agent reduces the need for manual intervention, increases transparency, and ensures accessibility of admission-related information—such as eligibility criteria, course details, fee structures, and deadlines. The use of IBM Cloud Lite and Granite ensures scalable, secure, and cost-effective deployment.

- Overall, the solution improves user experience, minimizes confusion during the application phase, and lays the foundation for future integration with college ERPs, multilingual support, and personalized guidance.

- The project highlights the potential of AI in transforming education support systems and making college admissions more efficient and student-friendly.

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Future scope

The **College Admission Agent** can be significantly improved and scaled to meet wider educational needs. Potential future developments include:

- **Incorporating Additional Data Sources**: Integrate data from government education portals, scholarship databases, and national entrance exam results to provide more comprehensive and updated responses.
- **Algorithm Optimization**: Improve retrieval accuracy and response quality using advanced semantic search methods, prompt tuning, and reinforcement learning from user feedback.
- **Geographic Expansion**: Extend coverage to multiple cities, states, or even countries, adapting the system to regional admission policies, languages, and academic calendars.
- **Edge Computing Integration**: Deploy lightweight versions of the agent on edge devices to provide faster responses in remote or low-connectivity areas.
- **Advanced Machine Learning Techniques**: Leverage transformer fine-tuning, knowledge graph integration, and multimodal input handling (e.g., voice, image-based queries) to enhance system intelligence and adaptability.
- **Mobile and Voice-Enabled Access**: Develop mobile apps with voice interaction for increased accessibility and reach, especially among rural or underserved student populations.

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This certificate is presented to

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According to the Adobe Learning Manager system of record

Completion date: 22 Jul 2025 (GMT)   **Learning hours:** 20 mins

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