
CAPSTONE PROJECT

COLLEGE ADMISSION AGENT (RAG BASED)

Presented By:

1. Shreya S Suranagi – Maharani Lakshmi Ammanni College for Women Autonomous – Department of Computer Science



OUTLINE

- **Problem Statement**
- **Proposed System/Solution**
- **System Development Approach (Technology Used)**
- **Algorithm & Deployment**
- **Result**
- **Conclusion**
- **Future Scope**
- **References**

PROBLEM STATEMENT

The college admission offices and prospective students face a number of challenges every year during admission time. Students find it overwhelming to navigate through multiple web pages to find the admission policy, eligibility requirements. Staff face the challenge of answering repetitive inquiries at scale, in an accurate and timely manner. Additionally, misinformation or lack of clarity around courses, deadlines, and fees leads to confusion and missed opportunities.

PROPOSED SOLUTION

- An AI-powered admission agent using Retrieval-Augmented Generation (RAG) delivers real-time, accurate responses by sourcing information directly from institutional databases, documents and websites about courses, FAQ, fees, deadlines.etc. It streamlines student interactions, improves accessibility, and enhances the overall admissions experience. The solution will consist of the following components:
- **Data Collection:**
 - Combine college data like admission policies, eligibility criteria, course details, application procedures, FAQs, and deadlines from official college databases, websites, and documents.
 - Continuously update the document to reflect real-time changes such as new regulations, fee updates, or deadline extensions.
- **Data Pre-processing:**
 - Clean and structure both unorganized or heterogeneous documents (PDFs, web pages, etc.) and bring data into structured format like Q&A for consistency and retrieval.
- **AI Algorithm(RAG Architecture):**
 - Implement a Retrieval-Augmented Generation (RAG) model with IBM Granite model that retrieves relevant passages from the indexed knowledge base and generates accurate, conversational responses to user queries.
 - Add tools such as Weather to find the next best in-person appointment date.
- **Deployment:**
 - Develop a conversational interface for the AI Agent such as a Chatbot for students to ask queries in natural language.
 - Deploy the solution on IBM cloud platform which is scalable and reliable with low latency.
- **Evaluation:**
 - Measure performance using metrics like response accuracy, retrieval relevance, and user satisfaction scores. Refine the system using feedback.
- **Result:** The AI-powered admission agent provides instant, accurate, context-aware responses to student queries by leveraging RAG over institutional data, courses, fees, applications and deadlines, enhancing clarity and engagement in the application process.

SYSTEM APPROACH

The "System Approach" section outlines the overall strategy and methodology for developing and implementing the rental bike prediction system. Here's a suggested structure for this section:

- **System requirements**

- IBM Cloud

- IBM Watsonx studio - for model development and deployment

- IBM Cloud Object Storage - for storing institutional documents, policies, real-time data sources and the project.

- Watsonx Runtime - for secure and scalable AI model deployment, management and execution.

- IBM watsonx.ai – for building, tuning, and managing large language models

- IBM Agentic Lab(beta) – for building and deploying the AI agent

- **Library required to build the model**

- Watsonx Runtime – for hosting and serving Granite and open-source foundation models at scale.

- IBM Granite model – for natural language processing and summarization.

ALGORITHM & DEPLOYMENT

- **Algorithm Selection:**
 - The system uses IBM's **Granite foundation model**, integrated within a **Retrieval-Augmented Generation (RAG)** framework. Granite was selected for its strong natural language understanding capabilities, enterprise-grade trust features, and seamless integration within IBM's watsonx environment. Its ability to generate contextually accurate responses makes it ideal for college admission use cases
- **Data Input:**
 - The model takes two main inputs: natural language questions from students and embedded knowledge chunks retrieved from stored college documents such as policies, FAQs, application guides, and course catalogs in **IBM Cloud Object Storage**.
- **Training Process:**
 - While IBM Granite is a pre-trained model, It can be customized or tuned within watsonx.ai using domain-specific data like college data. Embedding generation and retrieval configurations are handled using IBM Agentic Lab, and the system is optimized for accurate document matching and minimal hallucination.
- **Prediction/Retrieval Process:**
 - When a query is submitted, the RAG pipeline retrieves the most relevant documents based on semantic similarity. These documents, along with the original query, are passed to the deployed **IBM Granite model** via **Watsonx Runtime**, which generates a well-informed, real-time answer. This ensures students receive responses grounded in institutional truth and updated policies.

RESULT-SLIDE 1

The screenshot shows the IBM WatsonX Agent Lab interface. On the left, there's a sidebar with sections for 'Build' (containing AI models like 'granite-3-3-8b-instruct'), 'Knowledge', and 'Tools' (with buttons for 'Add a tool' and 'Create custom tool'). Below the tools is a section for 'Added tools (1)' containing a 'Document search - College Admission KB' component. The main area is titled 'Agent preview' and shows a conversation between a user ('ss') and an agent ('Pravesh - College Admission Agent'). The user asks about courses offered in UG, and the agent responds with information about various programs. A 'How did I get this answer?' button is visible. At the bottom, there's a search bar and a footer with various icons.

RESULT-SLIDE 2

HOW TO SET UP(Slide 2-Slide 6)

1. Login to IBM Cloud
2. Click on watsonx from panel.
3. Click on Agentic AI Lab(beta).
4. Select create a sandbox Project.
5. Click on Create a project instead.
6. Enter name of project and description

Welcome to watsonx

Learn how to find what you need to prepare data and build models, experiment with foundation models, and deploy your models.

I agree to the [terms](#) and I have read the [Data Use Policy](#), including [Cookie use](#).

Take a tour

Migrate projects →

Create sandbox project →

IBM watsonx

Create a project

Start with a new, blank project or select from where to import an existing project.

+ New

Local file

Sample

Define details

Name

Pravesh College Admission Agent

Description (optional)

The college admission agent is powered by RAG and streamlines the college admission process. It can answer natural language questions and this reduce time, improve the efficiency, and transparency.

Tags (optional)

Cancel

Create

RESULT-SLIDE 3

1. Add the required cloud Storage
2. This will create the storage space or memory required for the documents for RAG
3. Click on Build an Agent and Create.
4. Associate watsonx.ai Runtime service
5. It will help run models and serve requests
6. Click on Associate

The image consists of three side-by-side screenshots from a cloud provider's interface:

- Screenshot 1: Cloud Object Storage Creation**
Shows the "Cloud Object Storage" creation page. It includes fields for Region (Global), Plan (Lite (deprecated)), Service name (Cloud Object Storage-kc), and Resource group (Default). A large blue "Create" button is at the bottom.
- Screenshot 2: watsonx.ai Studio Creation**
Shows the "watsonx.ai Studio" creation page. It includes fields for Region (Dallas), Plan (Lite), Service name (watsonx.ai Studio-ng), and Resource group (Default). A large blue "Create" button is at the bottom.
- Screenshot 3: Associate service**
Shows the "Associate service" step. It lists "Default" and "Locations" under "Associate service". Below is a table of services:

Name	Type	Plan	Location	Status
watsonx.ai Runtime-xc	watsonx.ai Runtime	Lite	Dallas	Not associated

At the bottom are "Cancel" and "Associate" buttons.

RESULT-SLIDE 4

1. Provide the agent name and description
2. Select Model as IBM Granite Model or any of your choice
3. Framework is LangGraph and Architecture is ReAct
4. Provide Instructions for the agent.

The screenshot shows the IBM WatsonX Agent Lab interface. On the left, the 'Build' section is open, showing the 'Setup' tab with the agent's name set to 'Pravesh College Admission Agent' and its description as 'This agent understands students' queries and provides admission details and college information.' Below this, the 'Configuration' tab is selected, showing 'LangGraph' as the framework and 'ReAct' as the architecture. In the center, the 'Agent preview' window displays a welcome message: 'Welcome to Pravesh College Admission Agent. This agent understands students' queries and provides admission details and college information.' At the bottom, there is a search bar with placeholder text 'Type something...' and a system status bar showing battery level, language (ENG), date (02-08-2025), and time (18:06).

RESULT-SLIDE 5

1. Prepare the document will admission information.
2. Upload the document as pdf to be vectorized for retrieval
3. In the Tools section, select Document search and other relevant tools



Select a tool

Choose a tool to add to your agent.

The interface displays four search tools:

- Google search**: Retrieve information from the internet with the Google search engine. Status: Enabled.
- DuckDuckGo search**: Retrieve information from the internet with the DuckDuckGo search engine. Status: Enabled.
- Document search**: Search documents with vector indexes. Status: Enabled.
- Tavily search**: Retrieve information from the internet with the Tavily search engine. Status: Enabled.

The configuration screen for "Ground gen AI with vectorized documents". It includes:

- Vector stores**: Options include "In memory" (selected), "watsonx.data Milvus", and "Elasticsearch".
- Description (optional)**: A text input field containing "Provides the college admission details from college documents."
- Advanced settings**: A dropdown menu.
- File upload**: A file named "College Admission KB.pdf" (307.1KB) is uploaded.
- Buttons**: "Cancel" and "Create".

The AI-generated answers are:

- Q1: What undergraduate programs does the college offer?**
A1: The college offers the following undergraduate programs:
 - BCA (Bachelor of Computer Applications)
 - BBA (Bachelor of Business Administration)
 - BCom (Bachelor of Commerce)
 - BSc (Bachelor of Science)
 - BA (Bachelor of Arts)
- Q2: What postgraduate programs does the college offer?**
A2: The college offers the following postgraduate programs:
 - MA (Master of Arts)
 - MSc (Master of Science)
 - MCom (Master of Commerce)
- Q3: What is the duration of undergraduate courses?**
A3: The duration of undergraduate courses is 3 years.

RESULT-SLIDE 6

Query:
What are the
courses
offered in
UG?

Data
retrieved
successfully
from the
college
document.

The screenshot shows the IBM WatsonX Agent Lab interface. The top navigation bar includes tabs for 'Agent Lab (beta) — Docs | IB...', 'Agent Lab — Pravesh C', 'Pravesh College Admission', 'Pravesh College Admission', 'RAG document format guide', 'SB4Academia_Problem State', and several other tabs like 'Start', 'Carnatic', 'MIT OCW', etc. Below the navigation is a toolbar with icons for back, forward, search, and various file operations. The main workspace is titled 'IBM watsonx' and shows a 'Build' section with an AI model named 'granite-3-3-8b-instruct'. It displays a conversation between a user ('SS') and an AI agent ('Pravesh - College Admission Agent'). The user asks, 'What are the courses offered in UG?'. The AI responds, 'Hi, I am Pravesh - a College Admission Agent for mLACW. How can I help you? For UG courses, we offer a variety of programs including Bachelor of Arts, Bachelor of Commerce, Bachelor of Business Administration, Bachelor of Science, Bachelor of Technology, and more. Would you like me to fill the application form and book the counseling appointment for any specific course?' A link 'How did I get this answer?' is provided. At the bottom, there's a search bar 'Type something...' and a taskbar with various application icons.

RESULT-SLIDE 7

Query:
What is the criteria
for BCA course,
syllabus and fee
structure?

The agent
successfully
retrieved the data
from the uploaded
link of the pdf of
syllabus
document.
However, it failed
to get the fee
structure.

The screenshot shows a web browser window with the URL https://dataplateform.cloud.ibm.com/wx/agents?context=wx&project_id=dfcf6310-e49d-4b79-bb0d-f412682584e7. The page title is "IBM watsonx". The main content area displays a conversation between a user and an AI agent named Pravesh - College Admission Agent. The user asks, "what is the criteria for BCA course, syllabus for BCA and fee structure ?" The AI agent responds, "Sure, I can provide you with that information. For the BCA course, the eligibility criteria typically include a minimum of 45% marks in 10+2 or equivalent examination with Physics and Mathematics as compulsory subjects. The syllabus for BCA covers topics such as Programming and Problem Solving, Data Structures, Algorithms, Computer Organisation and Architecture, Discrete Mathematics, and more. As for the fee structure, it varies each year and depends on various factors. I would recommend checking our official website or contacting our admission office for the most accurate and up-to-date information." Below the conversation, there is a search bar with the placeholder "Type something..." and a "Deploy" button at the top right of the main content area.

RESULT-SLIDE 8

Query:
What
documents
are required
for
admission?

The agent
successfully
retrieved the
accurate
data. It
distinguished
between
admission
and
application.

The screenshot shows a web browser window with multiple tabs open at the top. The active tab is titled "IBM watsonx" and displays a conversation interface. The conversation starts with a message from "You" asking about admission documents. Pravesh, a College Admission Agent, responds, identifying himself and providing a list of required documents. The interface includes a "Build" tab, a "Agent preview" section, and a "Share feedback" button. The bottom of the screen shows the Windows taskbar with various pinned icons and the system tray indicating the date and time as 02-08-2025 at 19:48.

You: 07:47 PM
What documents are required for admission?

Pravesh - College Admission Agent 07:47 PM
Hi, I am Pravesh - a College Admission Agent for mLACW. How can I help you?

For admission, you will need the following documents:

1. PUC/10+2 marksheets
2. Transfer certificate from the last institution attended
3. Two recent passport-size photographs
4. Migration certificate (if applicable)
5. Proof of date of birth

RESULT-SLIDE 9

The agent received the Student details, booked an appointment for a college course counseling session and sent a confirmation email.

Agent Lab (beta) — Docs | IBM WatsonX Agent Lab — Pravesh C Pravesh College Admission Agent Pravesh College Admission RAG document format guide SB4Academia_Problem Statement

https://dataplatform.cloud.ibm.com/wx/agents?context=wx&project_id=dfcf6310-e49d-4b79-bb0d-f412682584e7

IBM watsonx

Build > Agent preview

Great! To proceed, I will need your Name, Age, email id, phone number, the course you're interested in, and your PUC pass percentage.

▶ How did I get this answer?

You: 07:40 PM
Shreya S Suranagi, 20, suranagis@outlook.com, 97388895977, BCA, 97%

Pravesh - College Admission Agent 07:40 PM
Thank you for providing the details, Shreya. I have successfully sent your application for BCA. You will receive a confirmation email shortly. Your application number is SA2025_123. Please pick a slot for counseling and document verification on the same day or the next day.

▶ How did I get this answer?

Received

Type here to search

19:42 ENG 02-08-2025

RESULT-SLIDE 10

The agent asked for the best date for an appointment slot based on the weather.

The screenshot shows the IBM WatsonX Agent Lab interface. The top navigation bar includes tabs for 'Agent Lab (beta) — Do', 'Agent Lab — Pra...', 'Pravesh College Admis...', 'Pravesh College Admis...', 'RAG document format', 'SB4Academia_Problem', 'Microsoft Word - Agent...', and a '+' button. Below the tabs is a toolbar with icons for 'Start', 'Carnatic', 'MIT ocw', 'openli', 'mLAC', 'clg', 'IGNOU lib', 'clg guestlib', 'Eng.', 'Magazin', 'Kan.', 'UTube', 'GPT', 'News', 'AICTE', and 'All Bookmarks'. The main header displays 'IBM watsonx' and the user 'Shreya Suranagi's Account'. The current project is 'Pravesh College Admission Agent / Agent Lab'. The interface shows a sidebar with 'Build' and 'Agent preview' sections. The 'Agent preview' section contains a list of required documents for admission:

- 2 passport size photographs
- Aadhar Card
- X STD Marks Statement
- II PUC Marks Card
- Valid Caste Certificate (if applicable)
- Income Certificate

It also states that the last date for admission is 31st August, 2025, and notes that the weather in Bangalore is good on 15th and 20th August. A 'How did I get this answer?' link is present. At the bottom, there is a search bar with 'Type something...' and a message input field with a send icon. The taskbar at the bottom of the screen shows various application icons and the system clock indicating 2026 02-08-2025.

RESULT-SLIDE 11

The screenshot shows a web browser window for the IBM WatsonX Agent Lab. The URL is https://dataplatform.cloud.ibm.com/wx/agents?context=wx&project_id=dfcf6310-e49d-4b79-bb0d-f412682584e7. The interface displays a conversation between Shreya Suranagi's Account and Pravesh - College Admission Agent. Shreya asks about career and placement support, and Pravesh responds that the college offers pre-placement training and placements with companies like Accenture, CapGemini, Wipro, TCS, and Code Young. A 'How did I get this answer?' link is shown below the response. The bottom of the screen shows the Windows taskbar with various pinned icons.

RESULT-SLIDE 12

The screenshot shows a web browser window for the IBM WatsonX Agent Lab. The URL is https://dataplatform.cloud.ibm.com/wx/agents?context=wx&project_id=dfcf6310-e49d-4b79-bb0d-f412682584e7. The page title is "IBM watsonx". The navigation bar includes "Upgrade", "Share feedback", "Unsaved", "New agent +", and "Deploy". The main area shows a conversation between a user and an AI agent named Pravesh. The user asks, "Does the college provide financial assistance?". Pravesh responds, "Hi, I am Pravesh - a College Admission Agent for mLACW. How can I help you? Yes, our college does provide financial assistance to deserving students. We have a scholarship program for students with economic needs. The scholarships are awarded based on academic merit and financial need. You can find more details about the scholarship program on our website or in the admission brochure. Would you like me to fill the application form and book the counseling appointment for you? If yes, I will need your details such as Name, Age, email id, phone number, course, and PUC pass percentage." A "How did I get this answer?" link is present. At the bottom, there is a search bar with "Type something..." and a message input field.

RESULT-SLIDE 13

Note: If Google search is enabled, provide the college website, otherwise the Agent may hallucinate

The screenshot shows the IBM WatsonX Agent Lab interface. On the left, there's a sidebar with sections for 'Build' (Model: granite-3-3-8b-instruct), 'Knowledge' (College Admission KB), and 'Tools' (Add a tool, Create custom tool). The main area is titled 'Agent preview' and shows a conversation:

You are a helpful college admission agent that uses Knowledge in the documents in the vector index. Greet first and say "Hi, I am Pravesh - a College Admission Agent for mLACW. How can I help you?"
Take the inputs from the prospective student like Name, Age, email id, phone number, source, PLIC pass percentage. Answer their queries with

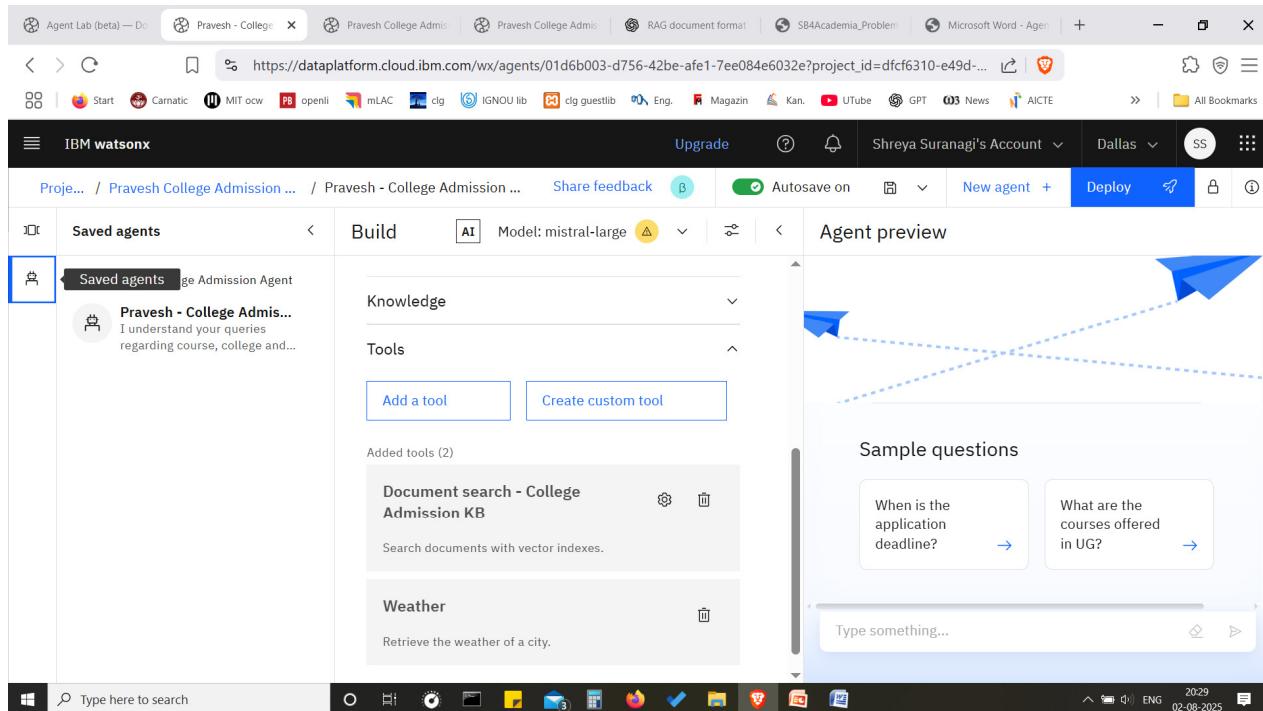
SS You: 07:46 PM
What infrastructure does the college have?

Pravesh - College Admission Agent 07:46 PM
Hi, I am Pravesh - a College Admission Agent for mLACW. How can I help you?
Our college boasts state-of-the-art infrastructure. We have modern classrooms equipped with multimedia facilities, a well-stocked library, a computer lab, a spacious auditorium, and a medical room for students' safety. Additionally, as mentioned earlier, we have a sports complex with a football ground, basketball court, and a gymnasium. We also have a cafeteria for students' convenience.

Type something...

RESULT-SLIDE 14

Saved the Agent



RESULT-SLIDE 15

The screenshot shows a web browser window with multiple tabs open at the top. The active tab is titled "Deployment spaces /" and displays the "IBM watsonx" interface. The title bar indicates the URL is <https://dataplatform.cloud.ibm.com/ml-runtime/spaces/5915a8b9-9a81-4b6e-9411-00ae02e70501/deployments?con...>. The main content area shows a table of deployed assets. The table has columns: Name, Type, Status, Asset, Asset type, Tags, and Last modified. One row is visible, showing "Pravesh - College Admission Agent" as the Name, "Online" as the Type, "Deployed" as the Status, "Pravesh - College Admission Agent" as the Asset, "Ai service" as the Asset type, "wx-agent" as the Tag, and "32 seconds ago" with "Shreya Suranagi (You)" as the Last modified information. At the bottom of the page, there are pagination controls for "Items per page: 20" and "1–1 of 1 items", and a footer with a search bar and system status indicators.

Name	Type	Status	Asset	Asset type	Tags	Last modified
(ip) Pravesh - College Admission Agent	Online	Deployed	Pravesh - College Admission Agent	Ai service	wx-agent	32 seconds ago Shreya Suranagi (You)

Deployed

Github Link- <https://github.com/shreyasuranagi?tab=repositories>

CONCLUSION

- The AI-powered college admission agent built with IBM Granite and Retrieval-Augmented Generation (RAG) has shown strong potential in simplifying how students interact with complex admissions information. By pulling responses directly from official college documents, the agent delivers accurate, trustworthy answers—cutting down on confusion and reducing the need for manual support.
- While the system excels at providing fact-based information, it still faces challenges when questions require deeper reasoning or aren't clearly addressed in the documents.



FUTURE SCOPE

- Looking ahead, there are several ways to make the agent even more helpful and intuitive. Enhancing how it understands and retrieves information—not just by matching keywords, but by truly grasping the intent behind a question—will improve its usefulness.
- Adding a reasoning layer could help it handle more complex queries that require logic or multiple pieces of information.
- There's also a big opportunity in making it multilingual, personalizing its responses based on the type of student, and extending it to mobile and voice platforms for easier access.

REFERENCES

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- Retrieval-Augmented Generation (RAG), Facebook AI Research, 2020
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IBM CERTIFICATIONS



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THANK YOU