CAPSTONE PROJECT

RESEARCH AGENT
AN AI-POWERED ASSISTANT FOR ACADEMIC AND SCIENTIFIC RESEARCH

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OUTLINE

- PROBLEM STATEMENT
- PROPOSED SYSTEM / SOLUTION
- SYSTEM DEVELOPMENT APPROACH (IBM CLOUD LITE / IBM GRANITE)
- ALGORITHM & DEPLOYMENT
- RESULT
- CONCLUSION
- FUTURE SCOPE
- REFERENCES

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ACADEMIC AND INDUSTRIAL RESEARCHERS FACE INCREASING WORKLOADS WHEN SEARCHING LITERATURE, SUMMARIZING PAPERS, MANAGING REFERENCES, AND GENERATING REPORTS. MANUAL PROCESSES CONSUME TIME, MAY LEAD TO OVERSIGHT OF RELEVANT INFORMATION, AND SLOW DOWN HYPOTHESIS GENERATION. AUTOMATING REPETITIVE RESEARCH TASKS IS A MAJOR CHALLENGE TO ENHANCE RESEARCH PRODUCTIVITY AND INNOVATION.

LEVERAGES ADVANCED NLP AND AI CAPABILITIES. THE SOLUTION USES IBM CLOUD LITE SERVICES AND IBM GRANITE MODELS TO ENSURE ROBUST, SCALABLE AI PROCESSING.

- The proposed system aims to address the challenge of predicting the required bike count at each hour to ensure a stable supply of rental bikes. This involves leveraging data analytics and machine learning techniques to forecast demand patterns accurately. The solution will consist of the following components:
- Data Collection:
  - Gather historical data on bike rentals, including time, date, location, and other relevant factors.
  - Utilize real-time data sources, such as weather conditions, events, and holidays, to enhance prediction accuracy.
- Data Preprocessing:
  - Clean and preprocess the collected data to handle missing values, outliers, and inconsistencies.
  - Feature engineering to extract relevant features from the data that might impact bike demand.
- Machine Learning Algorithm:
  - Implement a machine learning algorithm, such as a time-series forecasting model (e.g., ARIMA, SARIMA, or LSTM), to predict bike counts based on historical patterns.
  - Consider incorporating other factors like weather conditions, day of the week, and special events to improve prediction accuracy.
- Deployment:
  - Develop a user-friendly interface or application that provides real-time predictions for bike counts at different hours.
  - Deploy the solution on a scalable and reliable platform, considering factors like server infrastructure, response time, and user accessibility.
- Evaluation:
  - Assess the model's performance using appropriate metrics such as Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), or other relevant metrics.
  - Fine-tune the model based on feedback and continuous monitoring of prediction accuracy.
  - Result:

- USE IBM CLOUD LITE FOR HOSTING AND DEPLOYMENT.
- USE IBM GRANITE FOR LLM-BASED NLP TASKS (QUESTION ANSWERING, SUMMARIZATION, TEXT GENERATION).
- INTEGRATE APIS FOR LITERATURE SEARCH.
- IMPLEMENT CITATION AND REFERENCE MANAGEMENT TOOLS.
- USE PYTHON/NODE.JS FOR BACKEND.
- SIMPLE WEB FRONT-END FOR USER INTERACTION.

ALGORITHM:

- NLP FOR QUERY UNDERSTANDING.
- DOCUMENT RETRIEVAL & RANKING.
- SUMMARIZATION USING IBM GRANITE LLM.
- CITATION EXTRACTION.

DEPLOYMENT:

- IBM CLOUD FUNCTIONS OR CONTAINERS.
- FRONT-END HOSTED ON IBM CLOUD LITE.
- CONTINUOUS UPDATES VIA API.

THE RESEARCH AGENT AUTOMATES REPETITIVE RESEARCH TASKS, ENHANCES PRODUCTIVITY, ENSURES ACCESS TO RELEVANT INFORMATION, AND IMPROVES THE QUALITY AND SPEED OF ACADEMIC AND INDUSTRIAL RESEARCH.

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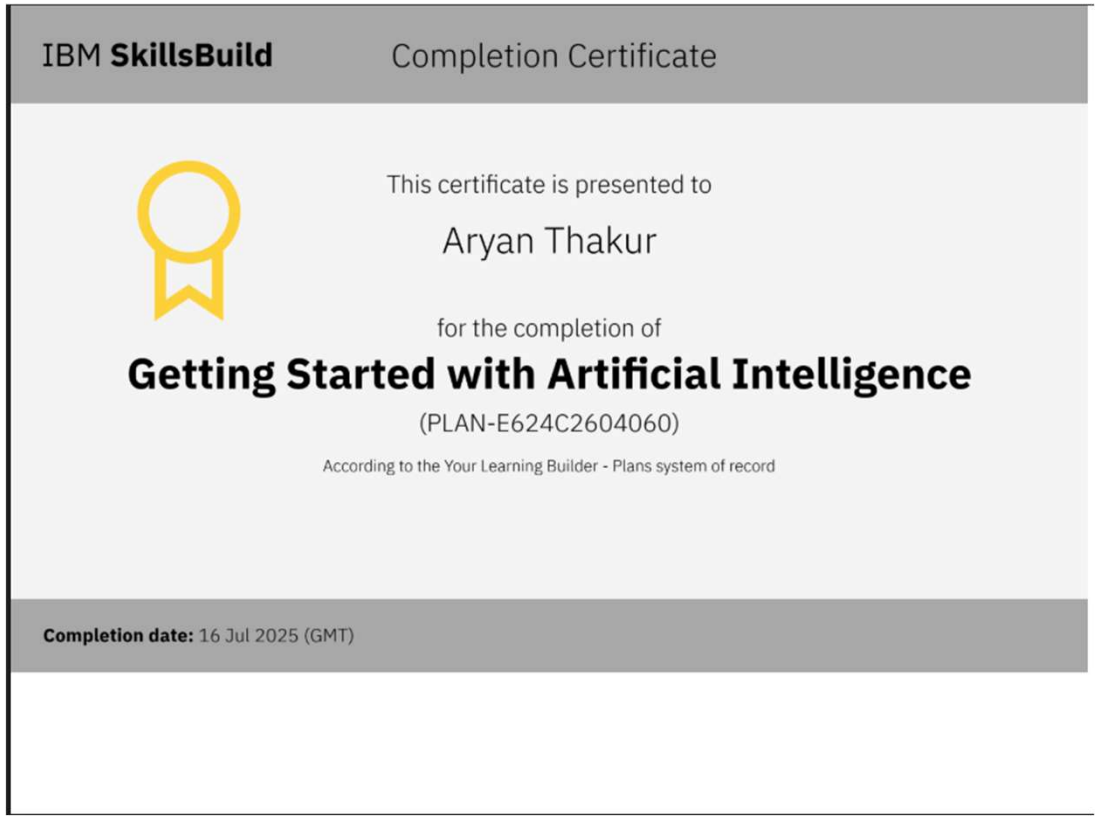
- INTEGRATE WITH MORE DATABASES (PUBMED, IEEE XPLORE, SCOPUS).
- ADD MULTILINGUAL CAPABILITY.
- DEVELOP COLLABORATION TOOLS FOR TEAMS.
- IMPLEMENT PLAGIARISM CHECKS.
- INTEGRATE VOICE-BASED QUERY SUPPORT.

REFERENCES

- List and cite relevant sources, research papers, and articles that were instrumental in developing the proposed solution. This could include academic papers on bike demand prediction, machine learning algorithms, and best practices in data preprocessing and model evaluation.

IBM CERTIFICATIONS



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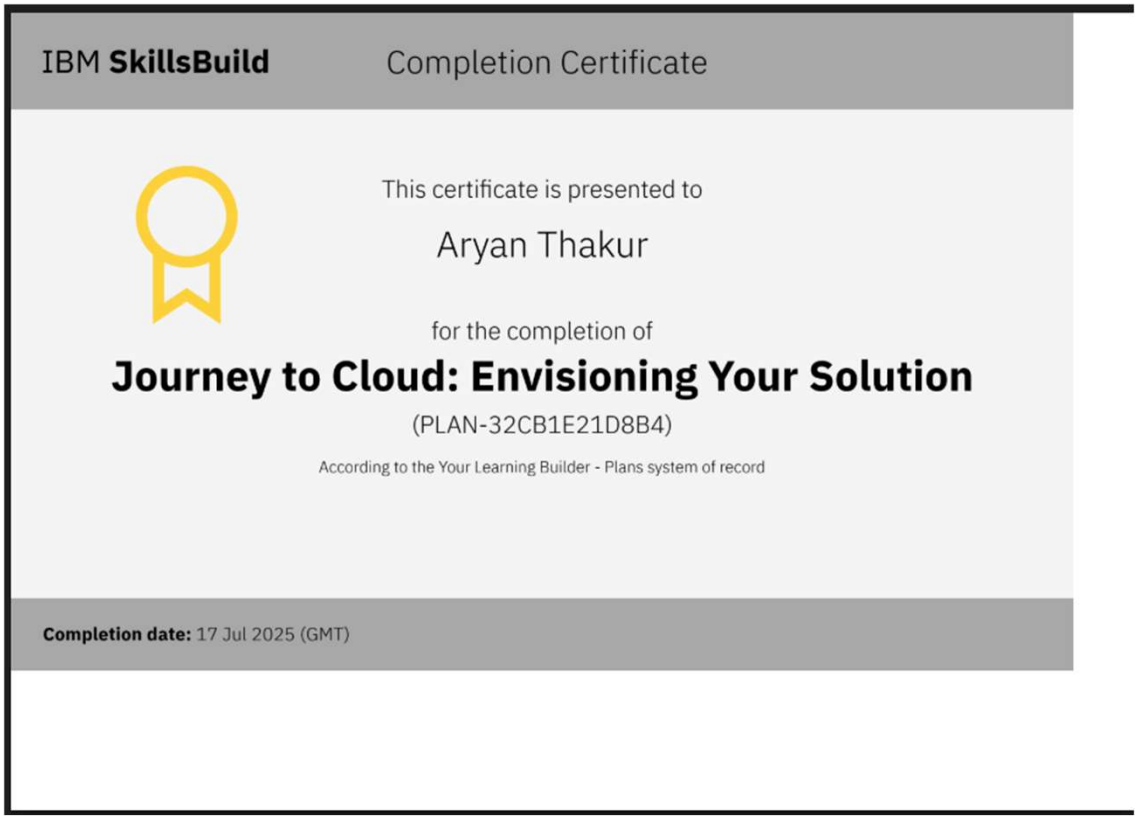

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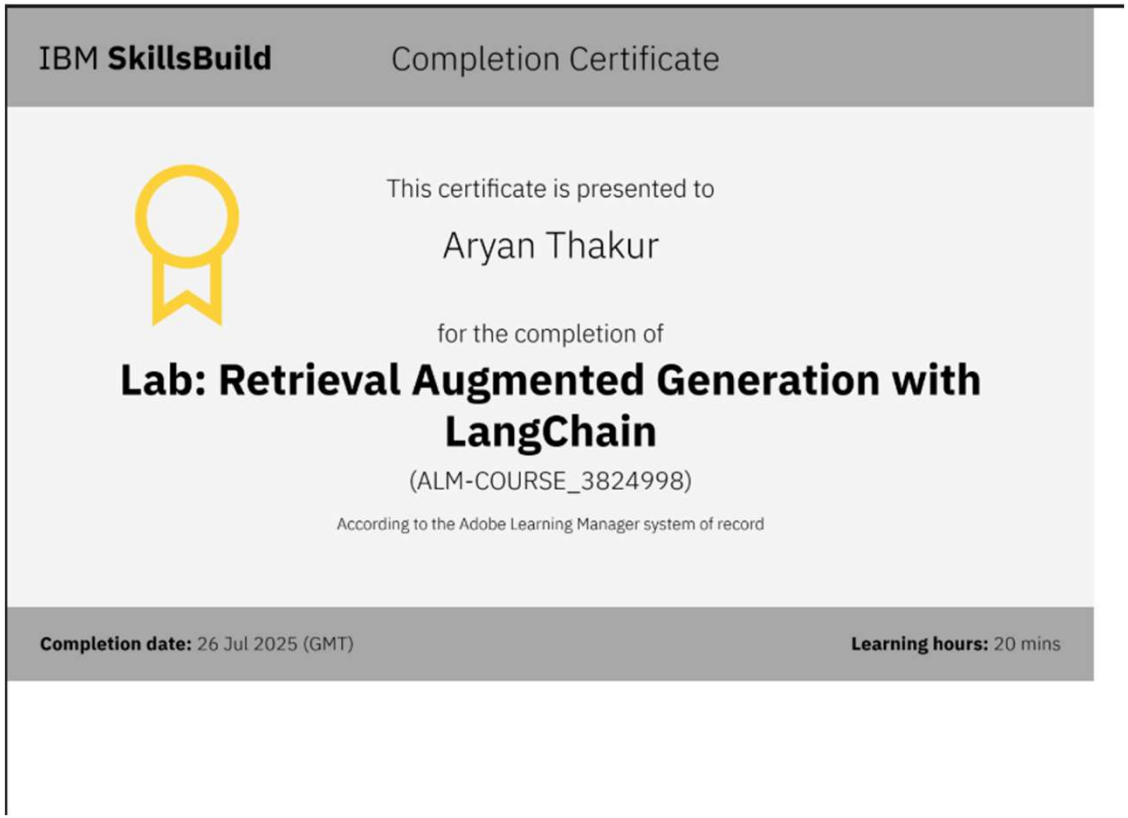

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THANK YOU

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