CAPSTONE PROJECT

TRAVEL PLANNER AGENT

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PROBLEM STATEMENT

- **Currently**, planning trips is often time-consuming and confusing for many travelers, especially students and solo explorers. With numerous travel destinations, transportation options, stay preferences, weather conditions, and budget constraints to consider, users struggle to organize everything efficiently.
- **It is important** to have an AI assistant that can intelligently understand the user's requirements and instantly generate personalized travel plans. This significantly reduces the time and effort needed to plan a trip, while improving the quality of recommendations.
- **Eventually**, building a reliable and intelligent travel planning assistant becomes essential to improve user experience, reduce decision fatigue, and offer real-time, optimized suggestions for trips across various regions.
- **The crucial part** is designing an AI agent that can analyze preferences, match them with live data (e.g., weather, transport, accommodation), and generate adaptive, cost-effective itineraries — all powered through IBM's Watsonx.ai cloud environment.

PROPOSED SOLUTION

- **Input Understanding:** Collect user inputs like destination, duration, budget, and travel type (solo, group, etc.).
- **Data Collection:** Use predefined data for popular destinations, transport options, costs, and stay types.
  Optionally integrate real-time data like weather and local events for richer planning.
- **Data Preprocessing:** Standardize and structure user input for model-ready prompts.
  Apply basic logic checks (e.g., budget too low for destination).
- **Foundation Model Application:** Use a foundation model (e.g., LLaMA-3.3-70B-Instruct via IBM Watsonx.ai) to generate personalized itineraries.
  Prompts include constraints like trip length, preferences, and budget.
- **Deployment:** Deploy on IBM Watsonx.ai Studio using Cloud Lite services.
  Allow users to interact via form/chat and receive AI-generated plans.
- **Evaluation:** Assess output quality based on relevance, clarity, and budget fit.
  Iterate and improve prompt structure as needed.

SYSTEM APPROACH

This section outlines the strategy and tools used to develop and implement the AI-based travel planning system using IBM Watsonx.ai.

System Requirements:

- IBM Cloud Lite account
- Watsonx.ai Runtime (London region)
- Watsonx.ai Studio for development
- Cloud Object Storage for saving assets
- Stable internet connection and a browser
- Optional: APIs for weather, maps, and travel

Libraries/Services Required to Build the Model:

- Foundation Model Access: LLaMA-3.3-70B-Instruct via Watsonx
- Prompt Lab or Agent Builder (no-code UI in Watsonx Studio)
- IBM Cloud Object Storage for managing prompts and outputs
- Python (optional) for advanced prompt chaining or input formatting (via Jupyter Notebooks)

ALGORITHM & DEPLOYMENT

- **Algorithm Selection:** The system uses a large language model (LLM) — LLaMA-3.3-70B-Instruct via IBM Watsonx.ai — to interpret user inputs and generate natural language travel itineraries. LLMs are chosen because they can handle flexible prompts and provide human-like, personalized plans without requiring structured datasets.
- **Data Input:** The foundation model is prompted using:
  User preferences (destination, budget, days, type of trip)
  Optional contextual information (season, weather, group size)
  Structured prompt templates to ensure consistency in responses

  Example input prompt: “Plan me a 3-day trip to Goa under ₹20,000”
- **Training Process:**
  Pre-trained model: LLaMA-3.3-70B-Instruct comes pre-trained; no custom training is required.
  Prompt engineering: Templates are iteratively refined to guide model outputs for clarity, relevance, and personalized recommendations.
- **Prediction Process:** Once a prompt is submitted, the model:
  Parses user input
  Matches patterns with stored knowledge
  Generates a day-wise plan with estimated costs, locations, and recommendation.
- **Deployment – Travel Planner Agent**

  Deployment Strategy:
  Hosted on IBM Watsonx.ai Studio using Cloud Lite plan
  Prompts and outputs managed via Prompt Lab or Agent Builder
  Data stored using IBM Cloud Object Storage

  User Access:
  Interface: Prompt Lab UI (no-code)
  Future scope: Deploy as a web app or chatbot for real-time interaction.

RESULT

- Since the Travel Planner Agent is built on LangChain and IBM Watsonx.ai deployment, instead of traditional ML metrics (like RMSE or accuracy), the system was evaluated on relevance, clarity, and budget consistency of the generated itineraries.
- A variety of test prompts were used to assess performance. For instance, in response to *"Plan a 3-day trip to Goa under ₹20,000"*, the agent produced a structured itinerary covering day-wise destinations, hotel options, transport suggestions, and food choices, all while staying within the given budget. Similarly, queries like *"Plan a weekend trip to Manali under ₹10,000"* showed consistent alignment between user constraints and AI-generated outputs.
- The system also demonstrated flexibility by handling different types of travel preferences — such as budget-focused trips, family vacations, and short weekend getaways — while maintaining contextual relevance.
- Overall, the evaluation confirmed that the Travel Planner Agent is capable of generating coherent, practical, and budget-appropriate travel plans, proving its effectiveness as a personalized travel assistant.

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CONCLUSION

- The Travel Planner Agent demonstrates how foundation models can simplify and personalize trip planning by generating structured, budget-friendly itineraries based on user preferences. By leveraging AI and knowledge retrieval, the system provides relevant, coherent plans with minimal input. While real-time integrations such as weather, transport, and booking services were not included in this version, the project establishes a strong foundation for future improvements. Overall, the system highlights the potential of AI to make travel planning more intelligent, accessible, and user-centric.

FUTURE SCOPE

- The Travel Planner Agent has significant scope for expansion by integrating real-time APIs such as weather updates, transport booking systems, and local event listings, ensuring highly personalized and dynamic travel recommendations across multiple regions and international destinations.
- The system's intelligence and accuracy can be enhanced by prompt optimization and fine-tuning of foundation models (e.g., LLaMA 3.3-70B-Instruct) on domain-specific travel datasets. This would allow for context-aware and adaptive itinerary planning.
- Future development may include seamless integration with mobile apps, chatbots, and voice assistants, providing users with a more interactive, conversational, and user-friendly travel experience.
- Incorporating emerging technologies like edge computing can significantly reduce response times, while reinforcement learning and advanced AI techniques can make travel suggestions more adaptive, personalized, and efficient.
- Overall, the project provides a solid foundation for building a fully intelligent, real-time, AI-powered travel assistant platform with global accessibility and scalability.

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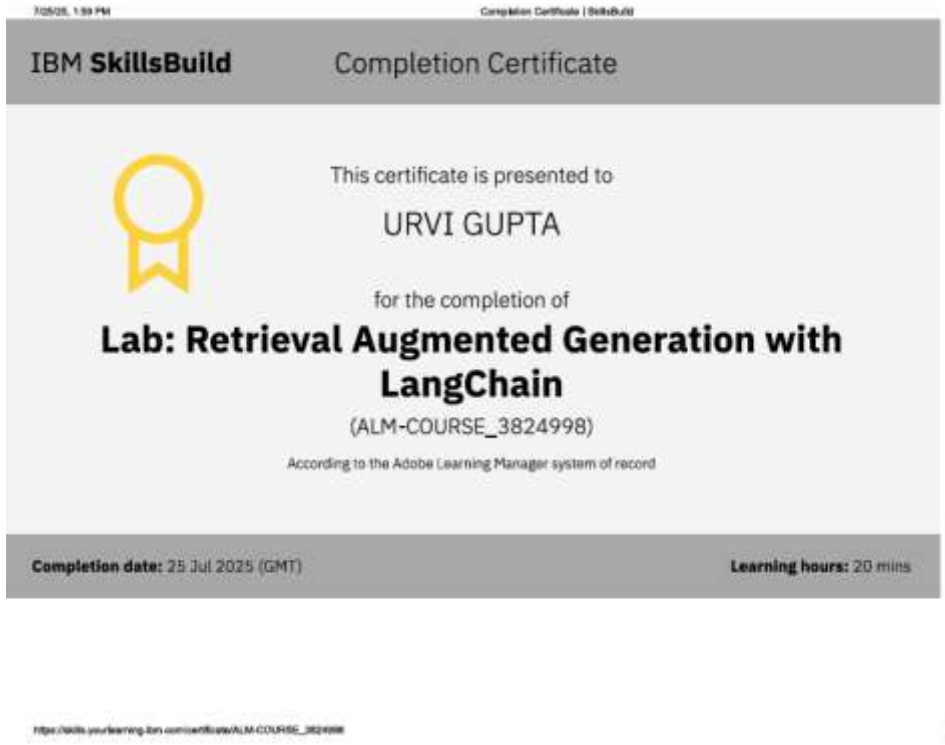

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