Travel Assistant AI - Google Colab Report

Overview

This project implements an intelligent Travel Assistant AI using **Google Colab** with **Google Gemini API**, **Tavily Search API**, **WeatherAPI**, and **Microsoft Markdown formatting**. The system provides comprehensive travel information including real-time weather data and tourist attractions through intelligent LLM reasoning.

Architecture and Technology Stack

Core Technologies

- **LLM**: Google Gemini Pro (via langchain-google-genai)
- **Search Engine**: Tavily Advanced Search API
- **Weather Data**: WeatherAPI.com with current + 3-day forecast
- **Framework**: LangChain with tool-calling agents
- **Environment**: Google Colab with IPython display
- **Formatting**: Microsoft Markdown with HTML styling

System Architecture

User Query → Google Gemini → Agent Reasoning → Tool Selection → API Calls → Result Synthesis → Markdown Display

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[Weather Tool] [Tavily Search Tool]

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WeatherAPI.com Advanced Web Search

(Current + Forecast) (Attractions + Travel Info)

LLM Reasoning Process with Google Gemini

How Google Gemini Powers the Reasoning

Google Gemini Pro serves as the central reasoning engine with the following capabilities:

1. Multi-Modal Understanding

- Processes natural language travel queries
- Understands context and user intent

- Handles complex, multi-part questions

2. Tool Orchestration Logic

Gemini's reasoning process:

User Query: "I want to visit Tokyo in December"

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Gemini Analysis:

1. Identify destination: Tokyo

2. Time context: December (winter season)

3. Information needed: Weather + Attractions

4. Tool selection: get_weather_forecast + get_travel_attractions

5. Seasonal considerations: Winter activities, clothing recommendations

3. Advanced Reasoning Steps

Step 1: Intent Classification

- Gemini categorizes the query type (destination info, weather, planning, comparison)
- Determines required information scope

Step 2: Tool Planning

- Decides which tools to call and in what sequence
- Considers dependencies between tool outputs

Step 3: Context-Aware Processing

- Integrates weather data with activity recommendations
- Provides season-appropriate suggestions
- Considers practical travel factors

Step 4: Response Synthesis

- Combines multiple data sources into coherent advice
- Formats information using markdown for readability
- Adds relevant emojis and structured sections

Reasoning Chain Example

User: "What should I expect in Iceland in December?"

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Gemini Reasoning Process:

1. Location: Iceland (Northern Europe, winter conditions)

2. Time: December (harsh winter, limited daylight)

3. Information Strategy:

  - Get current weather + 3-day forecast

  - Search for winter activities in Iceland

  - Consider seasonal challenges (daylight, roads, weather)

  - Recommend appropriate gear and preparation

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Tool Execution:

- Weather Tool: Current conditions + forecast

- Search Tool: "Iceland December winter activities attractions"

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Synthesis:

- Weather analysis with seasonal context

- Indoor/outdoor activity balance

- Practical travel tips for winter conditions

- Northern Lights viewing opportunities

Custom Tools Implementation

1. Enhanced Weather Tool

```
@tool
def get_weather_forecast(city: str) -> str:
   """Advanced weather tool with comprehensive data"""

   # Features:
   # - Current conditions
```

```
    # - 3-day forecast
    # - Air quality index
    # - UV index
    # - Rain probability
    # - Humidity and wind details

    # API Integration:
    current_url = "http://api.weatherapi.com/v1/current.json"
    forecast_url = "http://api.weatherapi.com/v1/forecast.json"

    # Returns markdown-formatted weather report
```

Key Enhancements:

- **Extended Forecast**: 3-day weather prediction
- **Air Quality**: EPA air quality index
- **UV Index**: Sun exposure safety information
- **Rain Probability**: Daily precipitation chances
- **Markdown Formatting**: Structured, readable output

2. Advanced Tavily Search Tool

```
tavily_search = TavilySearchResults(
    max_results=5,
    search_depth="advanced",
    include_answer=True,
    include_raw_content=False,
    include_images=True,
    api_key=tavily_api_key
)
```

Advanced Features:

- **Deep Search**: Advanced search depth for comprehensive results

- **Smart Answers**: AI-generated summaries from search results
- **Image Integration**: Relevant images for destinations
- **Content Filtering**: Removes irrelevant raw content
- **High-Quality Sources**: Prioritizes authoritative travel websites

Google Colab Integration Features

1. Microsoft Markdown Display System

```
def display_response(self, response_data: Dict[str, Any]):
    """Microsoft-style markdown rendering in Colab"""

    # Features:
    # - HTML conversion with extensions
    # - Custom CSS styling
    # - Responsive design
    # - Metadata display
    # - Error handling with styled messages
```

Visual Enhancements:

- **Segoe UI Font**: Microsoft's signature typography
- **Professional Styling**: Clean, corporate appearance
- **Color Coding**: Different colors for success/error states
- **Responsive Layout**: Adapts to different screen sizes
- **Metadata Display**: Timestamps and tool usage information

2. Interactive Colab Functions

```
# Easy-to-use functions for Colab users:
get_destination_info("Paris")        # Quick destination lookup
ask_travel_question("Best time for Japan?")  #
```