Role-based vs Chain-of-Thought Prompting - Comparative Study on Travel Planning

# 1. Objective

The objective of this study is to compare the effectiveness of role-based prompting (AI adopts a persona) and chain-of-thought prompting (AI reasons step by step) in generating structured, engaging travel itineraries. The experiment evaluates how each method impacts clarity, personalization, and overall usefulness.

# 2. Methodology

* **Task chosen**: Plan 3-day trips to different destinations. This task was selected because it combines factual planning, creative description, and structured reasoning, making it suitable for testing both prompting styles.
* **LLM used**: Groq API — LLaMA 3.1-8B-Instant model.
* **Prompts**:
* **Role-based prompt**: AI adopts a persona (Tour Guide, Foodie, Historian, Luxury Travel Agent).
* **Chain-of-thought prompt**: AI reasons step by step, first selecting attractions, then organizing them into daily itineraries, then adding food and cultural recommendations.
* **Test set**: 3 destinations were chosen to capture variety in culture and travel experiences (Tokyo, Paris, Bali).

# 3. Results Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Destination** | **Prompt Type** | **Prompt** | **Model Output (Summary)** | **Style & Observations** |
| Tokyo | Role-based (Foodie) | You are a Foodie. Plan a 3-day trip to Tokyo… | Focus: Sushi breakfast, ramen alleys, izakaya nightlife, Tsukiji market visit | Sensory-rich, personalized, food-centered. |
| Tokyo | Chain-of-Thought | Plan a 3-day trip to Tokyo step by step… | Day 1: Traditional shrines & street food  Day 2: Ramen & pop culture districts Day 3: Fish market & fine dining. | Organized, balanced itinerary. |
| India | Role-based (Tour Guide) | You are a Tour Guide. Plan a 3-day trip to India… | Highlights: Taj Mahal, Jaipur forts, Ganga aarti in Varanasi. | Engaging, cultural, rich storytelling. |
| India | Chain-of-Thought | Plan a 3-day trip to India step by step… | Day 1: Delhi monuments  Day 2: Agra & Taj Mahal  Day 3: Jaipur forts & palaces. | Logical, structured, balanced. |
| Bali | Role-based (Luxury Agent) | You are a Luxury Travel Agent. Plan a 3-day trip to Bali… | Focus: Private villa stays, spa retreats, fine dining on the beach. | Premium, aspirational, indulgent. |
| Bali | Chain-of-Thought | Plan a 3-day trip to Bali step by step… | Day 1: Temples & culture  Day 2: Beaches & water sports  Day 3: Relaxation & sunset dinner. | Holistic, systematic. |

# 4. Observations

* Role-based prompting produced more engaging and personalized itineraries, adapting the style depending on the persona.
* Chain-of-thought prompting produced more logically structured and balanced itineraries.
* Testing across different destinations (India, Bali, Tokyo) showed that the role-based style changes with persona (Tour Guide, Luxury Agent, Foodie), while Chain-of-Thought remained consistent and structured across all cases.”

# 5. Conclusion

Both prompting techniques produced useful itineraries but served different purposes:

* Role-based prompting is best when engagement, personalization, or stylistic variation is desired.
* Chain-of-thought prompting is best when clarity, systematic planning, and logical flow are important.