# Personalizing Travel Using LLMs

Raghav Mittal (University Of Texas At Arlington, USA)\*; Rushil Thareja (IIIT Delhi, India); Mukesh Mohania (IIIT Delhi, India); Yoshiharu Ishikawa (Nagoya University, Japan)

### Introduction

 $\rightarrow$  Points of Interest (POIs) worldwide are vast, multicultural, and yet significantly under-appreciated

 $\rightarrow$  eSahyatri (translation: eCompanion) aspires to personalize travel using its built-in storytelling features to bring past stories about POIs to life

- $\rightarrow$  Two modes of operation on *eSahyatri* 
  - 1) Navigation Mode  $\rightarrow$  when users navigate from a given source to destination
    - a) User-centric POI search and recommendations

## **User-Centric POI Indexing**



- b) Fact-based storytelling about navigation routes
- **Free-Roam Mode**  $\rightarrow$  when users wish to roam around freely with no destination
  - Detours based on context-aware POI search a)
  - Factual stories about offbeat POIs b)
  - Community building, entrepreneurship and gamification

### The <u>Personalized and Context-aware R-tree</u> (PCR-tree) [1]

## **Fact-Based Storytelling**



### **Query Reformulation Engine**

- $\rightarrow$  Uses three databases:
  - User profile + POIs, query templates, semantic knowledge base
- $\rightarrow$  Takes user query: {source, destination, categories, context vector}
- $\rightarrow$  Retrieves POIs from PCR-tree and keywords from user profile
- $\rightarrow$  Matches the query with a suitable query template to feed to the LLM

### LLM Fine-Tuning Engine

 $\rightarrow$  Uses a massively pre-trained LLM to create a prompt-story dataset, which is then used to create a fact-based story dataset

### Personalized Storytelling Engine

- $\rightarrow$  Receives the reformulated query and the fact-based story dataset
- $\rightarrow$  Generates a personalized, factual story using another fine-tuned LLM
- $\rightarrow$  Integrates the story with a knowledge graph

### Fact Correction Engine

- $\rightarrow$  Compares draft to the ground-truth about POIs
- $\rightarrow$  If facts match, the story is presented to the user
- $\rightarrow$  If not, the story is fed to another LLM fine-tuned for fact-correction

### **System Architecture**

#### System Core Components

- $\rightarrow$  Query Handler: Acts as the intermediary between the UIAM and the core
- $\rightarrow$  Preference-Based Routing and Recommendation Engine (PRRE): Determines potential routes and POIs
- $\rightarrow$  Storytelling Engine: Generates stories for identified POIs or routes
- $\rightarrow$  POI curator: cleans, aggregates, and integrates POIs/events before feeding to the storytelling engine

### User Interface and Application Manager (UIAM)

- $\rightarrow$  Merges trivia and other information about POIs to present engaging stories
- $\rightarrow$  Offers efficient visualizations

### **User Preference Manager**

 $\rightarrow$  Accesses user preference data stored in a user profile database; gathers and updates user preferences

### Spatial Database Engine

 $\rightarrow$  Performs indexing (using the PCR-tree) and querying of spatial data

### POI/Event Search Engines

 $\rightarrow$  Fetch relevant POI and event data and provide results to the POI curator and storytelling engine



### **User Interface And Community Building**



 $\rightarrow$  Host community events, meetups, sporting activities, and other similar gatherings to improve engagement and better understand user preference

 $\rightarrow$  Use built-in storytelling capabilities to facilitate small-to-medium-sized businesses and local service providers to advertise on its interface

 $\rightarrow$  Introduce gamification and give users economic incentives to contribute more fine-grained data to eSahyatri

#### **References:**

[1] Raghav Mittal, Ayaan Kakkar, Anirban Mondal, Mukesh Mohania, Ladjel Bellatreche, and Yoshiharu Ishikawa 2025. Enriching Spatial Indexes For User-Centric And Context-Aware Points Of Interest Search. To Appear In SSDBM.