Navigate LA28

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This project aims to develop an app to assist tourists visiting the 2028 LA Olympics. It will provide recommendations for nearby attractions, restrooms, parks, and transit stops using real-time spatial data and big data technologies such as Hadoop for spatial analysis. The project will address the challenges of dynamic routing and context-aware recommendations, integrating large GIS datasets to enhance the tourist experience.

Additional Key Words and Phrases: Big Data, Spatial Analysis, Hadoop, GIS, Olympics, Real-Time Data

ACM Reference Format:
Mohammed Faizaan Muzawar, Ajit Singh, Aditya Gambhir, and Samara Miramontes. 2025. Navigate LA28. 1, 1 (January 2025), 3 pages. https://doi.org/10.1145/nnnnnnn.nnnnnnn

1 Introduction

The 2028 LA Olympics will draw millions of visitors to Los Angeles, offering both opportunities and challenges for navigating the city. Existing tourist apps typically provide static maps and points of interest (POIs), which do not account for the dynamic nature of urban environments, especially during a large-scale event. This project proposes a tourist assistance app that will provide personalized, context-aware recommendations for tourists.

2 Background and Motivation

Tourists often face challenges when trying to navigate unfamiliar cities, particularly during events like the Olympics, where conditions such as traffic, transit delays, and crowd movements are highly dynamic. Current navigation tools do not adequately account for these dynamic factors, and tourists may struggle to find essential services like restrooms or transit stops. Our app will solve these issues by integrating spatial data with real-time updates, offering adaptive routing and recommendations based on current conditions.

3 Datasets

The following datasets will be used in the project:

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Manuscript submitted to ACM

- **Park Boundaries GIS Data:** Locations of LA parks. (Link: https://data.lacity.org/Parks-Recreation/Department-of-Recreation-and-Parks-GIS-Map-of-Park/nuub-r4zx)
- **Bike Lanes Data:** Information on bike lanes in Los Angeles. (Link: https://data.lacity.org/Transportation/Bikelanes/uzvv-a9xz)
- **Transit Stops:** Locations of bus and metro stops with real-time updates. (Link: https://developer.metro.net/gis-data/)
- **Restroom Locations:** Public restrooms in Los Angeles. (Link: https://catalog.data.gov/dataset/restroom/resource/1cd0569b-f506-4c2e-b1a2-f1c79231f8f3?inner_span=True)

4 Main Outcome

At the end of the project, we will deliver a web app that assists tourists with real-time recommendations for nearby attractions, restrooms, parks, and public transit. The app will provide dynamic routing and updates based on current traffic, transit conditions, and other real-time factors. Users will also be able to customize their preferences for which types of POIs they prioritize.

5 Relevance to Big Data

This project heavily leverages big data technologies to process both large, static spatial datasets and real-time data streams. Key technologies include:

- **Hadoop** for processing large spatial datasets such as park boundaries and bike lanes, stored in HDFS for efficient batch processing.

By integrating both batch and real-time processing, we will ensure the app provides accurate, real-time recommendations.

6 Evaluation

The success of the project will be evaluated based on the following criteria:

- **Response Time:** Measure the time the app takes to respond to user queries and update the display with new data.
- **Throughput:** Assess the number of requests handled per second to ensure the system can manage high user loads, especially during peak times.
- **Data Integrity and Accuracy:** Validate the accuracy of spatial data against trusted sources. Compare the real-time transit data with actual event logs to assess the correctness of information provided by the app.
- **Usability:** User feedback on the app's ease of use and effectiveness in helping them navigate the city.

7 Project Milestones and Timeline

- **Phase 1:** Data Acquisition and Preprocessing (Weeks 4–5): Collect and clean datasets, preprocess spatial data using Python's Geopandas and Shapely libraries.
- **Phase 2:** System Design and Integration (Weeks 6–7): Set up Hadoop for large dataset storage, design the back-end system using Python Flask/FastAPI, and integrate real-time data via Kafka.
- **Phase 3:** Front-End Development (Weeks 8–9): Build the UI using React and JavaScript mapping libraries (Leaflet or Mapbox), implement dynamic data visualizations.

- **Phase 4:** Testing and Optimization (Week 10): Perform system testing, optimization, and user feedback collection.

8 Bibliography

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