

# Master's Thesis

## Understanding Tradeoffs in User Decision-Making for Trip Planning

### Keywords

Tourism Recommender Systems, Sustainability, Full-Stack application development, User Study

### Project Description

In this era of abundant information and diverse options, travelers face numerous choices when organizing their trips, from destination selection to itinerary planning. This project aims to conduct a comprehensive user study through an application to understand the tradeoffs in user decision-making during trip planning, particularly when planning vacations to other cities. The study will focus on elucidating the impact of visualization strategies and other compounding factors on user decision-making in this context.

This project is an extension of the work in [\[4\]](#). The primary goal is understanding how much users will compromise when choosing the most sustainable travel options. We measure sustainability based on the popularity of the destination, the crowd levels during the travel month, and the CO2 emissions associated with the user's preferred mode of transport (train, car, or airplane). Each destination is assigned an aggregated score, the S-Fairness score, to indicate its sustainability.

We extend the existing application by including an approximate cost estimate for the trip based on the user's starting location, month of travel, number of travelers, and duration of stay. We also use an expert dataset to categorize cities into multiple features, such as culture, history, food, nightlife, etc., to match the user's preferences. The user also enters their preferences for these features on a scale of 1-10.

The application then shows a list of sustainable cities (S-Fair) that match their preferences and the approximate costs for their trips.

We also include Airbnb listing options and their approximate prices (from historical prices) for the chosen period, as well as an estimation of the transportation costs to display the cost estimation.

We also include historical weather data to enhance the attractiveness of the destinations.

The main objective of the application is to understand the trade-offs in user decision-making and how we can nudge the user to opt for a sustainable and environmentally friendly alternative.

Below are some possible trade-off analysis scenarios (with the possibility of adding more):

- If the user wants to visit a place rich in culture (max rated by them at the beginning) even if it is far away, i.e., more CO2 emissions vs. something less culturally significant but closer and sustainable.
- Similarly, a comparison of the other preferences against cost, travel time and emissions, weather, and their combinations
- Analyzing the intra-preferences trade-offs.

Statistical Analysis:

- Interaction Effects: Investigate if the impact of emission labels on choices varies by mode of transport.
- Cluster and Factor Analysis: Identify latent variables and user groups based on their responses.
- Statistical Power and Effect Size: Ensure significance and effect sizes are reported to validate the findings' reliability and practical significance.

## Objectives

- To identify the key factors influencing user decision-making during trip planning and sustainability.
- To explore visualization strategies on how to best communicate the sustainability features to the end user and the impact on their decision-making process
- To provide insights and recommendations for designing trip planning tools and platforms to better assist users in making informed decisions.

## Expected Outcomes

- A deeper understanding of the factors influencing user decision-making in trip planning.
- Insights into the effectiveness of different visualization strategies in facilitating user decisions and identifying compounding factors that interact with visualization strategies in shaping user choices.
- Setting up the study, recruiting participants, and also deducing the analysis of the final data gathered
- Recommendations for designing and improving trip planning tools and platforms to better serve user needs.
- Possibility to publish promising results at a scientific conference

## Required Experience

- Proficiency in ReactJS (or similar) for frontend development and UI/UX design, Python for backend, Firebase for database and hosting
- Familiarity with recommendation systems & Material UI is a plus.
- Proficiency in conducting literature reviews and synthesizing research findings.

- Experience in analyzing and evaluating research methodologies and algorithms.
- Strong critical thinking and problem-solving abilities to identify gaps and propose novel ideas in substitution recommendations.
- Proficiency in data analysis and interpretation for gaining insights from user response data
- Good understanding of software engineering principles and experience with version control tools like Git.
- Excellent written and verbal communication skills for the potential publication of results at a scientific conference

## References

[1] Modeling Sustainable City Trips: Integrating CO2 Emissions, Popularity, and Seasonality into Tourism Recommender Systems. Ashmi Banerjee, Tunar Mahmudov, Emil Adler, Fitri Nur Aisyah, and Wolfgang Wörndl. 2024. [arXiv preprint arXiv:2403.18604](https://arxiv.org/abs/2403.18604) (2024).

[2] Green Destination Recommender: A Web Application to Encourage Responsible City Trip Recommendations, Ashmi Banerjee, Tunar Mahmudov, and Wolfgang Wörndl. In Adjunct Proceedings of the 32nd ACM Conference on User Modeling, Adaptation and Personalization (UMAP Adjunct '24), July 01–04, 2024, Cagliari, Italy. ACM, New York, NY, USA *[to appear]*

[3] A User Interface Study on Sustainable City Trip Recommendations, Ashmi Banerjee, Tunar Mahmudov, and Wolfgang Wörndl. 2024. arXiv preprint. <https://arxiv.org/pdf/2405.11243>

[4] <https://gdr-demo.web.app/>

## Contact/Supervisors

We would love to hear from you if you're excited about the opportunity!

To apply, kindly submit your transcripts, CV, and a compelling motivation statement (maximum 200 words, crafted by your creativity and not generated by any AI tool 😊) to the following address:

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