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Spatializing Travel Preferences: Design and Evaluation of an Interactive Interface for Personalized Travel Planning using Map Imitation Techniques

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Abstract:

Maps have assumed an increasingly central role in tourism planning, functioning both as communication tools and as primary means of destination discovery (Brokou et al., 2021). As the volume of travelers grows, so does the complexity of planning a trip, and cartography has become an increasingly central tool in that process. The most popular platforms, such as Google Flights and Rome2Rio, organize destinations primarily through one-dimensional criteria — price, travel time, or distance. However, one criteria alone rarely determines whether a destination feels attractive or reachable. Travelers typically judge distance, ease of reaching their destination, trip cost, the sustainability of their journey, and how appealing their destination seems. This subjective sense of how far a place really is, also known as perceived distance (Shang et al., 2025), is absent from the common cartographic representations in tourism cartography. Current Tools that incorporate traveler preferences, such as SmartSustain (Banerjee et al., 2025) and the Green Destination Recommender (Banerjee et al., 2024), present their results as ordered lists, thereby discarding the spatial and exploratory qualities that make a map useful for destination discovery.

Cartography offers a way to bridge this gap. Map-like visualizations that use non-geographic variables as spatial coordinates"—a practice formalized as spatialization (Hogräfer et al., 2020) and extended to the map imitation format (Schlumpf, 2023)—allow for the spatialization of preferences instead of distances. **WhereToGo** (https://leslybautista.github.io/Wheretogo/) applies a bearing-preserving radial distortion to European capitals: the geographic azimuth from the origin is preserved as a directional anchor, while the radial distance to the origin encodes a score derived from a Weighted Linear Combination (WLC) based on four user-adjustable criteria—travel time, economic cost, carbon emissions, and destination popularity. Cities that align with the traveler's stated priorities migrate toward the center; others recede. A shaded relief layer derived from popularity allows for the reading of tourist influx patterns without the need for active filtering. A synchronized card panel complements the map view with the criteria values for each destination, combining the cartographic support of map imitation with the familiarity of a ranked list. Figure 1 shows the prototype; Figure 2 illustrates supplementary interface elements, the preference weight sliders, and the city detail panel.

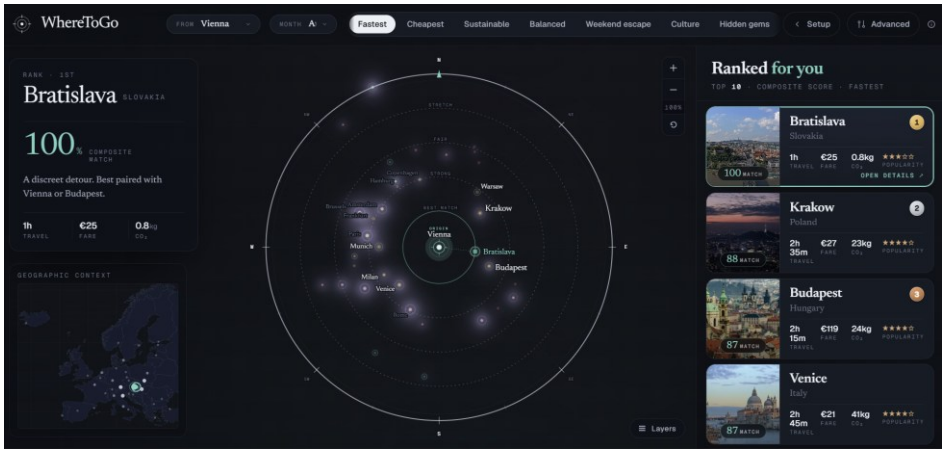

Figure 1. WhereToGo Prototype.

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The distorted map imitation provides holistic, exploratory affordances; it encourages pattern recognition, invites comparison across the entire set of destinations, and stimulates curiosity. The card panel, in contrast, offers precision, transparency, and direct comparability of scores (Banerjee et al., 2025). Both views synchronize as the slider weights are adjusted, and the user can explore them simultaneously. The prototype is deployed as a static client-side web application: destination data for European cities is obtained from a travel fare API and cached as a pre-computed static resource, consumed by a JavaScript front-end that renders the radial map mockup as an SVG. Animated transitions are triggered each time the user adjusts the preference weights, and the destinations smoothly migrate to their updated positions.

Figure 2. Preference weight sliders (left) and city detail panel for Warsaw (right), showing transport mode comparison, emission impact, seasonality, and destination highlights.

The system captures what users say they value — not what they necessarily act on. Whether the map view actually alters destination exploration—compared to a list alone—remains an open empirical question. A controlled user study ($N \approx 40$) with a within-subjects, ABBA counterbalancing design directly addresses this: participants interact with two conditions—the full interface (map + card panel) and the card panel only—framed by a destination elicitation task before and after the interaction. Usability and cognitive load are measured using the System Usability Scale (SUS) and the NASA-TLX. The user study is currently ongoing.

The shortcomings of the approach used in this research include that the calculation of user preferences via a weighted linear combination involves decisions on normalization, which remain invisible to the end user. Additionally, the sliders capture stated preferences, not actual behaviour: users may overweight socially desirable criteria (such as carbon emissions) relative to the factors that actually guide their travel decisions. Both limitations are acknowledged as structural design constraints, not avoidable artifacts. The empirical study is designed precisely to detect signs of this divergence, not to ignore it.

This research provides three contributions. Firstly, it represents an extension of the concept of map imitation from a static artifact to an interactive, personalized context. Secondly, it introduces radial distortion with azimuth preservation as an alternative design solution for representing users' spatial preferences while providing them with an accurate representation of the location of those areas. Finally, it provides quantitative empirical data concerning whether using a map-viewing interface can lead users to discover additional destinations that would not have been discovered using a rank-ordered list.

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