Traveltide Project Report

Executive Summary

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This project develops a data-driven customer segmentation and personalized perks framework for the Travel-Tide travel booking platform using behavioral, transactional, and demographic data. The objective is to improve booking conversion, customer retention, and long-term customer value through targeted incentive design.

Data from sessions, users, flights, and hotels were integrated under strict eligibility rules: only sessions after January 4, 2023 and users with more than seven sessions were included. The final analytical dataset contains 49,211 sessions, 16,099 trips, and 5,442 users. Extensive preprocessing was applied, including timestamp standardization, session-duration creation, missing-value handling, correction of invalid hotel nights, deduplication, and outlier filtering using the IQR method.

Thirty-seven user-level features were engineered capturing engagement, travel frequency, spending behavior, seasonality, discount usage, and cancellations. Three preference indices were introduced—hotel_hunter_index, flight_fanatic_index, and bundle_index—to quantify user tendencies toward hotel bookings, flight bookings, and bundled trips. Features were standardized and reduced using Principal Component Analysis (PCA), retaining 95% of total variance across 20 components. K-Means clustering was applied to the PCA output, with k=5 selected based on elbow analysis, silhouette scores, and business interpretability.

Five distinct customer segments were identified, exhibiting clear differences in spending levels, booking patterns, and travel preferences. Based on cluster profiles, tailored perks were assigned: Free Hotel Night with Flight, Exclusive Discount, Free Meal, Free Checked Bag, and Free Cancellation Fee. Each perk aligns directly with the dominant behaviors and needs of its segment, ensuring relevance and maximizing potential impact.

The project demonstrates how behavioral data can be transformed into actionable segmentation and personalization strategies through a robust analytical pipeline. A future A/B testing framework is proposed to validate perk effectiveness by measuring lift in booking conversion and revenue per user within each cluster. Expected business impact includes higher conversion rates, improved retention, more efficient incentive spending, and enhanced customer experience.

Overall, this work provides a scalable and interpretable foundation for personalized

marketing and rewards optimization at Travel-Tide.