TravelTide Rewards Segmentation Report

🚀 Introduction

Note: The visuals included in this report represent key examples from the full set of project outputs and are meant to illustrate core findings and strategies.

TravelTide is expanding its personalized rewards system to improve retention and encourage repeat travel. Our team built a user segmentation model based on session activity, booking behavior, and customer value to assign perks strategically.

The analysis covered over 15,000 users with 8+ sessions, integrating hotel bookings, flight behavior, session patterns, and demographic data. This report explains how we cleaned the data, engineered behavioral features, clustered users, and assigned perks that align with segment value.

⚖️ Data Cleaning & Feature Engineering
- Merged hotel, flight, session, and user data for a complete user journey
- Addressed natural nulls (e.g., missing return_time = one-way flight)
- Removed canceled trips to focus on committed behavior
- Calculated age from birth year and cleaned trip duration (nights)
- Used the Haversine formula to calculate flight distance
- Aggregated user-level stats: average nights, hotel spend, booking rate, distance flown

These steps ensured a high-quality base for segmentation.

📊 Segmentation Approach
We applied PCA to reduce dimensionality, then KMeans to group users into behavior-based segments. We evaluated DBSCAN and validated our model using silhouette score and user-level behavior (spend vs. nights).

Clusters showed strong separation in PCA space, and correlated clearly with engagement metrics.

📈 Segment Overview (Chart 1)
Key differences emerged:
- Weekend Explorers and Budget Travelers take shorter trips but vary in value
- Luxury Loyalists spend more and travel farther
- Young Adventurers skew younger with average spend

📊 Value by Segment (Chart 2)
Segments like Weekend Explorers and Solo Jetsetters lead in value, while Spontaneous Bookers offer lower return on investment (ROI).

📌 Cluster Validation (Chart 5a & 5b)
- PCA Scatter confirms distinct groupings in 2D space
- Hotel Spend vs. Nights shows longer stays = higher spend
- These validate that cluster labels reflect real behavior

📉 KPI Heatmap (Chart 7)
Compares clusters across trip length, spend, and booking KPIs. Shows clear behavioral fingerprints per segment.

🏨 Perk Assignment Summary (Chart 8)
Perks were matched to segment traits:
- High Value (e.g., Weekend Explorers, Luxury Loyalists): Lounge Access, Hotel Upgrades
- Price-Sensitive (e.g., Budget Travelers): Discounts
- Family & Meal-oriented: Meal Vouchers for Family Vacationers

This table maps segments to meaningful rewards, boosting personalization.

🔎 DBSCAN Tuning (Appendix)
Used k-distance plot to identify `eps` = ~5.5. Although DBSCAN wasn't final model, it validated density patterns in user space.

✅ Conclusion
We built a full behavioral segmentation and reward strategy:
- Cleaned and engineered a robust user dataset
- Identified clear, actionable clusters
- Validated them with visual + metric evidence
- Assigned rewards that align with segment value

This framework enables targeted perks that improve loyalty and maximize return on investment (ROI).

Chart 1 – Segment Overview

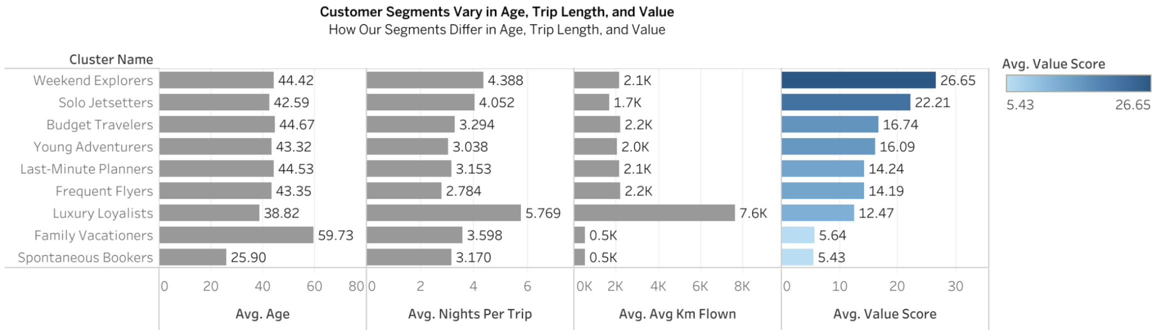

Chart 2 – Value Score by Segment

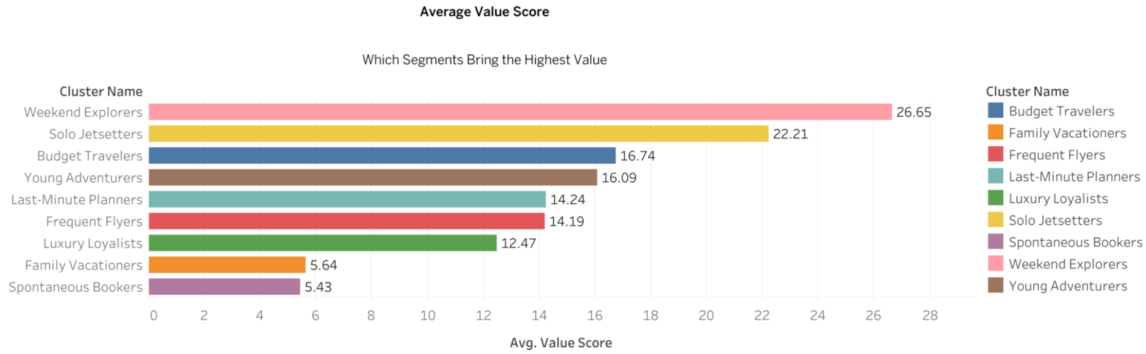

Chart 5a – Cluster Scatter Plot

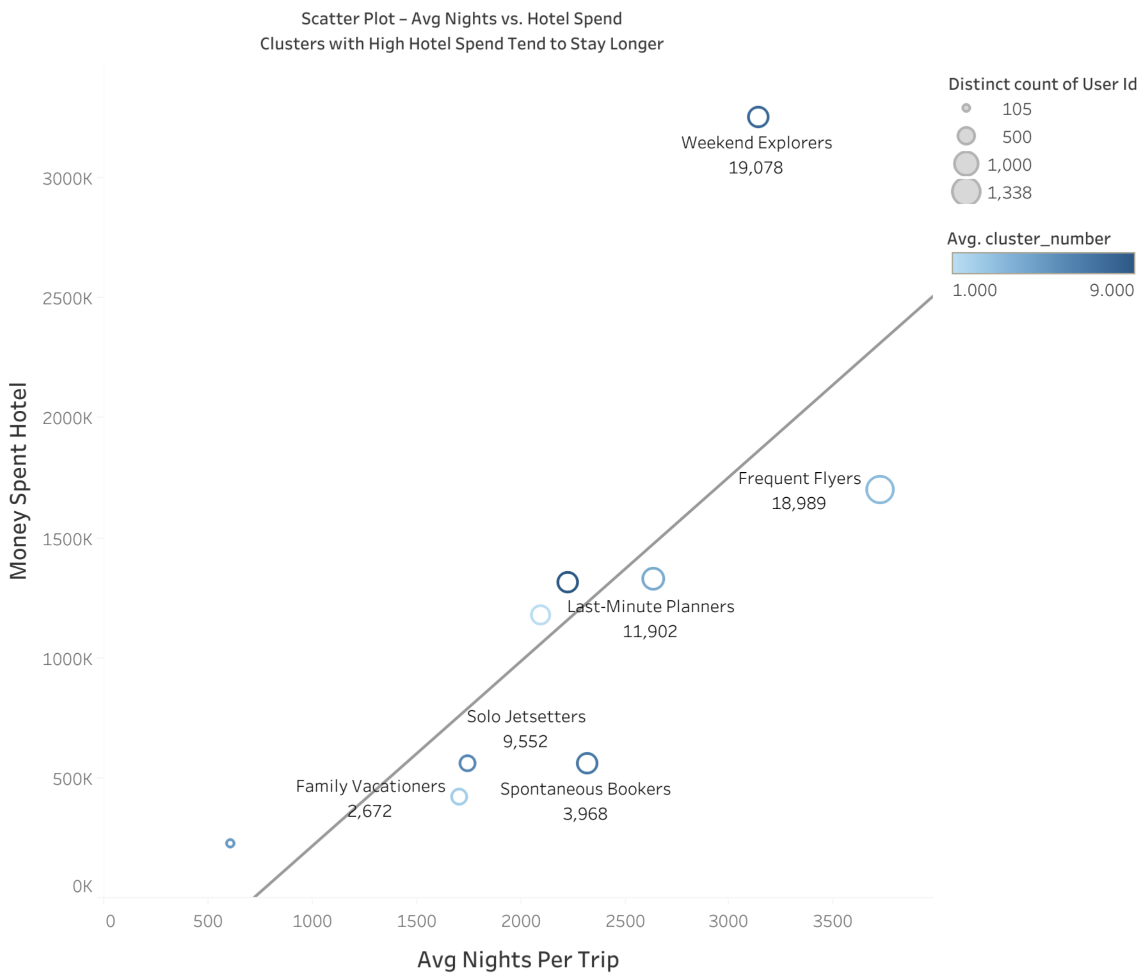

Chart 7 – Heatmap KPIs

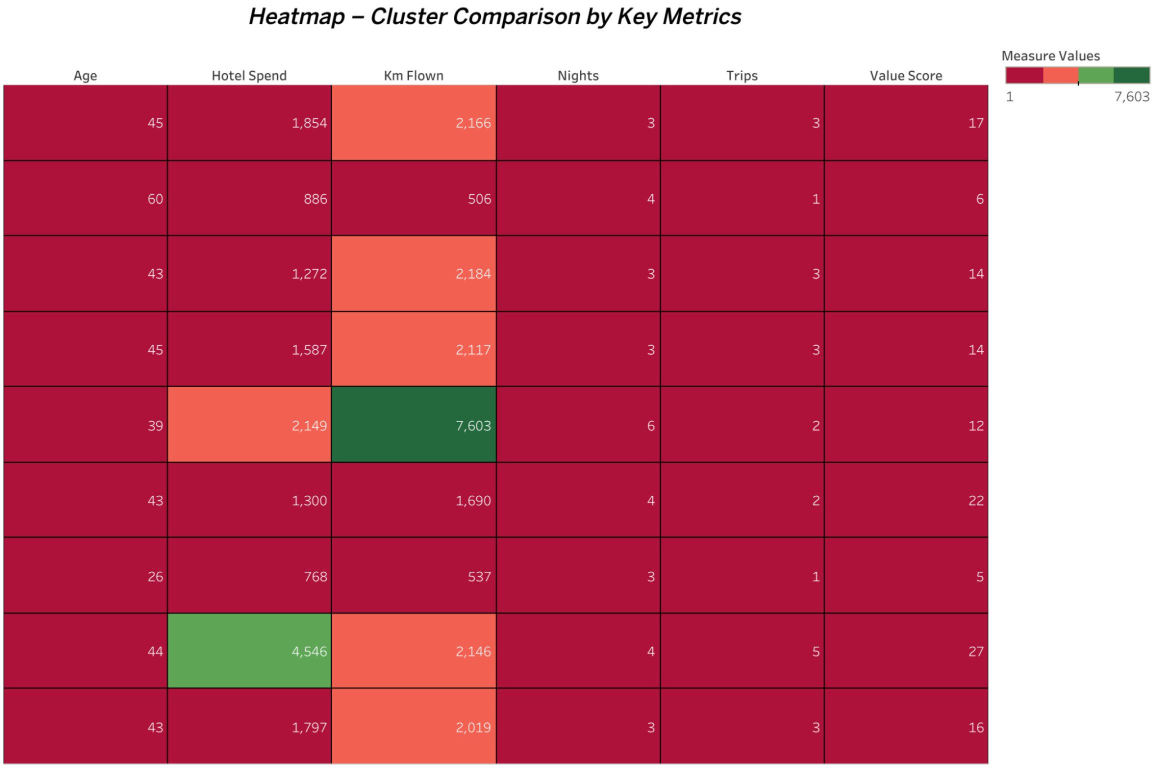

Chart 8 – Final Perk Assignment

Final Perk Assignment

Final Perk Assignment Strategy

Cluster Name	
Budget Travelers	Free Checked Bag..
Family Vacationers	Meal Voucher..
Frequent Flyers	10% Off Next Trip..
Last-Minute Planners	General Perk
Luxury Loyalists	Hotel Upgrade..
Solo Jetsetters	Free Meal..
Spontaneous Bookers	General Perk
Weekend Explorers	Lounge Access..
Young Adventurers	10% Off Next Trip..

Appendix – DBSCAN k-distance plot