AI-POWERED EXPERIENCE INTELLIGENCE SYSTEM
(Analytics and Artificial Intelligence for User Experience Optimization)

PROJECT REPORT

Submittedby

R ADHITYAN

Inpartial fulfillment of the requirements for the award of degree

BACHELOR OF TECHNOLOGY

in

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

PANIMALAR ENGINEERING COLLEGE

ANNA UNIVERSITY

CHAPTER 1

INTRODUCTION

In today's digital and service-driven era, user experience has become a critical determinant of success for organizations across industries such as transportation, navigation services, and social media platforms. Poor user experience can result in customer dissatisfaction, user churn, reduced engagement, and long-term revenue loss. Traditional analytical approaches, which rely primarily on historical reports and descriptive statistics, often fail to identify risks early or provide actionable insights for improving user experience.

Experience intelligence offers a data-driven solution to this challenge by combining data analytics and artificial intelligence to analyze user behavior patterns and predict future outcomes. By leveraging machine learning models, organizations can proactively identify dissatisfaction, churn risks, and engagement decline before they significantly impact business performance. This predictive capability enables timely interventions, optimized strategies, and improved service quality.

The project **"AI-Powered Experience Intelligence System"** is motivated by the need to transform raw user interaction data into intelligent, actionable insights that support proactive decision-making. The system integrates analytics and machine learning techniques to predict user experience outcomes across multiple real-world domains, enabling stakeholders to understand not only what may happen, but also why it may happen and how it can be improved.

The proposed system analyzes diverse datasets collected from taxi services, navigation applications, and short-form video platforms. These datasets typically include operational metrics, user activity patterns, engagement indicators, and platform-specific attributes. By processing and modeling this data, the system predicts customer satisfaction levels, churn probability, and content engagement risk. Additionally, an explainable AI layer and interactive dashboard allow users to explore predictions, identify key influencing factors, and simulate what-if scenarios in real time.

RELEVANCE OF DATA ANALYTICS IN EXPERIENCE INTELLIGENCE

In recent years, data analytics has significantly transformed the way organizations understand and manage user experience across digital platforms. By collecting and analyzing large volumes of user interaction data, organizations can identify behavior patterns, detect dissatisfaction signals, and anticipate potential issues such as churn or engagement decline. Unlike traditional analytics approaches that focus mainly on historical reporting, data-driven experience intelligence enables proactive decision-making based on real user behavior.

Data analytics allows analysts and decision-makers to uncover patterns, correlations, and hidden trends from complex datasets generated by users interacting with services such as transportation systems, navigation applications, and social media platforms. These insights support the prediction of customer satisfaction levels, churn risks, and content engagement performance. By leveraging predictive models, organizations can optimize pricing strategies, personalize user experiences, and improve service quality while reducing customer attrition.

Moreover, the integration of analytics with machine learning and interactive dashboards enables continuous monitoring and real-time insights. Decision-makers can explore key influencing factors, visualize trends, and simulate what-if scenarios to evaluate the impact of strategic changes. This proactive approach shifts organizations from reactive problem-solving to experience-driven optimization.

By combining analytical tools, visualization techniques, and artificial intelligence, experience intelligence systems enhance user satisfaction, strengthen retention, and improve engagement outcomes. This data-driven methodology minimizes guesswork, supports informed decision-making, and enables organizations to build sustainable, user-centric digital platforms. Ultimately, data analytics forms the foundation of modern experience intelligence, empowering organizations to achieve long-term success through improved user experience management.

ANALYTICAL ALGORITHM

The core of this project lies in a data-driven analytical algorithm that applies statistical analysis and machine learning principles to evaluate and predict user experience outcomes. Instead of relying on manually defined rules or static thresholds, the system learns behavioral patterns from historical user interaction data to identify risks related to customer satisfaction, user churn, and content engagement.

The analytical process begins with data preprocessing and feature engineering, where raw datasets collected from taxi services, navigation applications, and social media platforms are cleaned, normalized, and transformed into meaningful behavioral indicators. These indicators include metrics related to usage frequency, inactivity, cost efficiency, engagement intensity, and platform trust signals. The transformed features are then evaluated using suitable machine learning algorithms such as regression and classification models to estimate satisfaction scores, churn probability, and engagement risk.

The analytical workflow is designed to be transparent and interpretable. Rather than functioning as a black-box system, the project emphasizes explainability by identifying the key factors influencing each prediction. This logical and explainable analytical flow enables stakeholders to understand why a particular prediction was generated and how specific variables contribute to the outcome. Through visualization and rule-based explanations, the system ensures trustworthiness and clarity in data-driven decision-making.

APPLICATIONS

The AI-Powered Experience Intelligence System developed in this project has a wide range of real-world applications across multiple digital and service-oriented domains:

• **Transportation and Mobility Services:**
Enables service providers to analyze trip characteristics, pricing factors, and peak-hour conditions to predict customer satisfaction and optimize operational strategies for improved user experience.

• **Navigation and Location-Based Applications:**
Supports user retention efforts by predicting churn risk based on activity patterns, personalization usage, and inactivity levels, allowing organizations to implement targeted re-engagement strategies.

• **Digital Content and Social Media Platforms:**
Assists content creators and platform managers in predicting engagement performance by analyzing interaction metrics, content structure, creator credibility, and moderation signals.

• **Business Decision Support Systems:**
Provides organizations with actionable insights, risk interpretation, and what-if simulations through interactive dashboards, enabling proactive and informed decision-making.

• **Customer Experience Optimization:**
Helps organizations improve satisfaction, reduce churn, and enhance engagement by leveraging analytics-driven insights rather than reactive analysis.

• **Customer Retention and Loyalty Programs:**
Organizations can utilize churn prediction insights to design personalized loyalty programs, targeted offers, and reward mechanisms aimed at retaining high-risk users and strengthening long-term customer relationships.

• **Dynamic Pricing and Service Optimization:**
By analyzing satisfaction trends and behavioral patterns, service providers can adjust pricing strategies, promotional offers, and service availability dynamically to improve perceived value and user satisfaction.

• **Product and Feature Improvement:**
Experience intelligence insights help product teams identify underperforming features, usability issues, and friction points within applications. This supports data-driven enhancements and iterative product development.

• **Marketing Strategy and Campaign Optimization:**
Marketing teams can leverage engagement and churn predictions to tailor campaigns for specific user segments, improving campaign effectiveness and return on investment.

• **User-Centric Experience Design:**
UX designers can use analytical insights to understand how different factors influence user satisfaction and engagement, enabling the design of more intuitive and user-friendly digital experiences.

• **Educational and Research Applications:**
The system can be used as a learning and research tool to demonstrate real-world applications of data analytics, machine learning, and explainable AI in experience-driven domains

CHAPTER 2

LITERATURE REVIEW

EXPERIENCE INTELLIGENCE AND THE EVOLUTION OF DATA-DRIVEN USER ANALYTICS

Experience intelligence has emerged as one of the most transformative applications of data analytics in modern digital services. The rapid growth of mobile applications, online platforms, and data-driven business models, combined with advancements in artificial intelligence (AI) and machine learning, has enabled organizations to shift from traditional reactive analysis to predictive and proactive experience management.

Earlier approaches to user analysis primarily relied on static reports, basic metrics, and manual interpretation of historical data. These methods provided limited insights into future user behavior and were often insufficient for identifying early warning signs of dissatisfaction, disengagement, or churn.

As digital ecosystems became more complex, the need for intelligent systems capable of continuous monitoring, real-time data processing, and behavioral forecasting became increasingly evident.

Modern experience intelligence systems aim to predict outcomes such as customer satisfaction, retention probability, and content engagement before negative trends fully materialize. By analyzing large-scale interaction data, organizations can optimize service quality, personalize user journeys, and improve long-term platform performance.

TRADITIONAL USER ANALYTICS APPROACHES

Historically, organizations relied on two primary approaches to understanding user behavior: reactive analytics and descriptive reporting.

Reactive analytics involves addressing user issues only after complaints, churn, or engagement drops are observed. Although straightforward, this approach often leads to delayed responses, customer dissatisfaction, and reputational damage. It fails to prevent problems and only reacts once negative outcomes have already occurred.

Descriptive analytics focuses on summarizing past data through dashboards and performance reports. While this method provides useful historical insights, it lacks adaptability to changing user behavior and does not support real-time intervention or future prediction.

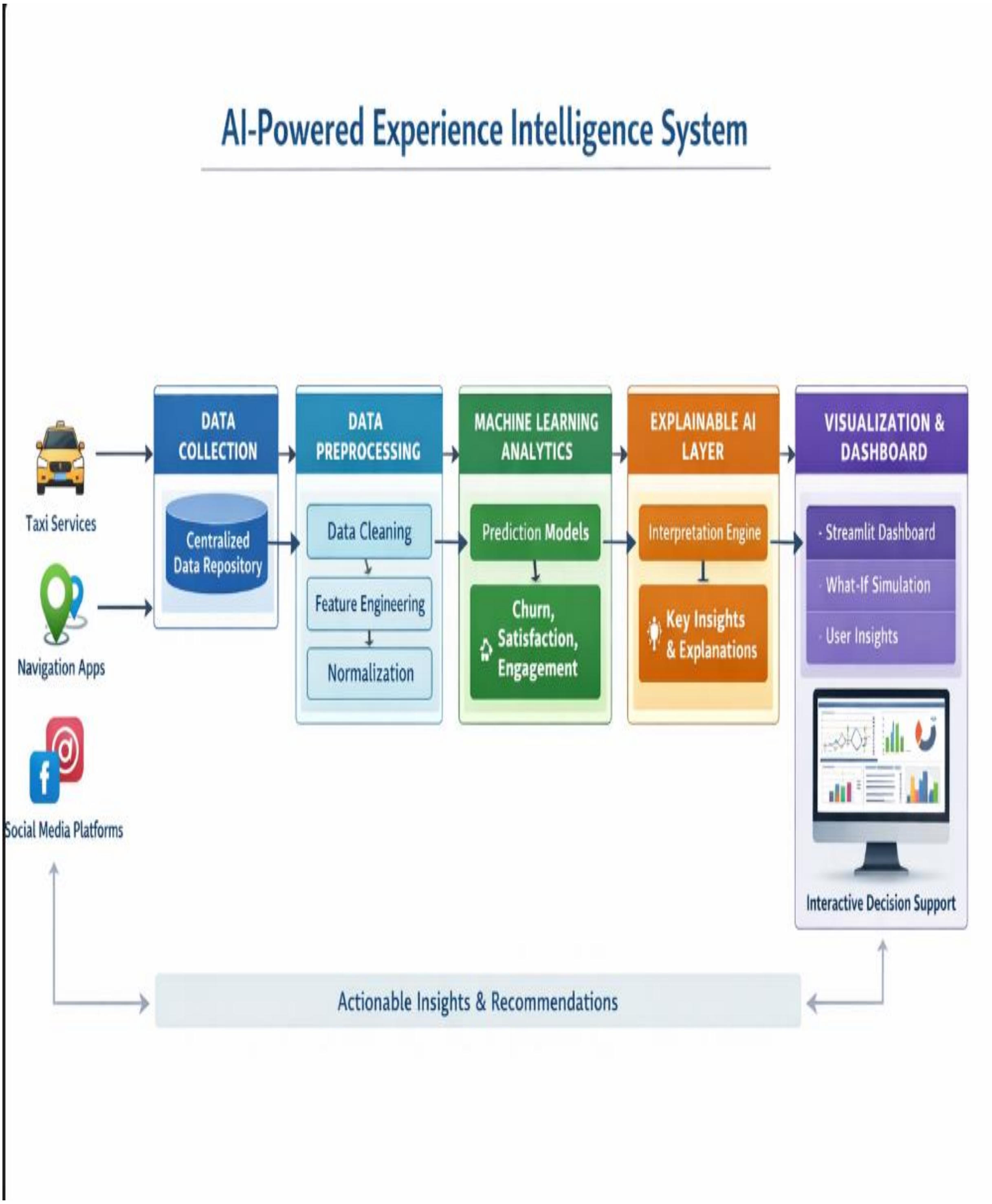
As a result, organizations frequently miss opportunities to retain users or improve experience proactively.

These limitations motivated researchers and practitioners to explore predictive experience analytics and intelligent decision-support systems. By leveraging machine learning models and behavioral pattern recognition, experience intelligence systems can identify early risk indicators and recommend strategic actions, enabling organizations to move from passive observation to proactive optimization.

CHAPTER 3

SYSTEM DESIGN

SYSTEM ARCHITECTURE



The system architecture of the **AI-Powered Experience Intelligence System** is designed as a modular, data-driven framework that integrates data collection, preprocessing, machine learning analytics, explainable intelligence, and interactive visualization. The architecture ensures a seamless flow of data from raw input to actionable insights while maintaining scalability, transparency, and real-time interaction.

In the initial stage, user interaction data is collected from multiple real-world domains, including taxi services, navigation applications, and social media platforms. These datasets are stored in a centralized data repository for further processing. The data preprocessing layer performs essential operations such as data cleaning, handling missing values, normalization, and feature engineering to transform raw data into meaningful behavioral indicators.

The processed data is then passed to the analytical engine, which applies machine learning algorithms such as regression and classification models to predict key experience metrics. These predictions include customer satisfaction scores, user churn probability, and content engagement risk. The analytical engine is designed to learn patterns from historical data and generate reliable predictions based on user behavior.

An explainable AI layer is integrated into the architecture to interpret model outputs and identify key factors influencing predictions. This layer enhances transparency by providing reason-based explanations, risk categorization, and actionable recommendations, ensuring that predictions are understandable and trustworthy.

The final layer of the system is the visualization and decision-support layer, implemented using an interactive Streamlit dashboard. This layer presents predictions, insights, and what-if simulations in a user-friendly format, enabling stakeholders to explore scenarios, understand risks, and make informed decisions. The overall architecture supports proactive experience optimization by transforming analytical outputs into practical and strategic insights.

CHAPTER 4

PROJECT MODULES

MODULES

The AI-Powered Experience Intelligence System is designed using a modular architecture, where each module performs a specific function in transforming raw data into actionable insights. This modular approach improves scalability, maintainability, and clarity of the system.

Module 1: Data Collection Module

This module is responsible for collecting and organizing datasets from multiple real-world domains, including taxi services, navigation applications, and social media platforms. The datasets contain structured user interaction data such as trip details, usage activity, engagement metrics, and platform-specific attributes.
The collected data is stored in a centralized repository and serves as the primary input for subsequent processing and analysis.

Module 2: Data Preprocessing Module

The data preprocessing module ensures the quality and reliability of the input data. Raw datasets often contain missing values, inconsistencies, outliers, and irrelevant attributes that can negatively affect model performance.
This module performs operations such as:

- Handling missing and inconsistent values
- Data normalization and scaling
- Removal of noise and redundant features
- Feature selection and transformation

The output of this module is a clean and structured dataset suitable for machine learning analysis.

Module 3: Feature Engineering Module

The feature engineering module transforms preprocessed data into meaningful behavioral indicators that represent user experience patterns. Domain-specific features are derived to capture critical aspects such as satisfaction drivers, inactivity levels, engagement intensity, and trust signals.
These engineered features improve model accuracy and enhance the interpretability of predictions.

Module 4: Machine Learning Analytics Module

This module applies machine learning algorithms to predict user experience outcomes. Depending on the domain, regression and classification models are used to estimate metrics such as customer satisfaction score, churn probability, and engagement risk.
The models are trained using historical data and validated to ensure reliable predictive performance. This module forms the analytical core of the system.

Module 5: Explainable AI Module

To enhance transparency and trust, the explainable AI module interprets the outputs of machine learning models. It identifies key factors influencing each prediction and provides rule-based explanations, risk categorization, and reason summaries. This module ensures that predictions are understandable to non-technical users and supports informed decision-making.

Module 6: What-If Simulation Module

The what-if simulation module allows users to experiment with changes in input parameters and observe their impact on predicted outcomes. By modifying variables such as cost, duration, activity levels, or engagement intensity, users can explore alternative scenarios in real time.
This module supports strategic planning and optimization by enabling proactive evaluation of improvement strategies.

Module 7: Visualization and Dashboard Module

The visualization module presents analytical results through an interactive Streamlit-based dashboard. It displays predictions, insights, risk levels, explanations, and simulation results in a user-friendly format.
Interactive controls such as sliders, checkboxes, and metrics enable real-time user interaction with the system, bridging the gap between complex analytics and practical decision-making.

Module 8: Decision Support Module

The decision support module integrates insights from all previous modules to provide actionable recommendations. Based on predicted outcomes and risk levels, the system suggests corrective actions, optimization strategies, and experience improvement measures.
This module ensures that analytical outputs are transformed into meaningful business decisions.

CHAPTER 5

RESULTS & DISCUSSION

Dashboard Output and Result Analysis

The developed AI-Powered Experience Intelligence System was deployed as an interactive Streamlit dashboard to visualize predictive insights and support real-time decision-making. The dashboard integrates machine learning predictions with explainable insights and what-if simulations across multiple experience domains. Sample outputs obtained from the dashboard are shown below.

Figure 5.1: Taxi Experience Intelligence Dashboard

This dashboard presents predicted customer satisfaction insights based on trip-related parameters such as travel duration, trip distance, cost efficiency, peak-hour conditions, and tipping behaviour. The model identifies potential dissatisfaction risks and provides actionable recommendations to improve service quality and pricing strategies.

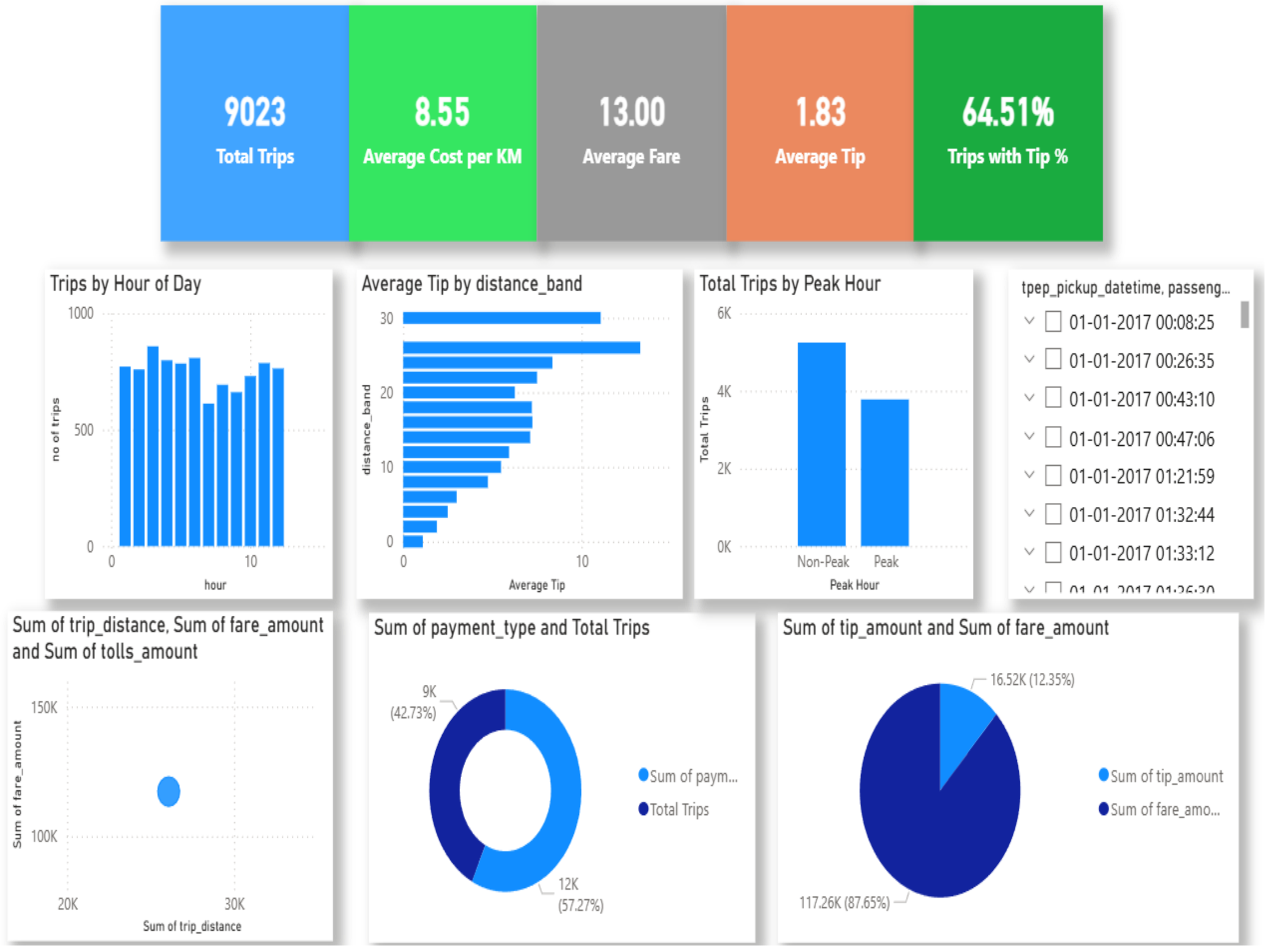


Figure 5.2: Navigation Application User Churn Prediction Dashboard

This dashboard illustrates the churn probability of users based on activity patterns, session frequency, inactivity duration, and personalization usage. The system categorizes users into risk levels and highlights key factors influencing churn, enabling targeted retention and re-engagement strategies.

Figure 5.3: Social Media Engagement Intelligence Dashboard

This dashboard analyzes content engagement performance by evaluating interaction intensity, content duration, creator credibility, and platform trust signals. The system predicts engagement risk and explains how moderation status and content characteristics impact visibility and user interaction.

5.3 Discussion of Result

From the experimental results, it is observed that the proposed system effectively captures behavioural patterns across different domains. The predictive models demonstrate the ability to identify high-risk scenarios related to dissatisfaction, churn, and low engagement. The explainable AI layer enhances interpretability by clearly indicating the contributing factors behind each prediction.

The interactive nature of the dashboard enables stakeholders to explore alternative scenarios and understand how changes in input parameters affect predicted outcomes. This combination of predictive intelligence and visual analytics supports proactive decision-making and highlights the practical applicability of the proposed system in real-world environments.

CHAPTER 6

IMPLEMENTATION

INTRODUCTION

This chapter describes the technologies, software frameworks, datasets, algorithms, and implementation details used for the development of the **AI-Powered Experience Intelligence System**. The system integrates data analytics, machine learning, explainable intelligence, and interactive visualization to predict and improve user experience across multiple domains.
The implementation focuses on transforming raw user interaction data into meaningful insights through preprocessing, predictive modeling, and dashboard-based decision support. The entire system is developed using Python and deployed as an interactive web application.

TECHNOLOGY USED

- Python
- Machine Learning & Data Analytics Libraries
- Visualization and Dashboard Frameworks

SOFTWARE DESCRIPTION:

PYTHON

Python is a versatile and widely adopted programming language used for developing data analytics, machine learning, and artificial intelligence applications. Its simplicity, readability, and extensive ecosystem of libraries make it well-suited for implementing predictive analytics and interactive dashboards.
In this project, Python serves as the core development language for data preprocessing, model training, explainable analysis, and dashboard integration.

DATA ANALYTICS AND MACHINE LEARNING FRAMEWORKS

The AI-Powered Experience Intelligence System is implemented using Python and its rich ecosystem of data analytics and machine learning libraries, enabling an end-to-end analytical workflow.

- **Pandas:**
  Used for data loading, cleaning, transformation, and feature engineering across taxi, navigation, and social media datasets.
- **NumPy:**

Supports efficient numerical computation and array-based operations for feature calculation and normalization.

- **Scikit-learn:**
  Provides machine learning algorithms such as Linear Regression, Logistic Regression, and Random Forest for predicting satisfaction scores, churn probability, and engagement risk.
- **Matplotlib / Seaborn:**
  Used for exploratory data analysis (EDA) and visualizing distributions, correlations, and behavioral patterns.
- **Streamlit:**
  Enables the development of an interactive and user-friendly web dashboard that allows real-time user interaction, scenario simulation, and insight visualization.

These frameworks collectively support data ingestion, predictive modeling, explainability, and real-time decision support.

DATASET DESCRIPTION

The datasets used in this project are derived from real-world user interaction scenarios across three domains:

- **Taxi Experience Dataset:**
  Contains trip-related attributes such as distance, duration, cost, payment details, and tipping behavior used to estimate customer satisfaction.
- **Navigation Application Dataset (Waze):**
  Includes user activity metrics such as sessions, drives, inactivity duration, navigation frequency, and device type used to predict churn probability.
- **Social Media Engagement Dataset (TikTok):**
  Comprises content interaction metrics such as views, likes, shares, comments, video duration, creator verification status, and moderation indicators used to assess engagement risk.

These structured datasets form the foundation for training and evaluating predictive models.

ALGORITHM: MACHINE LEARNING–BASED EXPERIENCE PREDICTION

The system employs a hybrid analytical approach that combines data preprocessing, feature engineering, and supervised machine learning algorithms to predict user experience outcomes.

Workflow:

1. Data cleaning and preprocessing
2. Feature engineering and normalization
3. Model training using historical data (80:20 train-test split)
4. Prediction generation and evaluation
5. Explainable insight generation

Regression models are used for satisfaction prediction, while classification models are applied for churn and engagement risk detection.

SAMPLE PSEUDOCODE

```
import pandas as pd
from sklearn.linear_model import LogisticRegression

# Load dataset
data = pd.read_csv("user_experience_data.csv")

# Select features
X = data[['activity_days', 'sessions', 'cost_per_km', 'duration']]
y = data['churn_label']

# Train model
model = LogisticRegression(max_iter=1000)
model.fit(X, y)

# Predict churn risk
data['churn_probability'] = model.predict_proba(X)[:, 1]
```

This algorithmic approach enables the system to predict experience risks automatically based on behavioral patterns.

DASHBOARD IMPLEMENTATION

After model predictions are generated, results are visualized through an interactive Streamlit dashboard. Users can modify input parameters using sliders and controls to explore different scenarios and understand their impact on predicted outcomes. The dashboard presents:

- Predicted scores and probabilities
- Risk categorization
- Explainable insights
- What-if simulation results

This ensures transparency and usability for both technical and non-technical stakeholders.

INSIGHT AND RECOMMENDATION GENERATION

The system integrates a rule-based explainability layer that interprets model outputs and generates actionable recommendations. Based on predicted risks, the system suggests strategies to improve satisfaction, reduce churn, and enhance engagement.

CHAPTER 7

CONCLUDING REMARKS

CONCLUSION

This project, **AI-Powered Experience Intelligence System**, successfully demonstrates the application of data analytics and artificial intelligence techniques to analyze, predict, and improve user experience across multiple real-world digital domains. By integrating machine learning models with explainable intelligence and interactive visualization, the system moves beyond traditional descriptive analytics toward proactive and data-driven decision support.

The system effectively analyzes user interaction data from taxi services, navigation applications, and social media platforms to predict customer satisfaction, user churn probability, and content engagement risk. Through systematic data preprocessing, feature engineering, and predictive modeling, meaningful behavioral patterns were identified and transformed into reliable insights. The inclusion of an explainable AI layer ensures transparency by clearly identifying the factors influencing each prediction, thereby enhancing trust and interpretability.

An interactive Streamlit-based dashboard was developed to present analytical results in a user-friendly manner. The dashboard allows stakeholders to explore predictions, understand risk levels, and perform what-if simulations by modifying key input parameters. This real-time interaction bridges the gap between complex analytical models and practical business decision-making, enabling informed and timely interventions.

The proposed system highlights the importance of experience intelligence in modern digital ecosystems, where user satisfaction, retention, and engagement play a critical role in organizational success. By leveraging analytics-driven insights, the system supports proactive optimization strategies that can improve service quality, reduce churn, and enhance overall user experience.

In conclusion, the AI-Powered Experience Intelligence System demonstrates how data analytics and artificial intelligence can be effectively combined to create scalable, interpretable, and impactful decision-support solutions. The project serves as a strong foundation for further research and development in experience intelligence and showcases the practical relevance of AI-driven analytics in real-world applications.

In addition to its analytical capabilities, the proposed system emphasizes usability and interpretability, which are critical factors for the adoption of AI-driven solutions in real-world environments. By combining predictive models with rule-based explanations and intuitive visualizations, the system ensures that insights are accessible to both technical and non-technical users.

This approach reduces the complexity often associated with machine learning systems and encourages confident decision-making based on transparent and understandable results.

LIMITATIONS OF THE SYSTEM

- The system is trained on historical datasets and does not process real-time streaming data.
- Prediction accuracy depends on the quality and completeness of the input datasets.
- Machine learning models require periodic retraining to adapt to changing user behavior.
- The current system focuses on selected domains and may require customization for new applications.

CHAPTER 8

CONCLUSION & FUTURE WORK

CONCLUSION

The AI-Powered Experience Intelligence System presented in this project demonstrates the effective integration of data analytics, machine learning, and interactive visualization to address critical challenges related to user experience management. By analyzing real-world datasets from transportation services, navigation applications, and social media platforms, the system successfully predicts customer satisfaction, user churn probability, and content engagement risk.

The project emphasizes a proactive approach to experience optimization by moving beyond traditional descriptive analytics. Through systematic data preprocessing, feature engineering, and predictive modeling, meaningful behavioral patterns are identified and transformed into actionable insights. The inclusion of an explainable AI layer enhances transparency by clearly highlighting the factors influencing each prediction, enabling stakeholders to trust and interpret the results with confidence.

Furthermore, the interactive Streamlit dashboard serves as an effective decision-support tool by allowing users to explore predictions, perform what-if simulations, and evaluate the impact of different scenarios in real time. The modular and scalable architecture ensures that the system can be easily extended and adapted to additional domains. Overall, the project successfully demonstrates how analytics-driven artificial intelligence can be applied to improve user satisfaction, retention, and engagement in modern digital ecosystems.

FUTURE WORK

Although the proposed system delivers reliable and interpretable results, several enhancements can be explored to further improve its functionality and applicability. Future work may include the integration of real-time data streams through APIs to enable continuous monitoring and live prediction of user experience metrics. This would allow organizations to respond instantly to changing user behavior.

Advanced machine learning and deep learning techniques such as gradient boosting, neural networks, and transformer-based models can also be incorporated to improve prediction accuracy and capture more complex behavioral patterns. Additionally, the explainable AI component can be enhanced using advanced interpretability techniques to provide deeper insights into model behavior.

The system can be extended to include additional domains such as e-commerce, healthcare, education, and customer relationship management, making it a generalized experience intelligence platform. Furthermore, tighter integration with Business Intelligence tools such as Power BI can provide richer descriptive analytics alongside predictive insights. These enhancements would strengthen the system’s scalability, intelligence, and real-world applicability.

The AI-Powered Experience Intelligence System has been deployed as a live web application using Streamlit Cloud and can be accessed at: https://ai-experience-intelligence-system.streamlit.app

REFERENCES

[1] Provost, F., & Fawcett, T. (2013). *Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking*. O'Reilly Media.

[2] Han, J., Kamber, M., & Pei, J. (2012). *Data Mining: Concepts and Techniques* (3rd ed.). Morgan Kaufmann Publishers.

[3] Géron, A. (2022). *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow* (3rd ed.). O'Reilly Media.

[4] Pedregosa, F., Varoquaux, G., Gramfort, A., Michel, V., Thirion, B., Grisel, O., … Duchesnay, É. (2011). Scikit-learn: Machine learning in Python. *Journal of Machine Learning Research*, 12, 2825–2830.

[5] Breiman, L. (2001). Random forests. *Machine Learning*, 45(1), 5–32.

[6] Kaggle. (2024). *NYC Yellow Taxi Trip Records Dataset*. Retrieved from https://www.kaggle.com

[7] Google. (2024). *Google Data Analytics Professional Certificate – Capstone Project Datasets*. Coursera. Retrieved from https://www.coursera.org

[8] Kaggle. (2024). *Waze User Churn Dataset*. Retrieved from https://www.kaggle.com

[9] Kaggle. (2024). *TikTok Video Engagement Dataset*. Retrieved from https://www.kaggle.com

[10] Aggarwal, C. C. (2015). *Data Mining: The Textbook*. Springer.

[11] Ribeiro, M. T., Singh, S., & Guestrin, C. (2016). "Why Should I Trust You?" Explaining the Predictions of Any Classifier. *Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, 1135–1144.

[12] Few, S. (2013). *Information Dashboard Design: Displaying Data for At-a-Glance Monitoring* (2nd ed.). Analytics Press.

[13] McKinney, W. (2018). *Python for Data Analysis* (2nd ed.). O'Reilly Media.

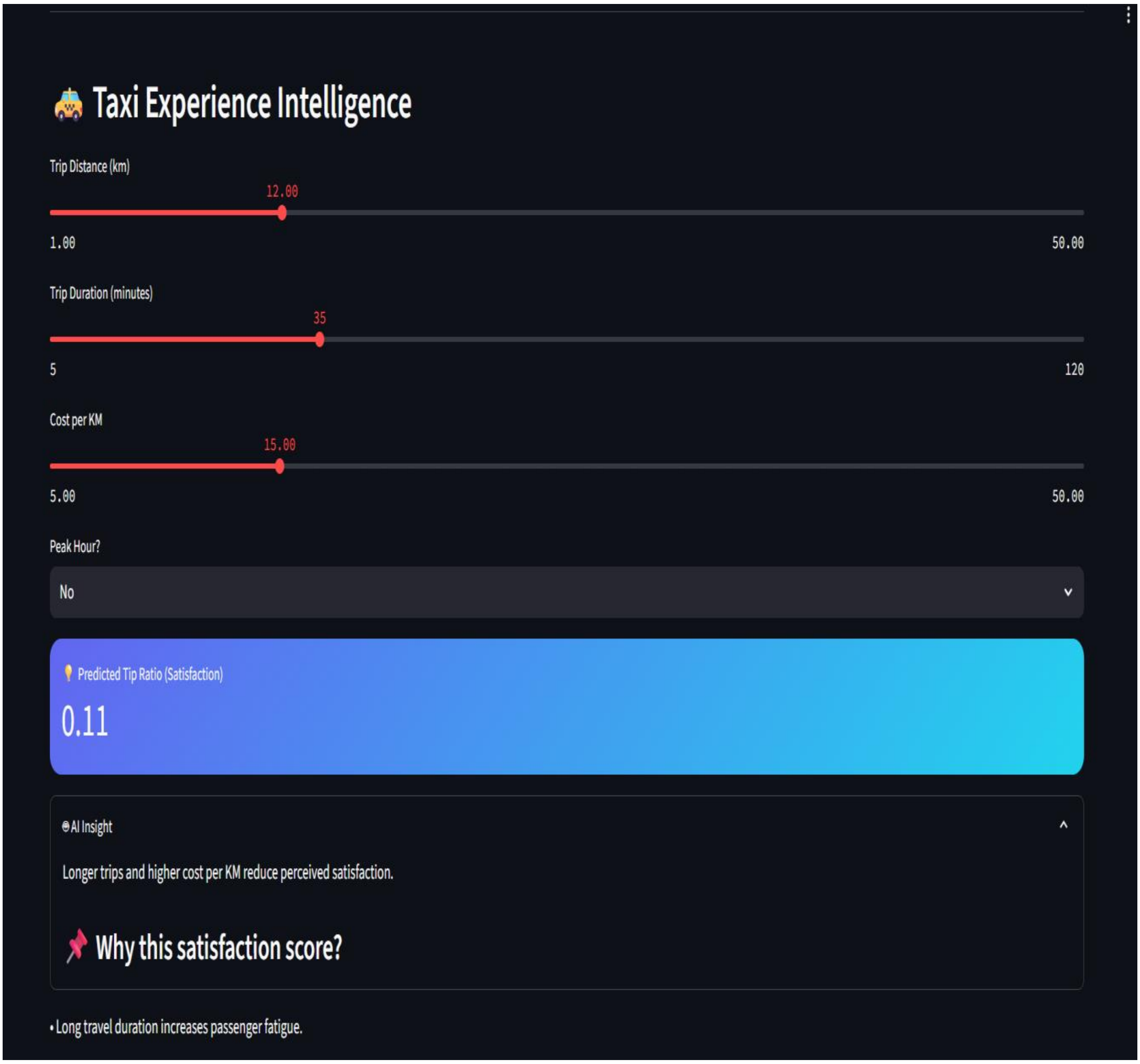
[14] Streamlit Inc. (2024). *Streamlit Documentation*. Retrieved from https://docs.streamlit.io

[15] Microsoft. (2024). *Power BI Documentation*. Retrieved from https://learn.microsoft.com/power-bi https://learn.microsoft.com/power-bi

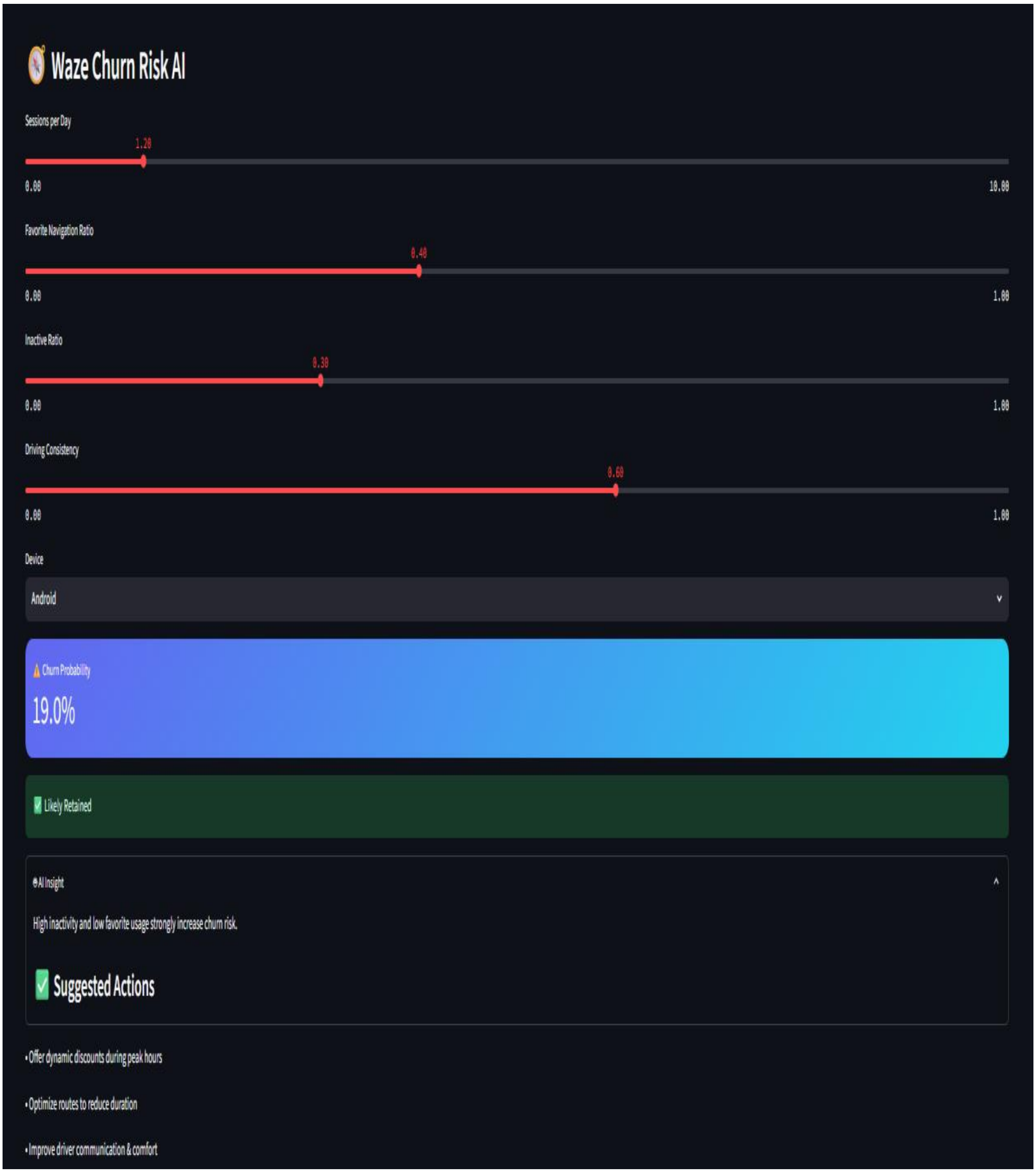
APPENDIX A – DASHBOARD SCREENSHOTS

This appendix contains sample screenshots of the Streamlit-based AI-Powered Experience Intelligence System, illustrating predictive insights, explainable results, and interactive what-if simulations across taxi services, navigation applications, and social media platforms.

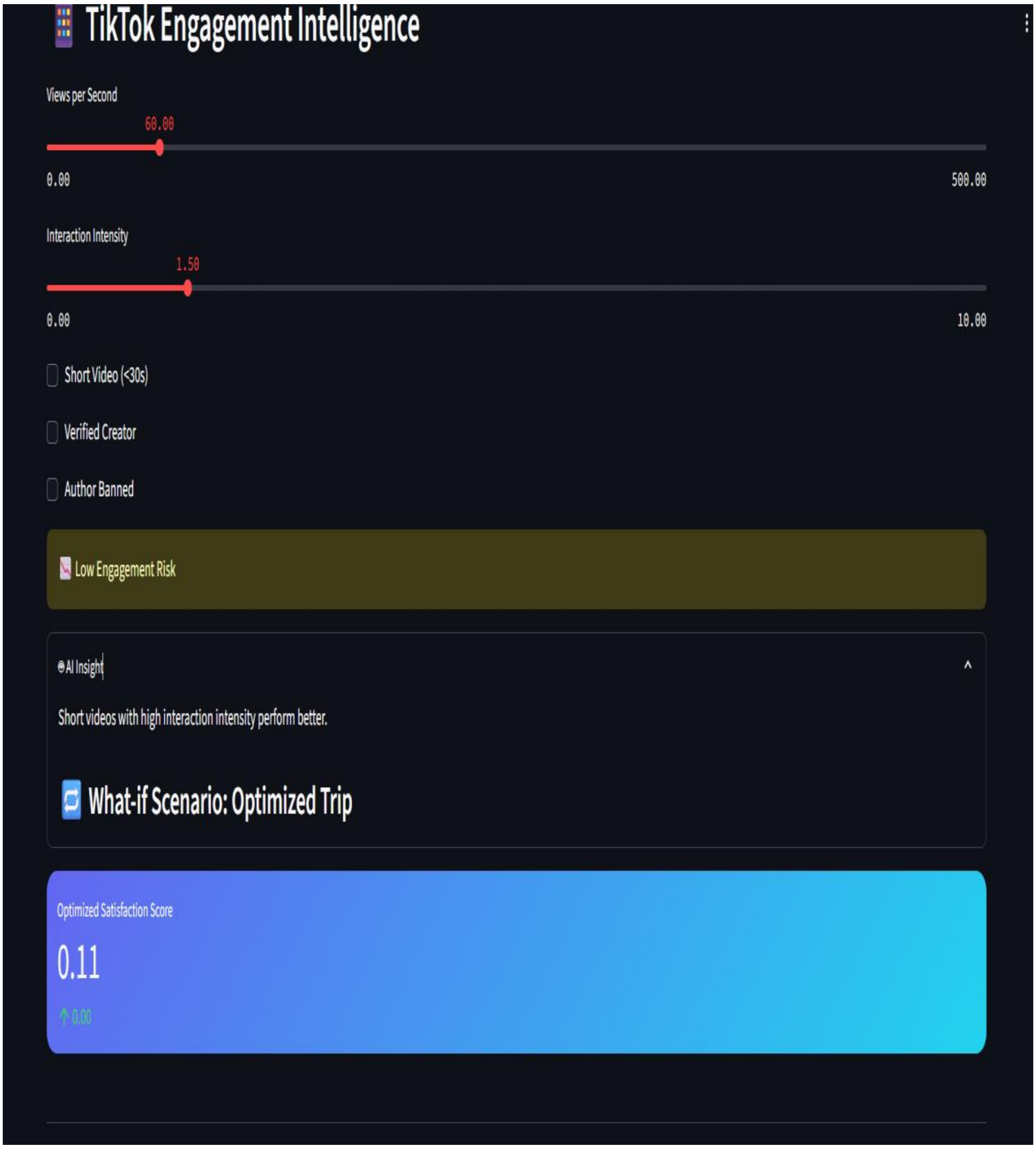
TAXI EXPERINCE INTELLIGENCE



WAZE CUSTOMER CHURN RISK INTELLIGENCE



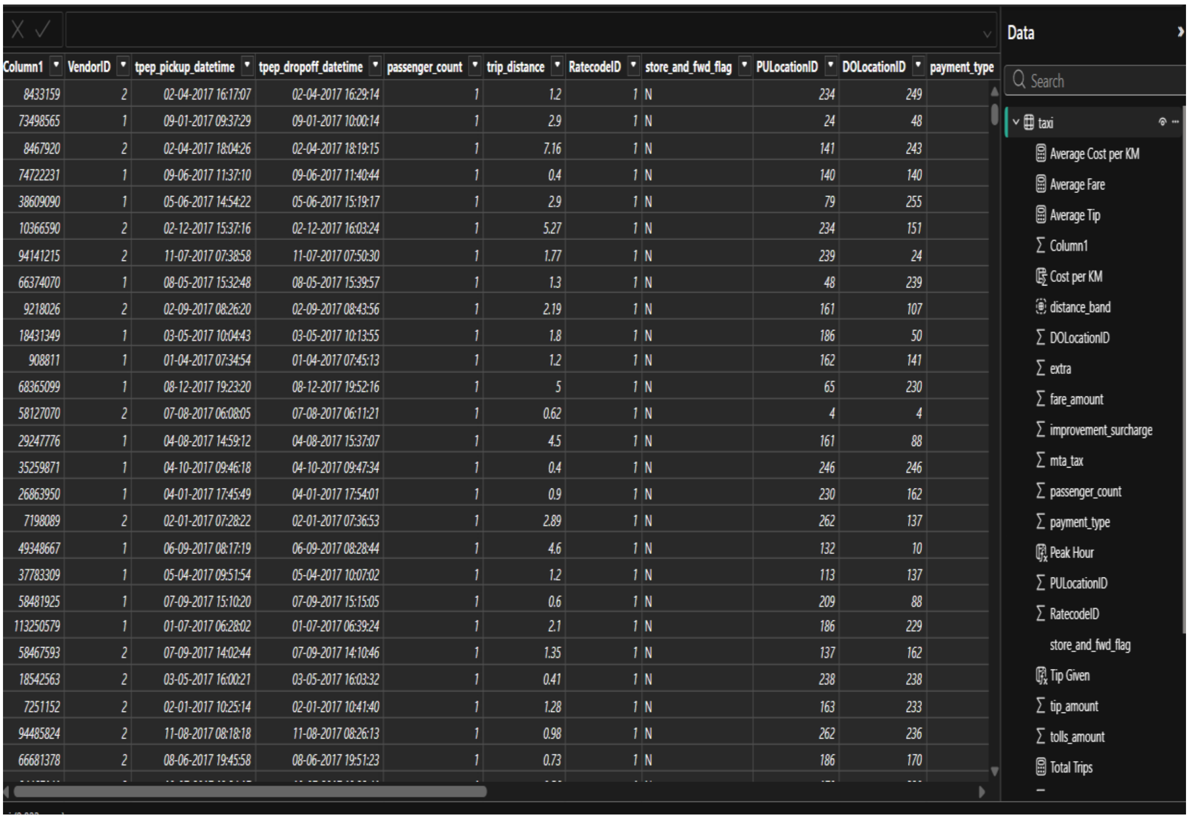
TIKTOK ENGAGEMENT INTELLIGENCE



APPENDIX B - DATA SET OVERVIEW

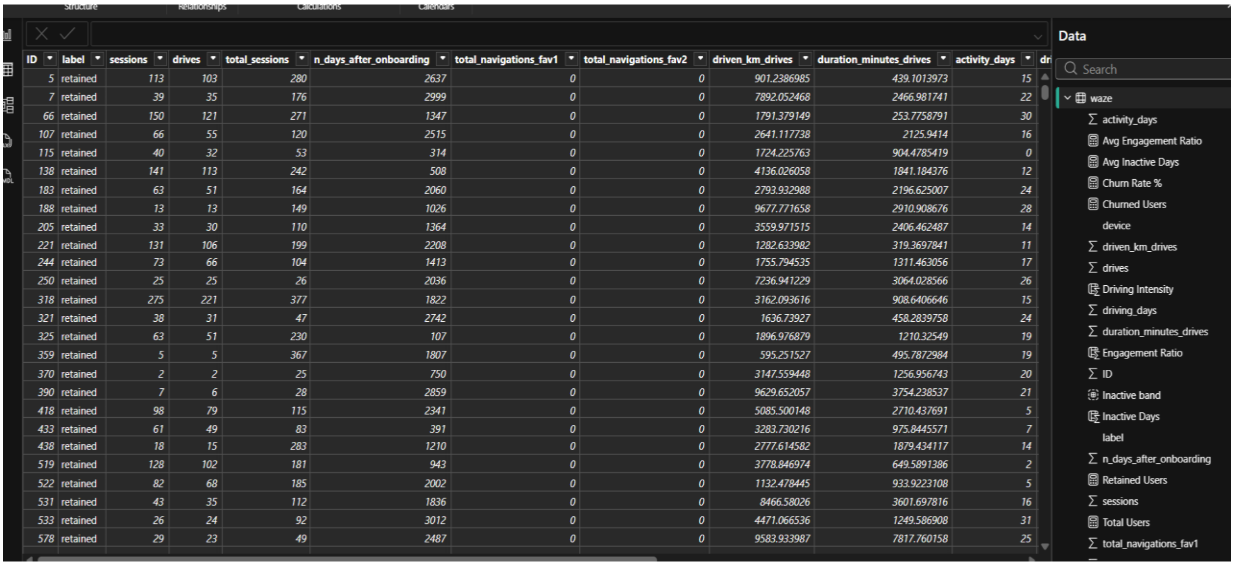
This appendix presents a brief overview of the datasets used in the development of the AI-Powered Experience Intelligence System. The datasets were sourced from publicly available real-world platforms and include structured user interaction data from taxi services, navigation applications, and social media platforms. These datasets served as the foundation for analytics, feature engineering, and predictive modeling across all modules of the system.

TAXI EXPERIENCE INTELLIGENCE (DATASET)



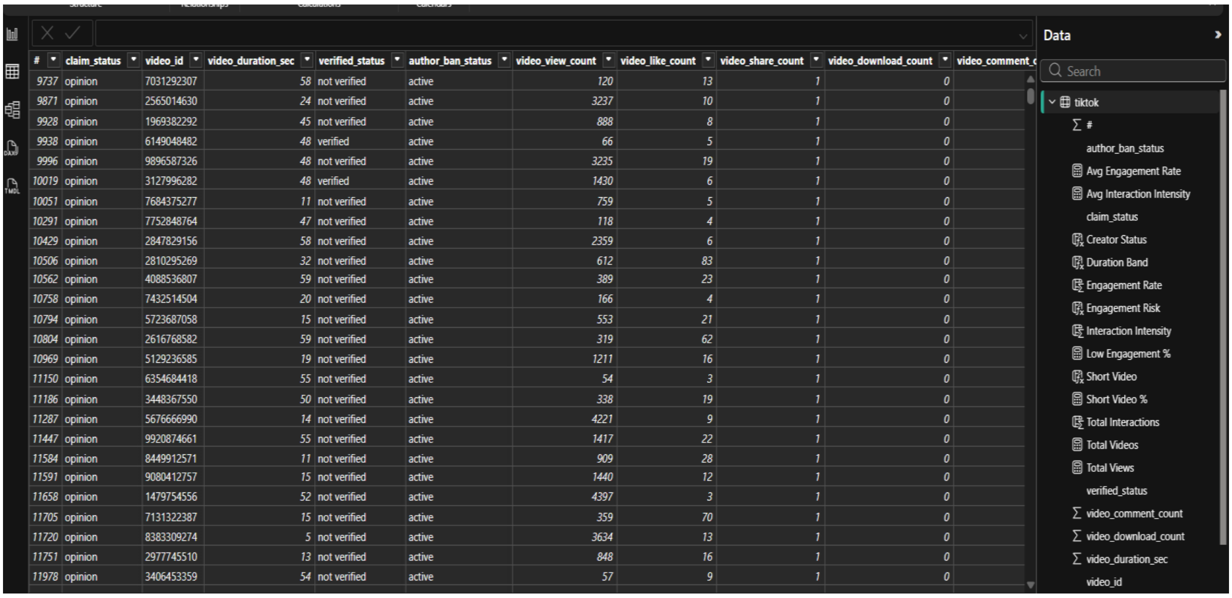
Column1	VendorID	tpep_pickup_datetime	tpep_dropoff_datetime	passenger_count	trip_distance	RatecodeID	store_and_fwd_flag	PULocationID	DOLocationID	payment_type
8433159	2	02-04-2017 16:17:07	02-04-2017 16:29:14	1	1.2	1	N	234	249	
73498565	1	09-01-2017 09:37:29	09-01-2017 10:00:14	1	2.9	1	N	24	48	
8467920	2	02-04-2017 18:04:26	02-04-2017 18:19:15	1	7.16	1	N	141	243	
74722231	1	09-06-2017 11:37:10	09-06-2017 11:40:44	1	0.4	1	N	140	140	
38609090	1	05-06-2017 14:54:22	05-06-2017 15:19:17	1	2.9	1	N	79	255	
10366590	2	02-12-2017 15:37:16	02-12-2017 16:03:24	1	5.27	1	N	234	151	
94141215	2	11-07-2017 07:38:58	11-07-2017 07:50:30	1	1.77	1	N	239	24	
66374070	1	08-05-2017 15:32:48	08-05-2017 15:39:57	1	1.3	1	N	48	239	
9218026	2	02-09-2017 08:26:20	02-09-2017 08:43:56	1	2.19	1	N	161	107	
18431349	1	03-05-2017 10:04:43	03-05-2017 10:13:55	1	1.8	1	N	186	50	
908811	1	01-04-2017 07:34:54	01-04-2017 07:45:13	1	1.2	1	N	162	141	
68365099	1	08-12-2017 19:23:20	08-12-2017 19:52:16	1	5	1	N	65	230	
58127070	2	07-08-2017 06:08:05	07-08-2017 06:11:21	1	0.62	1	N	4	4	
29247776	1	04-08-2017 14:59:12	04-08-2017 15:37:07	1	4.5	1	N	161	88	
35259871	1	04-10-2017 09:46:18	04-10-2017 09:47:34	1	0.4	1	N	246	246	
26863950	1	04-01-2017 17:45:49	04-01-2017 17:54:01	1	0.9	1	N	230	162	
7198089	2	02-01-2017 07:28:22	02-01-2017 07:36:53	1	2.89	1	N	262	137	
49348667	1	06-09-2017 08:17:19	06-09-2017 08:28:44	1	4.6	1	N	132	10	
37783309	1	05-04-2017 09:51:54	05-04-2017 10:07:02	1	1.2	1	N	113	137	
58481925	1	07-09-2017 15:10:20	07-09-2017 15:15:05	1	0.6	1	N	209	88	
113250579	1	01-07-2017 06:28:02	01-07-2017 06:39:24	1	2.1	1	N	186	229	
58467593	2	07-09-2017 14:02:44	07-09-2017 14:10:46	1	1.35	1	N	137	162	
18542563	2	03-05-2017 16:00:21	03-05-2017 16:03:32	1	0.41	1	N	238	238	
7251152	2	02-01-2017 10:25:14	02-01-2017 10:41:40	1	1.28	1	N	163	233	
94485824	2	11-08-2017 08:18:18	11-08-2017 08:26:13	1	0.98	1	N	262	236	
66681378	2	08-06-2017 19:45:58	08-06-2017 19:51:23	1	0.73	1	N	186	170	

WAZE CHURN RISK INTELLIGENCE (DATASET)



ID	label	sessions	drives	total_sessions	n_days_after_onboarding	total_navigations_fav1	total_navigations_fav2	driven_km_drives	duration_minutes_drives	activity_days
5	retained	113	103	280	2637	0	0	901.2386985	439.1013973	15
7	retained	39	35	176	2999	0	0	7892.052468	2466.981741	22
66	retained	150	121	271	1347	0	0	1791.379149	253.7758791	30
107	retained	66	55	120	2515	0	0	2641.117738	2125.9414	16
115	retained	40	32	53	314	0	0	1724.225763	904.4785419	0
138	retained	141	113	242	508	0	0	4136.026058	1841.184376	12
183	retained	63	51	164	2060	0	0	2793.932988	2196.625007	24
188	retained	13	13	149	1026	0	0	9677.771658	2910.908676	28
205	retained	33	30	110	1364	0	0	3559.971515	2406.462487	14
221	retained	131	106	199	2208	0	0	1282.633982	319.3697841	11
244	retained	73	66	104	1413	0	0	1755.794535	1311.463056	17
250	retained	25	25	26	2036	0	0	7236.941229	3064.028566	26
318	retained	275	221	377	1822	0	0	3162.093616	908.6406646	15
321	retained	38	31	47	2742	0	0	1636.73927	458.2839758	24
325	retained	63	51	230	107	0	0	1896.976879	1210.32549	19
359	retained	5	5	367	1807	0	0	595.251527	495.7872984	19
370	retained	2	2	25	750	0	0	3147.559448	1256.956743	20
390	retained	7	6	28	2859	0	0	9629.652057	3754.238537	21
418	retained	98	79	115	2341	0	0	5085.500148	2710.437691	5
433	retained	61	49	83	391	0	0	3283.730216	975.8445571	7
438	retained	18	15	283	1210	0	0	2777.614582	1879.434117	14
519	retained	128	102	181	943	0	0	3778.846974	649.5891386	2
522	retained	82	68	185	2002	0	0	1132.478445	933.9223108	5
531	retained	43	35	112	1836	0	0	8466.58026	3601.697816	16
533	retained	26	24	92	3012	0	0	4471.066536	1249.586908	31
578	retained	29	23	49	2487	0	0	9583.933987	7817.760158	25

TIKTOK ENGAGEMENT INTELLIGENCE (DATASET)



#	claim_status	video_id	video_duration_sec	verified_status	author_ban_status	video_view_count	video_like_count	video_share_count	video_download_count
9737	opinion	7031292307	58	not verified	active	120	13	1	0
9871	opinion	2565014630	24	not verified	active	3237	10	1	0
9928	opinion	1969382292	45	not verified	active	888	8	1	0
9938	opinion	6149048482	48	verified	active	66	5	1	0
9996	opinion	9896587326	48	not verified	active	3235	19	1	0
10019	opinion	3127996282	48	verified	active	1430	6	1	0
10051	opinion	7684375277	11	not verified	active	759	5	1	0
10291	opinion	7752848764	47	not verified	active	118	4	1	0
10429	opinion	2847829156	58	not verified	active	2359	6	1	0
10506	opinion	2810295269	32	not verified	active	612	83	1	0
10562	opinion	4088536807	59	not verified	active	389	23	1	0
10758	opinion	7432514504	20	not verified	active	166	4	1	0
10794	opinion	5723687058	15	not verified	active	553	21	1	0
10804	opinion	2616768582	59	not verified	active	319	62	1	0
10969	opinion	5129236585	19	not verified	active	1211	16	1	0
11150	opinion	6354684418	55	not verified	active	54	3	1	0
11186	opinion	3448367550	50	not verified	active	338	19	1	0
11287	opinion	5676666990	14	not verified	active	4221	9	1	0
11447	opinion	9920874661	55	not verified	active	1417	22	1	0
11584	opinion	8449912571	11	not verified	active	909	28	1	0
11591	opinion	9080412757	15	not verified	active	1440	12	1	0
11658	opinion	1479754556	52	not verified	active	4397	3	1	0
11705	opinion	7131322387	15	not verified	active	359	70	1	0
11720	opinion	8383309274	5	not verified	active	3634	13	1	0
11751	opinion	2977745510	13	not verified	active	848	16	1	0
11978	opinion	3406453359	54	not verified	active	57	9	1	0