Website Funnel Analysis Report

1. Project Overview

This project focuses on analyzing website user behavior through a funnel analysis using interaction data consisting of 21,663 records from the company's website for October 2025. The analysis aims to understand how users move through different stages of the conversion funnel, from initial website visits to final purchases. By examining funnel performance across traffic channels, geographic regions, and product categories, this project provides a structured view of customer journey patterns and website effectiveness. The analysis supports data-driven evaluation of key performance metrics through exploratory analysis and interactive dashboard reporting.

2. Dataset Summary

- Rows: 21,663
- Columns: 10
- Key Features:
- User and Session Information: User_ID, Session_ID
- Funnel Activity Data: Event, Timestamp
- User Context: Device, Region
- Traffic Source Details: Channel
- Product Information: Product_Category
- Performance Indicators: Revenue, Bounce_Flag
- Missing Data: No missing values were observed across the dataset

3. Exploratory Data Analysis using Python

The exploratory data analysis (EDA) was conducted using Python to understand website funnel behavior, prepare the data for analysis, and generate meaningful insights. The process followed a structured and sequential approach as outlined below.

3.1 Library Import and Environment Setup

The analysis began by importing the required Python libraries for data manipulation, visualization, and analysis.

Key libraries included:

- Pandas and Numpy for data handling and transformations
- Matplotlib and Seaborn for static visualizations
- Plotly for interactive charts
- Datetime for time-based calculations
- Warnings were suppressed to keep the notebook output clean and focused.

3.2 Data Loading

The funnel dataset was loaded into the Python environment using **pandas**. An initial preview of the data was performed to confirm:

- Successful data import
- Correct column names
- Proper data structure

	User_ID	Session_ID	Event	Timestamp	Device	Region	Channel	Product_Category	Revenue	Bounce_Flag
0	USR00001	SES00001	Browse	2025-10-28 07:33:50	Desktop	West	Organic	Home	0.0	Yes
1	USR00001	SES00001	Add to Cart	2025-10-28 07:36:50	Tablet	East	Social Media	Beauty	0.0	Yes
2	USR00001	SES00001	Checkout	2025-10-28 07:40:50	Mobile	West	Email	Beauty	0.0	Yes
3	USR00002	SES00002	Browse	2025-10-19 09:15:10	Desktop	East	Email	Electronics	0.0	No
4	USR00002	SES00002	Add to Cart	2025-10-19 09:18:10	Mobile	West	Social Media	Fashion	0.0	No

3.3 Initial Data Exploration

Basic exploratory checks were performed to understand the dataset structure:

- Reviewed column names and total number of fields
- Checked data types of all columns
- Examined sample records to understand user actions and funnel stages

3.4 Data Cleaning and Preparation

Several data preparation steps were carried out to ensure data quality and consistency:

- Verified the dataset for missing values across all columns and confirmed that no null values were present.
- Checked for duplicate records and validated that the dataset contained no duplicate rows.
- Reviewed the unique value counts for key columns to understand data distribution and cardinality.
- Extracted date and time-based features from the timestamp column, including date, day of week, hour, and week number, to support time-based analysis.
- Created a sequential event order within each session to track the exact sequence of user actions during a session.

Session_ID	Event	Timestamp	Device	Region	Channel	Product_Category	Revenue	Bounce_Flag	Date	DayOfWeek	Hour	WeekNumber	Event_sequence
SES00001	Browse	2025-10-28 07:33:50	Desktop	West	Organic	Home	0.0	Yes	2025-10-28	Tuesday	7	44	1
SES00001	Add to Cart	2025-10-28 07:36:50	Tablet	East	Social Media	Beauty	0.0	Yes	2025-10-28	Tuesday	7	44	2
SES00001	Checkout	2025-10-28 07:40:50	Mobile	West	Email	Beauty	0.0	Yes	2025-10-28	Tuesday	7	44	3
SES00002	Browse	2025-10-19 09:15:10	Desktop	East	Email	Electronics	0.0	No	2025-10-19	Sunday	9	42	1
SES00002	Add to Cart	2025-10-19 09:18:10	Mobile	West	Social Media	Fashion	0.0	No	2025-10-19	Sunday	9	42	2

3.5 Funnel Stage Mapping and Custom Column Creation

To perform funnel analysis, the event-level data was converted into session-level data:

- Defined the funnel stages in order: Browse → Add to Cart → Checkout → Purchase
- Grouped data by Session ID to create one record per session
- Captured key session details such as:
    - User ID
    - Session start and end time
    - Device, region, channel, and product category
    - Revenue generated in the session
    - Bounce indicator
- Calculated session duration using session start and end timestamps
- Created an event sequence to track the order of user actions within each session
- Identified the highest funnel stage reached in each session

Session Summary Created:

User_ID	Session_Start	Session_End	Event_Sequence	Device	Region	Channel	Product_Category	Revenue	Bounce_Flag	Session_Duration_Min	Max_Funnel_Stage
USR00001	2025-10-28 07:33:50	2025-10-28 07:40:50	[Browse, Add to Cart, Checkout]	Desktop	West	Organic	Home	0.00	Yes	7.0	Checkout
USR00002	2025-10-19 09:15:10	2025-10-19 09:27:10	[Browse, Add to Cart, Checkout, Purchase]	Desktop	East	Email	Electronics	448.18	No	12.0	Purchase
USR00003	2025-10-12 02:19:00	2025-10-12 02:29:00	[Browse, Add to Cart, Checkout, Purchase]	Desktop	East	Google Ads	Beauty	1437.19	No	10.0	Purchase
USR00004	2025-10-05 17:55:48	2025-10-05 17:55:48	[Browse]	Tablet	West	Social Media	Home	0.00	Yes	0.0	Browse
USR00005	2025-10-19 12:35:49	2025-10-19 12:37:49	[Browse, Add to Cart]	Tablet	West	Google Ads	Electronics	0.00	Yes	2.0	Add to Cart

3.6 Funnel Metrics Calculation

We reviewed the full customer funnel to understand how users progress and where they drop off.

1. Measured total sessions at each funnel stage
2. Calculated conversion rates between stages
3. Identified drop-off points where users leave

All results are summarized in a single funnel table showing:

1. Funnel stage
2. Session volume
3. Conversion rate
4. Drop-off percentage

🎯 Overall Funnel Analysis:

	Stage	Sessions	Stage_Order	Conversion_Rate	Drop_Off_Rate
0	Browse	10000	0	100.00	0.00
1	Add to Cart	7059	1	70.59	29.41
2	Checkout	3524	2	35.24	50.08
3	Purchase	1080	3	10.80	69.35

3.7 Revenue Analysis

Revenue-specific analysis was performed for completed purchases:

- Total revenue generated
- Average order value
- Total number of completed orders

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💰 Revenue Analysis:
Total Revenue: $1,176,405.78
Average Order Value: $1,089.26
Total Orders: 1,080.0
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3.8 Overall Funnel Visualization

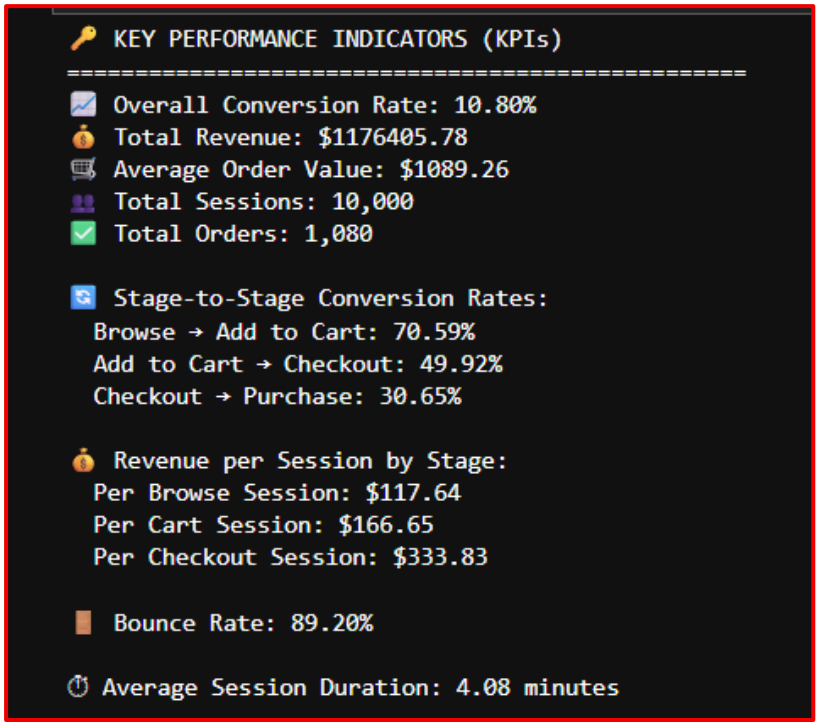
Multiple charts were created to visually represent funnel performance:

1. Funnel Conversion Chart showing session count at each stage
2. Stage-to-Stage Drop-off Chart highlighting user loss between stages
3. Revenue by Funnel Stage to understand revenue contribution
4. Session Duration by Funnel Stage to analyze engagement patterns

3.9 Funnel Metrics and KPI's

Key performance metrics were calculated using the session-level data to evaluate overall funnel efficiency and user behavior:

- Measured overall conversion rate, total sessions, total orders, total revenue, and average order value.
- Analyzed stage-to-stage conversion rates to identify drop-offs between major funnel stages.
- Calculated revenue per session at each funnel stage to understand value contribution as users progress.
- Evaluated bounce rate to assess early exits from the website.
- Computed average session duration to measure overall user engagement.



4. Dashboard in Power BI

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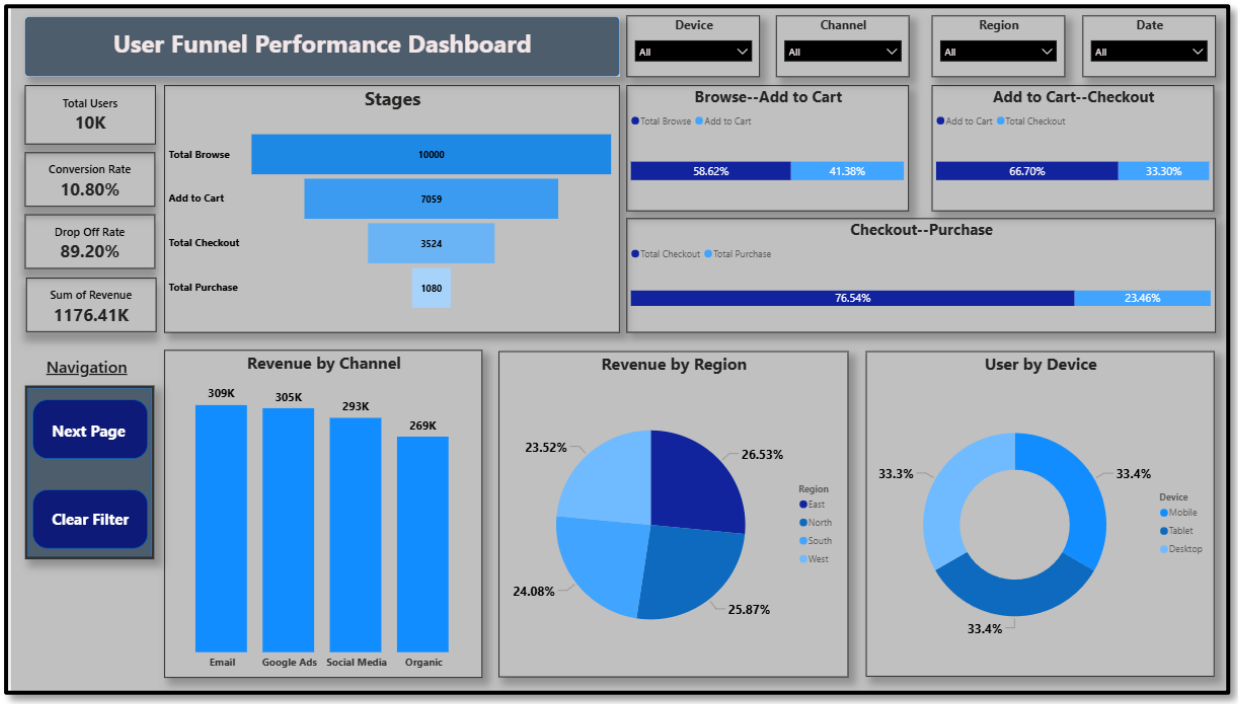

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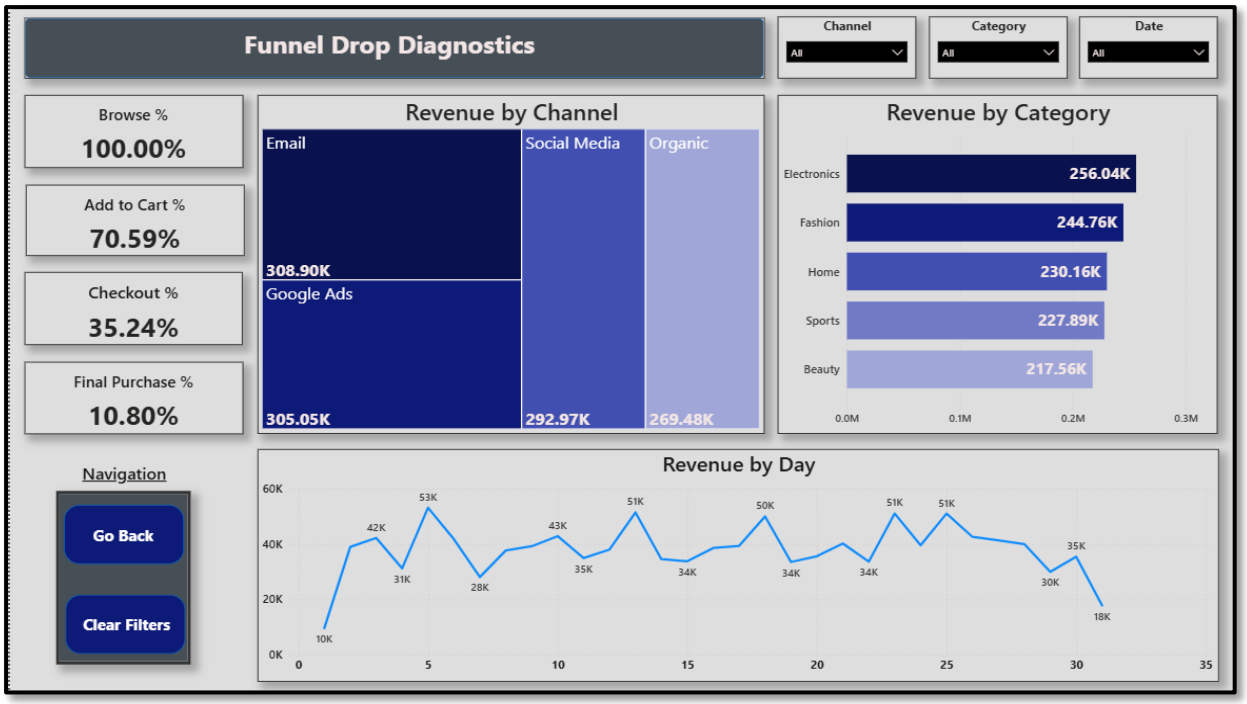

5. Strategic Recommendations

1. Improve Checkout-to-Purchase Conversion

- The largest drop-off occurs at the final stage of the funnel.
- Simplify the checkout flow by reducing steps, enabling guest checkout, and improving payment reliability to minimize friction.

2. Strengthen Add-to-Cart Engagement

- A significant drop is observed between Add to Cart and Checkout.
- Use clear pricing, transparent shipping costs, and cart reminders to encourage users to proceed further.

3. Reduce High Bounce Rate

- A high bounce rate indicates users leaving without meaningful engagement.
- Optimize landing pages with faster load times, clearer value propositions, and stronger calls to action, especially for high-traffic channels.

4. Leverage High-Value Sessions

- Revenue per session increases substantially at deeper funnel stages.
- Retarget users who reach Add to Cart or Checkout using personalized offers and remarketing campaigns to maximize conversion.

5. Optimize Channel Performance

- Focus marketing spend on channels that drive higher-quality sessions rather than just higher traffic volume.
- Reduce investment in channels with high bounce rates and low progression through the funnel.

6. Enhance User Experience Across Devices

- Review device-level performance to identify potential usability issues.
- Ensure mobile and tablet experiences are optimized, as friction on these devices often impacts final conversions.

7. Use Session Duration as an Engagement Signal

- Sessions with higher engagement time show better funnel progression.
- Improve content relevance and on-site navigation to keep users engaged longer.