# User Engagement and Purchase Behaviour Analysis

## 1. Introduction

This report provides a comprehensive analysis of user engagement data and its relation to purchase likelihood. The analysis was conducted from data cleaning and preprocessing to identifying meaningful insights from visualizations. The process and findings are detailed step-by-step below.

## 2. Data Overview

- **Dataset Size**: 500 records
- **Columns**:
    - Quantitative Metrics: Likes, Shares, Comments, Clicks, Engagement with Ads, Time Spent on Platform
    - Categorical Metrics: Engagement Level, Purchase Likelihood

## 3. Analysis Process

### 3.1 Data Cleaning

- Some metrics (e.g., Likes, Shares, Comments, etc.) were stored as strings instead of numerical data.
- Removed invalid characters and converted engagement metrics to numeric types.
- Verified data consistency and ensured no null or missing values.

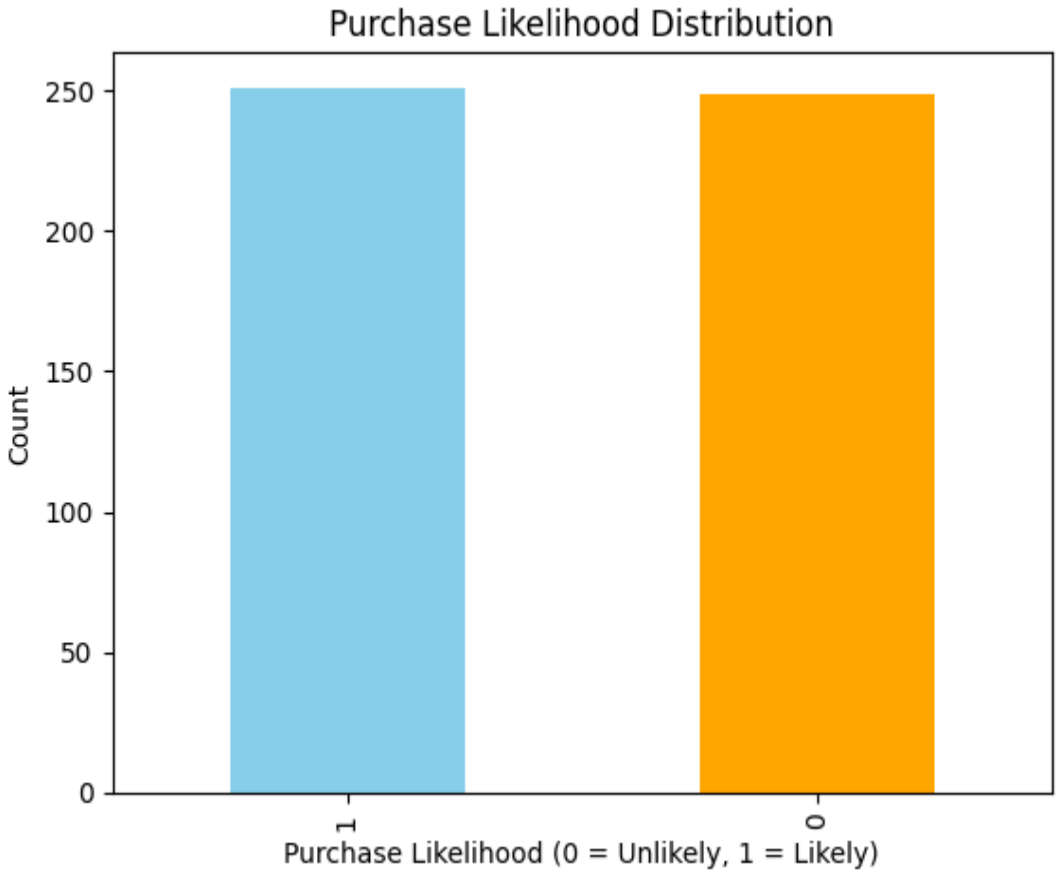
### 3.2 Data Exploration

- Inspected distributions of numerical features.
- Reviewed target variable (Purchase Likelihood) distribution.
- Purchase Likelihood is evenly split between likely and unlikely buyers.

### 3.3 Visualization and Analysis

#### 3.3.1 Purchase Likelihood Distribution

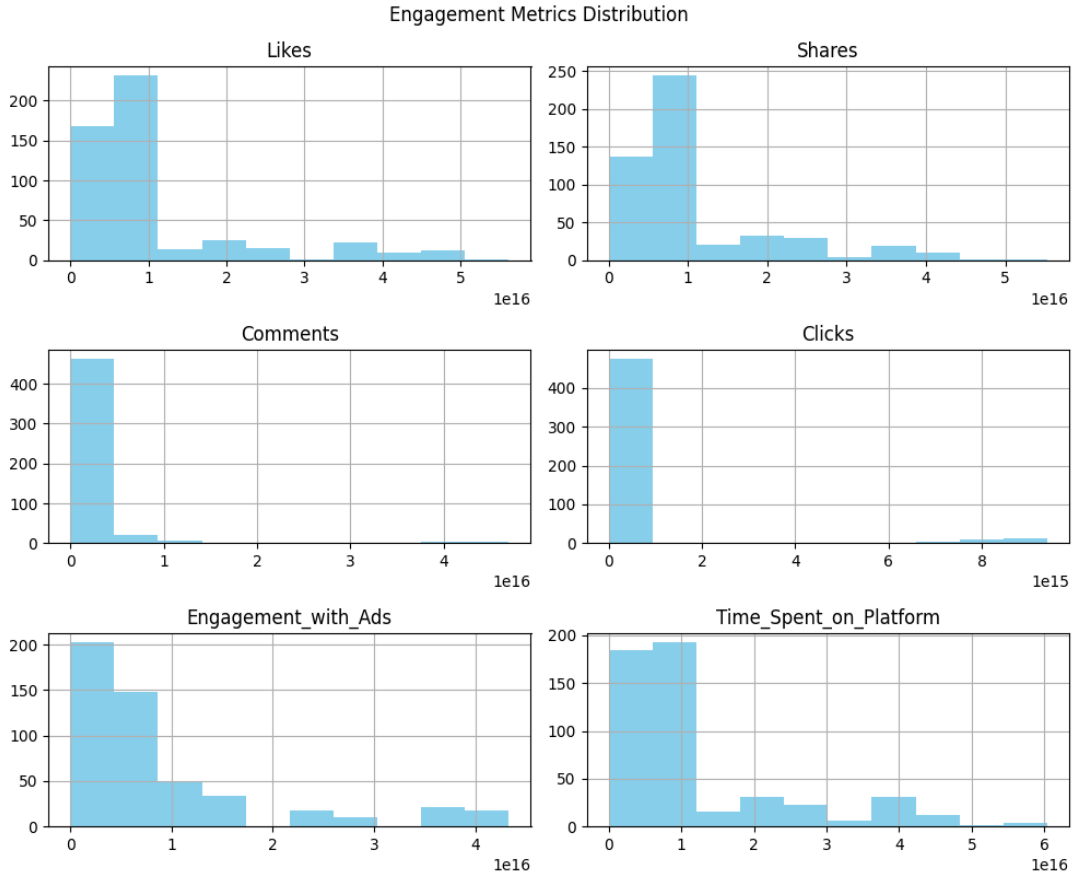
- **Visualization Used**: Bar Chart




- **Findings**:
    - 50% of users are likely to purchase, and 50% are not.
    - Indicates an opportunity to target both groups equally for better results.

### 3.3.2 Engagement Metrics Distribution

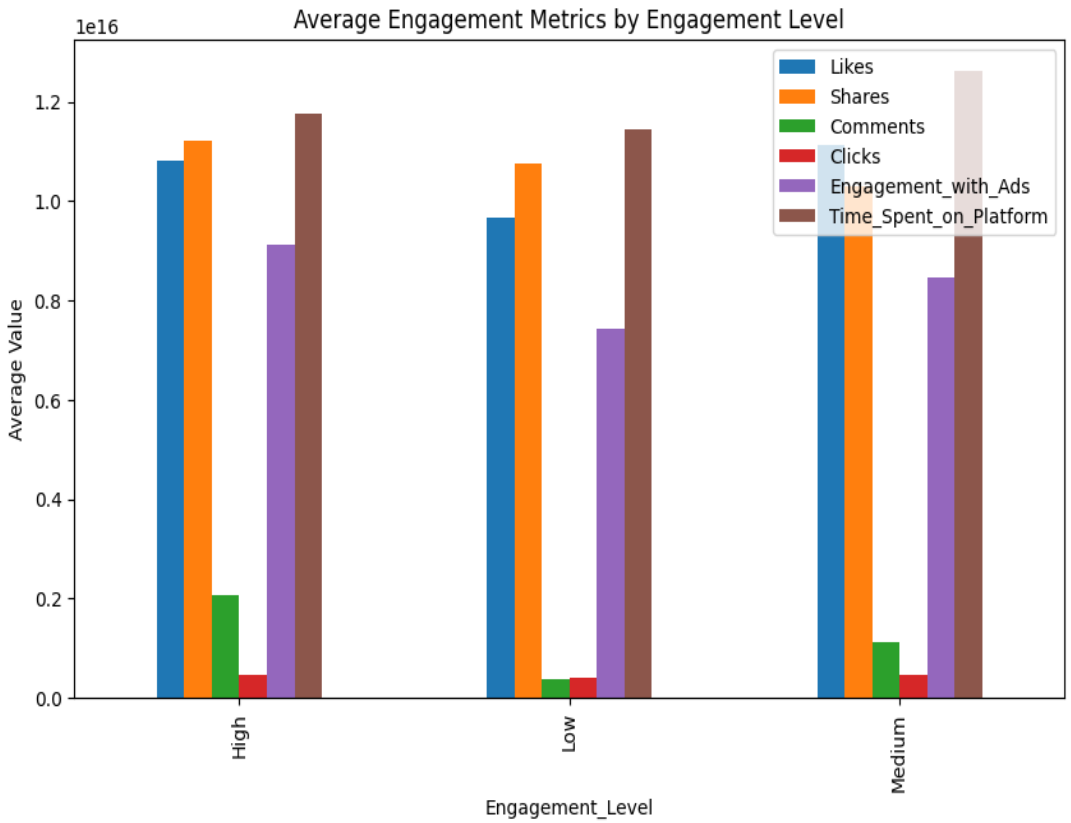
- **Visualization Used**: Histograms




- **Findings**:
    - Likes, Shares, Comments, Clicks, Engagement with Ads, and Time Spent on Platform are all highly skewed.
    - Most users show low interaction, with a few users showing extremely high activity.
    - Time Spent and Likes dominate, while Comments and Clicks are minimal.

### 3.3.3 Average Engagement by Engagement Level

- **Visualization Used**: Bar Chart




- **Findings**:
    - High Engagement users significantly outperform others across all metrics.
    - Low and Medium Engagement groups have relatively flat performance.

## 4. Key Insights

1. **Purchase Likelihood**:
    - Buyers and non-buyers are evenly distributed, providing an opportunity to improve conversion rates through targeted campaigns.
2. **Engagement Metrics**:
    - Metrics like Likes and Time Spent dominate while Comments and Clicks are minimal.
    - Right-skewed distributions suggest a significant focus on engaging the low-activity users.
3. **Engagement Levels**:
    - High Engagement users are more active and more likely to interact with content.
    - Medium and Low Engagement users require campaigns to increase their activity levels.

## 5. Recommendations

1. **Target Non-buyers**:
    - Create personalized campaigns and highlight value propositions to convert unlikely buyers.
2. **Increase Comments and Clicks**:
    - Launch interactive content like polls, quizzes, and gamification to encourage clicks and comments.
3. **Leverage High Engagement Users**:
    - Build loyalty programs for highly engaged users and turn them into brand advocates.
4. **Nurture Medium and Low Engagement Users**:
    - Utilize engaging content formats, targeted ads, and behavior-based recommendations to increase activity.
5. **Investigate Highly Engaged Users**:
    - Analyze behavior patterns of the top-engaged users and use their insights to design effective campaigns for others.

## 6. Limitations and Future Scope

- **Limitations**:
    - The dataset lacks additional demographic details, which could enhance personalization.
    - Engagement data is skewed, requiring advanced techniques to handle outliers effectively.
- **Future Scope**:
    - Incorporate additional data sources, such as user demographics or behavioral trends, for a more holistic analysis.
    - Use predictive modeling to identify potential high-value customers and their engagement drivers.

## 7. Conclusion

- This analysis highlights the significant potential in targeting low and medium-engagement users while nurturing highly engaged ones. Tailored strategies for increasing Clicks and Comments, combined with personalized campaigns for non-buyers, can drive both engagement and purchase likelihood.