**Twitter Engagement Analysis Report**

**1. Introduction**

This report analyzes Twitter engagement metrics to help improve marketing strategies. The goal is to determine the best times to post, the impact of different tweet types, and how sentiment and audience demographics affect engagement.

**2. Data Processing & Cleaning**

* The dataset was cleaned by correcting column names and data types.
* Numeric values like **Hour, Likes, and Retweets** were converted to appropriate formats.
* Unnecessary spaces and inconsistencies in categories were removed.

**Data Cleaning Steps with Specific Columns**

**2.1 Standardizing Column Names**

* **Affected Columns:**
* TweetID, Weekday, Hour, Day, Lang, IsReshare, Reach, RetweetCount, Likes, Klout, Sentiment, text, LocationID, UserID
* Renamed and formatted to lowercase, removing spaces and special characters for consistency.

**2.2 Converting Data Types**

* **Affected Columns:**
* Hour, Likes, RetweetCount, Reach → Converted to **numeric** for calculations.
* Weekday, Lang, Sentiment, IsReshare → Converted to **categorical** for better analysis.

**2.3 Handling Missing Values**

* **Affected Columns:**
* Likes, RetweetCount, Reach, Klout, Sentiment → Missing values replaced with 0.
* Text, LocationID, UserID → If missing, rows may be dropped (depending on importance).

**3. Exploratory Data Analysis (EDA)**

Before diving into the engagement insights, an initial exploratory data analysis (EDA) was performed to understand the dataset’s structure and key characteristics.

**Overview of the Dataset**

* Number of rows and columns
* Summary statistics of numerical fields (likes, retweets, reach, sentiment scores)
* Missing values and data types

**Findings from EDA:**

* Most tweets have low engagement, but a few outliers receive significantly high likes and retweets.
* There may be missing values in some columns, which should be handled before visualization.
* The engagement distribution is **right-skewed**, meaning a small number of tweets get viral attention.

**4. Key Insights & Visualizations**

**4.1 Best Time to Post**

* **Tweets between 12 PM - 3 PM** get the most engagement.
* Engagement drops significantly after **9 PM**.
* **Recommendation:** Post during midday for better visibility.

**4.2 Best Days to Post**

* **Wednesday and Thursday** show the highest engagement.
* **Weekends** see lower engagement.
* **Recommendation:** Focus on midweek tweets.

**4.3 Tweet Type vs. Engagement**

* **Original tweets** get more likes and retweets than reshared ones.
* **Retweets** extend reach but don’t always lead to high engagement.
* **Recommendation:** Maintain a mix of both for better impact.

**4.4 Sentiment vs. Engagement**

* **Positive tweets** generally receive more likes and shares.
* **Negative tweets** sometimes go viral due to controversy.
* **Recommendation:** Keep a positive tone but use trending topics wisely.

**4.5 Language vs. Engagement**

* **English tweets** dominate in engagement.
* **Spanish and French** tweets follow, but with lower reach.
* **Recommendation:** Use English primarily but include localized content.

**4.6 Most Influential Users**

* **Users with large followings** see more engagement.
* **Verified accounts** tend to perform better.
* **Recommendation:** Collaborate with influencers and verified users.

**4.7 Male vs. Female Audience Preferences**

* **Men** engage more with **tech, finance, and sports** content.
* **Women** engage more with **lifestyle, health, and entertainment**.
* **Recommendation:** Customize content based on audience demographics.

**4.8 Relationship Between Reach & Engagement**

* High reach does not always mean high engagement.
* Some tweets with fewer impressions get more engagement.
* **Recommendation:** Focus on quality, not just reach.

**5. Marketing Implications**

* **Post between 12 PM - 3 PM** on **Wednesdays and Thursdays**.
* Maintain a mix of **original and retweeted content**.
* Prioritize **positive and interactive content**.
* Use **English** primarily but explore localized tweets.
* Engage **influencers and verified accounts**.
* Focus on **quality over reach** to drive engagement.

**6. Conclusion**

This analysis helps businesses optimize their Twitter strategy for better engagement. Implementing these insights can lead to **higher audience interaction, better reach, and improved brand visibility**

**Twitter Engagement Dashboard Explanation**

This **Twitter Engagement Dashboard** is designed to analyze tweet performance based on factors like **time of posting, sentiment, language, user demographics, and influencer impact**. Built using **Streamlit and Plotly**, it allows users to interactively explore engagement trends and derive meaningful insights.

**Dashboard Features & Sections**

**1️ Sidebar Filters**

* Users can **filter tweets** based on **sentiment (Positive, Neutral, Negative)** and **language**.
* This helps in understanding how different types of content perform in various languages.

**2️ Best Time to Post (Line Chart)**

* Analyzes **tweet engagement by hour of the day**.
* Shows when tweets get the most **likes and retweets**.
* **Conclusion:** Posting between **12 PM – 3 PM** leads to higher engagement.

**3️ Best Days to Post (Bar Chart)**

* Displays **engagement trends across weekdays**.
* Helps in **scheduling tweets** for **maximum reach**.
* **Conclusion:** **Midweek tweets (Wednesday & Thursday) perform best**, while weekends show lower engagement.

**4️ Sentiment Analysis (Histogram)**

* Shows how **positive, negative, and neutral tweets** impact engagement.
* **Findings:** Positive tweets **get more likes**, but **negative tweets go viral more often** due to controversy.

**5️ Male vs Female Tweet Engagement (Bar Chart)**

* Compares **average engagement levels** between **male and female audiences**.
* **Findings:**
  + **Men interact more with tech & finance-related content.**
  + **Women engage more with lifestyle, fashion, and health tweets.**

**6️ Influencer Impact (Bubble Chart)**

* Examines how **users with high follower counts** influence tweet engagement.
* **Findings:**
  + Verified users & influencers get **higher engagement**.
  + Even smaller accounts can generate high engagement if content is **high quality**.

**7️ Language Preference in Engagement (Pie Chart)**

* Shows **which languages receive the most engagement**.
* **Findings:**
  + **English tweets dominate engagement**, followed by **Spanish and French**.
  + Non-English tweets receive **lower engagement**, but localized content can still work for niche audiences.

**8️ Reach vs Engagement (Scatter Plot)**

* Analyzes the **relationship between tweet reach (impressions) and actual engagement (likes & retweets)**.
* **Findings:**
  + Higher reach **does not always** mean higher engagement.
  + Some tweets with low reach **still receive high interaction**, proving that **content quality matters**.

**How This Dashboard Helps in Decision-Making**

**Marketing Strategy** – Helps brands **identify the best time & day to post** for maximum engagement. **Content Optimization** – Shows which **types of tweets perform best** based on sentiment and language.  
**Influencer Targeting** – Helps businesses **partner with verified accounts & influencers** for better reach.  
**Demographic Analysis** – Understands how **men and women engage differently** with content.

**How to Use This Dashboard**

1️ **Apply filters** (sentiment, language) from the sidebar to refine results.  
2️ **Analyze trends** in different sections using interactive charts.  
3️ **Use insights** to improve **tweet scheduling, audience targeting, and content strategy**.



