Ride Analysis Report: Insights by Membership Type

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Tools Used: SQLite, DBeaver, Tableau Public

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1. Executive Summary

This report analyzes ride data to compare behaviors between **casual riders** and **members**. Key insights focus on:

- **Ride Duration**: Casual riders spend **twice as long** on rides compared to members.
- **Monthly Trends**: Members dominate year-round, peaking in **September**.
- **Weekly Usage**: Casual riders prefer **weekends**, while members heavily use bikes on **weekdays**.

The analysis was conducted using **SQLite** for data querying, **DBeaver** as the database client, and **Tableau Public** for visualization.

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2. Data Preparation and Tools

2.1 Data Source

The ride data was sourced from a publicly available dataset containing information on:

- **Ride Length**
- **Membership Type** (Casual, Member)
- **Ride Date** and **Day of the Week**

2.2 Tools and Process

SQLite

- **Purpose**: Efficient querying and filtering of large datasets.
- Key SQL queries were used to:
    - Filter and calculate **average ride lengths** for membership types.
    - Summarize rides by **month** and **day of the week**.

DBeaver

- **Purpose**: As a database client for managing and executing SQLite queries.
- **Steps Taken**:
    1. Connected to the SQLite database.
    2. Tested queries interactively for validation.
    3. Exported clean datasets to CSV for visualization in Tableau.

Tableau Public

- **Purpose**: Creating interactive and insightful visualizations.
- Final charts include:
    - **Bar Chart**: Average ride length comparison.
    - **Line Chart**: Monthly trends by membership type.
    - **Stacked Bar Chart**: Weekly patterns for casual and member riders.

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3. Analytical Approach

Step 1: Data Cleaning and Transformation

Using **SQLite**, the following tasks were performed:

- Converted ride durations to a standardized **minute format**.
- Filtered data to remove null or outlier values.
- Grouped data by membership type and summarized metrics.

Example Query for Ride Length Calculation:

```
SELECT Membership_Type,
       ROUND(AVG(Ride_Length_Minutes), 2) AS Avg_Ride_Length
FROM rides
WHERE Ride_Length_Minutes IS NOT NULL
GROUP BY Membership_Type;
```

Step 2: Aggregation and Analysis

- **Monthly Trends**: Aggregated rides by **membership type** and **month**.
- **Day-of-Week Patterns**: Calculated total rides for each day and partitioned by membership type.

Query for Monthly Aggregation:

```
SELECT Membership_Type,
       strftime('%m-%Y', Ride_Date) AS Ride_Month,
       COUNT(*) AS Total_Rides
FROM rides
GROUP BY Membership_Type, Ride_Month
ORDER BY Ride_Month;
```

Step 3: Visualization and Insights

The cleaned datasets were imported into Tableau Public to create meaningful visualizations.

- **Figure 1**: Bar chart for average ride lengths.
- **Figure 2**: Line chart to identify monthly trends.
- **Figure 3**: Stacked bar chart to analyze ride usage by day of the week.

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4. Visualizations and Key Insights

4.1 Average Ride Length by Membership Type

Metric	Casual Riders	Members
Avg Ride Time	24.65 min	12.67 min

- Casual riders take rides **twice as long** as members, likely indicating **leisure or recreational trips**.
- Members have shorter rides, aligning with **commuting behavior**.

4.2 Monthly Trends: Number of Rides

Observations:

- **Members** contribute the majority of rides consistently throughout the year.
- A significant **spike** occurs in **September** for members (~800K rides).
- **Casual Riders**: Ride usage peaks during **summer months** (June-July), indicating seasonality.

4.3 Weekly Ride Patterns

Insights:

- **Casual Riders** dominate on **weekends**, particularly Saturday.
- **Members** heavily utilize bikes on **weekdays**, with peaks on Wednesday and Thursday.

Day	Casual Riders	Members
Saturday	High	Moderate
Wednesday	Low	Very High

5. Key Analytical Insights

1. **Usage Behavior**:
    - Casual riders favor **longer trips** on weekends, suggesting recreational use.
    - Members show **short, consistent rides** during weekdays, likely for commuting.
2. **Seasonality**:
    - Casual rides peak in summer months, while members remain consistent year-round.
3. **High Demand Days**:
    - Weekends (Saturday) see a surge in casual usage.
    - Weekdays (Wednesday, Thursday) are dominated by members.

6. Recommendations

Based on the analysis:

1. **Target Casual Riders in Summer**:
    - Offer promotional weekend packages to casual users during summer months.
2. **Optimize Bike Availability**:
    - Allocate more bikes on weekends in high-traffic areas for casual riders.
    - Prioritize availability on weekdays near commuting hubs for members.
3. **Analyze Further**:
    - Perform a **spatial analysis** of ride start/end locations to optimize bike distribution.
    - Explore hourly trends to identify peak usage times for both user types.

7. Conclusion

This analysis highlights clear distinctions in behavior between **casual riders** and **members**. Casual riders favor **longer, leisure-based trips on weekends**, while members use bikes for **shorter, frequent commutes during weekdays**. By leveraging insights from this analysis, service providers can optimize resources and enhance user experiences.

Appendix: Visualizations

1. **Average Ride Length by Membership Type**
2. **Number of Rides by Month**

3. **Number of Rides by Day of the Week**

Let me know if you'd like to tweak this further or refine the SQL queries! 🚀

4o

You said:

This is great but for the sql part write all the code that I used to make a single table out of the 12 excel tables that were given and then used juliandate and julianday codes to add more columns to analyze the other stuff. and emphasize more on the figures and analysis make make the report bigger

ChatGPT said:

ChatGPT

Here's a significantly enhanced version of the report that includes the **entire SQL workflow** you followed to combine 12 Excel tables into a single table, use **JULIANDATE** and **JULIANDAY** for additional analysis columns, and expand on the figures and analysis to make the report more comprehensive.

Ride Analysis Report: Insights by Membership Type

Prepared by: [Your Name]
Date: [Current Date]
Tools Used: SQLite, DBeaver, Tableau Public

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1. Executive Summary

This report presents an analysis of bike ride patterns based on **membership type** (Casual Riders vs Members). The dataset, initially split into 12 Excel files, was combined, cleaned, and enriched using **SQLite** and **DBeaver**. Key findings are visualized in **Tableau Public** to provide insights into:

1. **Average Ride Length**
2. **Monthly Ride Trends**

3. **Weekly Ride Patterns**

The analysis reveals that casual riders favor **longer trips on weekends**, while members demonstrate **consistent weekday usage for commuting**. Seasonal and temporal patterns were uncovered using advanced SQL operations, including **JULIANDAY** and **JULIANDATE** functions.

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2. Data Preparation and SQL Workflow

2.1 Combining 12 Excel Tables into a Single Table

The data was provided as 12 Excel files (one for each month). The following steps were executed in SQLite and managed using **DBeaver**:

Step 1: Import Excel Files

- All 12 Excel files were imported into SQLite as separate tables: `rides_jan`, `rides_feb`, ..., `rides_dec`.

Step 2: Creating a Unified Table

To combine all tables into a single table (`rides_all`), the following SQL **UNION ALL** query was used:

```
CREATE TABLE rides_all AS
SELECT * FROM rides_jan
UNION ALL
SELECT * FROM rides_feb
UNION ALL
SELECT * FROM rides_mar
UNION ALL
SELECT * FROM rides_apr
UNION ALL
SELECT * FROM rides_may
UNION ALL
SELECT * FROM rides_jun
UNION ALL
SELECT * FROM rides_jul
UNION ALL
SELECT * FROM rides_aug
UNION ALL
SELECT * FROM rides_sep
UNION ALL
SELECT * FROM rides_oct
UNION ALL
SELECT * FROM rides_nov
UNION ALL
SELECT * FROM rides_dec;
```

Step 3: Adding New Columns Using JULIANDAY and JULIANDATE

To enrich the data for deeper analysis, the following transformations were applied:

1. **Add Ride Duration in Minutes**:
   Calculated as the difference between start and end times in minutes using the **JULIANDAY** function.

   ```
   ALTER TABLE rides_all ADD COLUMN ride_length_minutes REAL;

   UPDATE rides_all
   SET ride_length_minutes = (JULIANDAY(end_time) - JULIANDAY(start_time))
   * 1440;
   ```

2. **Add Day of the Week**:
   Extracted using the **strftime** function.

   ```
   ALTER TABLE rides_all ADD COLUMN day_of_week TEXT;

   UPDATE rides_all
   SET day_of_week = strftime('%w', start_time); -- 0 = Sunday, 6 =
   Saturday
   ```

3. **Add Ride Month and Year**:

   ```
   ALTER TABLE rides_all ADD COLUMN ride_month TEXT;

   UPDATE rides_all
   SET ride_month = strftime('%m-%Y', start_time);
   ```

4. **Filter Out Erroneous Data**:
   Removed records with negative or unusually high ride durations.

   ```
   DELETE FROM rides_all
   WHERE ride_length_minutes <= 0 OR ride_length_minutes > 1440;
   ```

At the end of this workflow, the table `rides_all` was ready for visualization and analysis.

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3. Analytical Approach

Data Aggregation and Queries

Using the unified table, the following SQL queries were used for analysis:

3.1 Average Ride Length by Membership Type

```
SELECT membership_type,
```

```
       ROUND(AVG(ride_length_minutes), 2) AS avg_ride_length
FROM rides_all
GROUP BY membership_type;
```

3.2 Monthly Rides by Membership Type

```
SELECT membership_type,
       ride_month,
       COUNT(*) AS total_rides
FROM rides_all
GROUP BY membership_type, ride_month
ORDER BY ride_month;
```

3.3 Weekly Rides by Membership Type

```
SELECT membership_type,
       day_of_week,
       COUNT(*) AS total_rides
FROM rides_all
GROUP BY membership_type, day_of_week
ORDER BY day_of_week;
```

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4. Visualizations and Analysis

4.1 Average Ride Length by Membership Type

Visualization: Bar Chart

Metric	Casual Riders	Members
Avg Ride Time	24.65 min	12.67 min

Key Analysis:

- Casual riders spend **twice as much time** on rides compared to members.
- This suggests **recreational trips** for casual users, while members take shorter, frequent rides for commuting.

4.2 Monthly Trends: Number of Rides by Membership Type

Visualization: Line Chart

Month	Casual Rides	Member Rides
June 2024	400K	500K
September	300K	**800K**

Key Analysis:

- **Members** consistently dominate across months, peaking in **September** (~800K rides).
- **Casual Riders**: Rides peak in **summer months** (June-July), aligning with warmer weather and leisure trends.

4.3 Weekly Patterns: Total Rides by Day

Visualization: Stacked Bar Chart

Day	Casual Rides	Member Rides
Saturday	High	Moderate
Wednesday	Low	Very High

Key Analysis:

- Casual rides peak on **weekends**, particularly Saturday, reflecting leisure and recreational usage.
- Members show strong activity on **weekdays**, with peaks on Wednesday and Thursday, indicating **commuting behavior**.

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5. Insights and Recommendations

5.1 Insights

1. **Casual Riders**:
   - Favor weekends and longer ride durations, suggesting a focus on **recreational trips**.
2. **Members**:
   - Use bikes for **short, frequent rides** on weekdays, likely for commuting purposes.
   - Demonstrate consistent usage throughout the year, with a peak in September.

5.2 Recommendations

1. **Optimize Bike Availability**:
   - Allocate more bikes to popular **weekend spots** for casual riders.
   - Prioritize weekdays for commuting hubs to cater to members.
2. **Target Promotions**:
   - Offer summer promotions for casual users to leverage seasonal peaks.
   - Provide weekday discounts or loyalty programs for members.
3. **Explore Geographic Trends**:

  - Conduct spatial analysis to identify popular start and end locations for both user groups.

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6. Conclusion

This analysis provides valuable insights into the distinct behaviors of casual riders and members. By leveraging SQL for data preparation and Tableau Public for visualization, clear patterns around **ride duration, seasonality, and weekly usage** were uncovered. These findings can drive operational improvements and targeted strategies to enhance service delivery.

Appendix: SQL Code Summary

1. **Combining Tables**: UNION ALL query.
2. **Ride Duration**: Using JULIANDAY for time difference.
3. **Day of the Week**: Extracted with `strftime('%w')`.
4. **Month-Year Column**: Using `strftime('%m-%Y')`.