**Bike Usage Analysis Report**

**Introduction:**

This report presents the findings from an exploratory data analysis of the bike sharing dataset, which includes information about bike rentals, weather conditions, and other relevant factors. The analysis aims to provide insights into bike usage patterns and the influence of various variables on bike rentals.

**Data Exploration:**

The dataset consists of the following variables:

- dteday: Date of the bike rental

- season: Season (1: Spring, 2: Summer, 3: Fall, 4: Winter)

- holiday: Whether the day is a holiday or not

- weekday: Day of the week

- temp: Normalized temperature in Celsius

- hum: Normalized humidity

- windspeed: Normalized wind speed

- count: Total number of bike rentals

**Variable Distributions:**

The distributions of the numerical variables were examined using histograms with kernel density estimation (KDE) curves:

A graph of a temperature distribution

Description automatically generated

The temperature distribution shows a roughly normal distribution centered around 20°C.

A graph of a humidity distribution

Description automatically generated

The humidity distribution is slightly skewed to the right, with most values concentrated around the median.

A graph of a graph with lines

Description automatically generated with medium confidence

The windspeed distribution is positively skewed, with a high frequency of low windspeed values.

**Bike Usage by Categorical Variables:**

The relationship between bike usage (count) and categorical variables (season, holiday, and weekday) was explored using box plots:

A diagram of a bike usage by season

Description automatically generated

The box plot reveals that bike usage is highest during the summer and lowest during the winter, indicating a seasonal pattern.

A diagram of a bike usage

Description automatically generated

The box plot shows slightly lower bike usage on holidays compared to non-holidays.

A graph of a diagram

Description automatically generated with medium confidence

The box plot demonstrates higher bike usage during weekdays compared to weekends, suggesting commuting patterns.

**Time Series Analysis:**

The bike usage over time was visualized using a line plot:  
A blue and black sound waves

Description automatically generated

The line plot reveals potential seasonal patterns and trends in bike usage, with peaks and valleys corresponding to different seasons and periods.

**Correlation Analysis:**

The correlation matrix was calculated to understand the relationships between variables:  
A screenshot of a computer screen

Description automatically generated

The correlation matrix reveals moderate positive correlations between bike usage (count) and temperature (0.404), season (0.438), and humidity (0.126). There is also a weak positive correlation between bike usage and windspeed (0.093).

**Conclusion:**

The exploratory data analysis provides valuable insights into bike usage patterns and the influence of various factors. Key findings include:

- Bike usage is highest during the summer season and lowest during the winter, indicating a seasonal pattern.

- Weekdays exhibit higher bike usage compared to weekends, possibly due to commuting patterns.

- Holidays slightly reduce bike usage compared to non-holidays.

- Temperature and season have the strongest positive correlations with bike usage, followed by humidity and windspeed.

These insights inform better decision-making processes, such as resource allocation, maintenance scheduling, and marketing strategies, to better meet the demand for bike rentals and improve the overall bike sharing service.