Bike Sharing Dataset

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Part 2: Prescriptive Analysis with Bike Sharing Dataset Introduction:

Programs for bike sharing, which offer a quick and environmentally beneficial form of transportation, have grown to be an essential component of urban mobility. Using the available dataset, this paper examines bike rental trends from the perspectives of time, season, weather, and user behavior.

❖ **Objectives**

Identify trends in bike rentals over time.

Examine the impact of seasons and weather conditions on rentals. Anaylze differences between casual and registered users
Provide insights for forecasting demand and improving bike-sharing infrastructure.

❖ Data Overview

The dataset contains 731 daily records with variables such as date, season, weather conditions, temperature, humidity, wind speed, and bike rental counts (casual, registered, total).

❖ Analysis Perspectives

Temporal Perspective (Time-Based Analysis)

Yearly Trends: Rentals have shown an increasing trend over time.

Monthly Variations: Summer months see higher rentals, while winter months show a decline.

Day-wise Trends: Rentals tend to be higher on weekdays due to work commutes.

Holidays vs. Working Days: Holidays show a slight drop in rentals, with more leisure-based usage.

Seasonal Perspective

Peak seasons: Summer and spring months have the highest demand.

Winter Impact: Cold temperatures and adverse weather reduce rental frequenc

Recommendation: Increase bike availability in peak months and offer incentives in off-peak periods.

Weather Perspective

Temperature Influence: Higher temperatures correlate with increased rentals.

Humidity & Wind Speed: Extreme humidity and strong winds negatively impact rentals.

Weather Situations: Clear weather sees the highest rentals, while rainy/snowy days experience drops.

On the right-hand side, scatter plot is used to analyze the relationship between weather conditions, month, and rental count. This leads to the conclusion that weather does have a significant impact on rental behavior, as they do exhibit a greater concentration of blue triangles (likely favorable weather) and are more prevalent during middle months when such behavior would occur. The bottom-line chart shows rental volume over time, showing the pattern with a bell shape peak in the summer months (May to September) and a low in January. For operational planning purposes, this is particularly well suited in terms of being able to show when the demand will be higher and when to schedule the maintenance during slow time.

In fact, these dashboards serve as an example or two of some best practices in data visualization. In the first section, they use the appropriate charts for each analysis question: scatter plot for exploring relationships, line graphs for tracking trends over time and bar charts for unequal categories. In second they provide many linked perspectives of the same data so viewers can make linkages between patterns across visualizations. Third, they provide summary statistics as well as annotations (such as the 2008 sum of sales price) to evidence the most interesting observations.

For the dataset of housing prices, the predictive analysis is to find out variables that affect the property value. It shows that sale price correlate with the lot dimensions, finished square footage, year built, and market timing. This could aid to help real estate professionals build predictive models to value properties, or aid in the decisions of homeowners as to achieve a better return on investment in improvement. An example of prescriptive analytics is the bike rental dashboard, which gives categorical insights for decision making decisions that are based on operations (Sharma et al.2022). This can provide seasonal and weather dependent pattern, which can be used for resource allocation, staff decisions and maintenance scheduling. For instance, in the case of the business, summer months and days where bikers are burning up the road should ensure maximum bike availability while those winter downtime should be used for repairs and upgrading.

Both of them could benefit from the deeper analytical insights and extra interactive components. For example, adding price forecast tools or neighborhood filters might make the housing dashboard more actionable. This would be an excellent candidate for hyperparameter search since the bike rental dashboard would benefit from extra explicit optimization recommendations, such as recommended distribution patterns based on historical demand. All things considered, these Power BI dashboards are highly helpful for visualizing complicated datasets and supporting both prescriptive and predictive analysis. Property prices are determined by data from the housing dashboard, and the bike rental dashboard offers a wealth of operational insight. They demonstrate how raw data may be transformed into usable business intelligence through effective design, enabling more thoughtful business

❖ Conclusion

The analysis provides insights into how seasonality, weather, and user behavior impact bike rentals. By leveraging these insights, businesses and policymakers can improve bike-sharing services, enhance customer experience, and promote sustainable urban mobility