` R analytics Dashboard using Shiny

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About the Data Set

The dataset is about black carbon concentration in air in 2017. it appears to be a time-series dataset with various parameters recorded at regular intervals (in this case, every minute). The dataset contains a timestamp, and each entry includes a variety of measurements, such as sensor readings, flow rates, pressure, temperature, and status indicators.

Key columns

- **Timestamp:** The "Date Time" column represents the date and time of each record.
- **Sensor Readings (RefCh1, Sen1Ch1, Sen2Ch1, RefCh7, Sen1Ch7, Sen2Ch7):** Multiple sensor readings for different channels.
- **Flow Rates (Flow1, Flow2, FlowC):** Flow rates for different channels.
- **Pressure and Temperature (Pressure(Pa), Temperature(¬∞C)):** Pressure and temperature readings.
- **Status and Detection (Status, ContStatus, DetectStatus, LedStatus, ValveStatus):** Various status indicators.
- **Bacterial Concentration (BC11, BC12, ..., BC7):**Readings related to bacterial concentration.
- **Other Parameters (TapeAdvCount, BB(%), ContTemp, SupplyTemp, LedTemp):** Miscellaneous parameters.

Data Quality Checks

1. **Missing Values:** Checked for missing values in each column to ensure data completeness.

2. **Outliers:** Identified and handled outliers in numerical columns.

Trends and Patterns

1. **Temporal Trends:** Explored how sensor readings, flow rates, pressure, and temperature change over time.

2. **Correlations:** Investigated correlations between different parameters. **How do sensor readings correlate with pressure or temperature?**

Visualizations

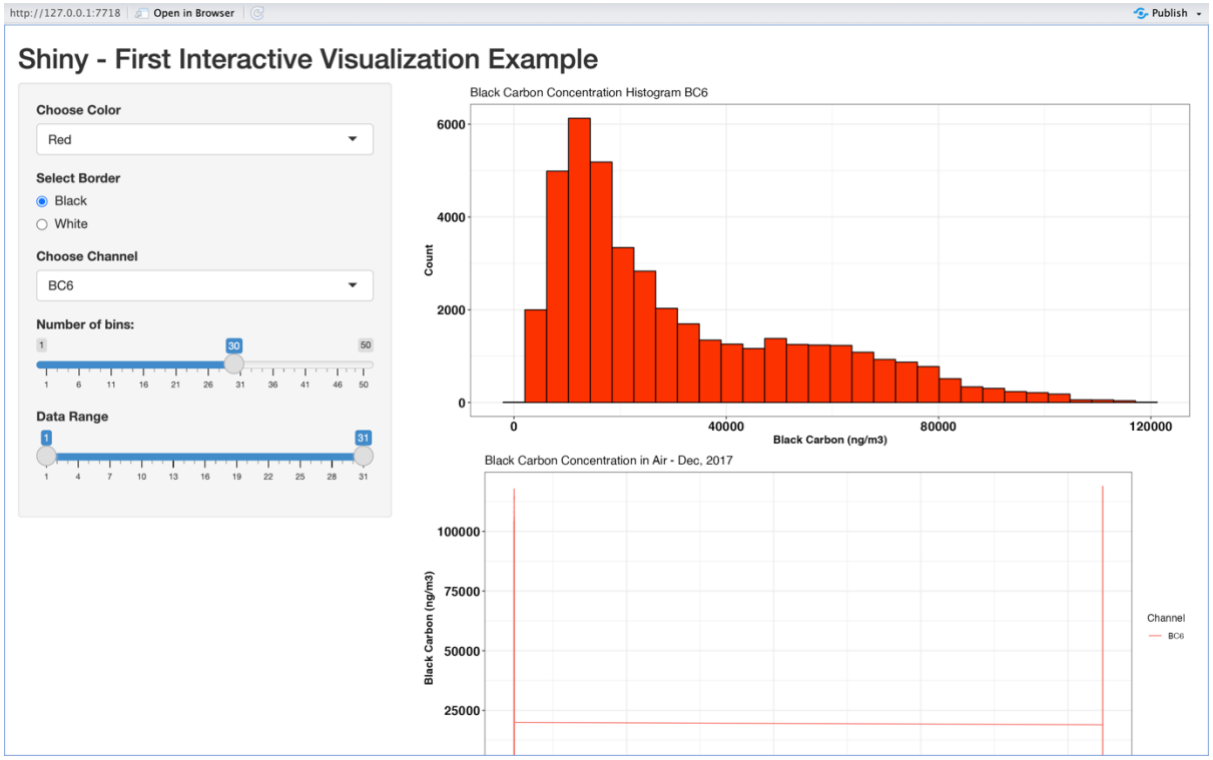
1. **Time Series Plots:** Plotted time series graphs for key parameters to observe trends.

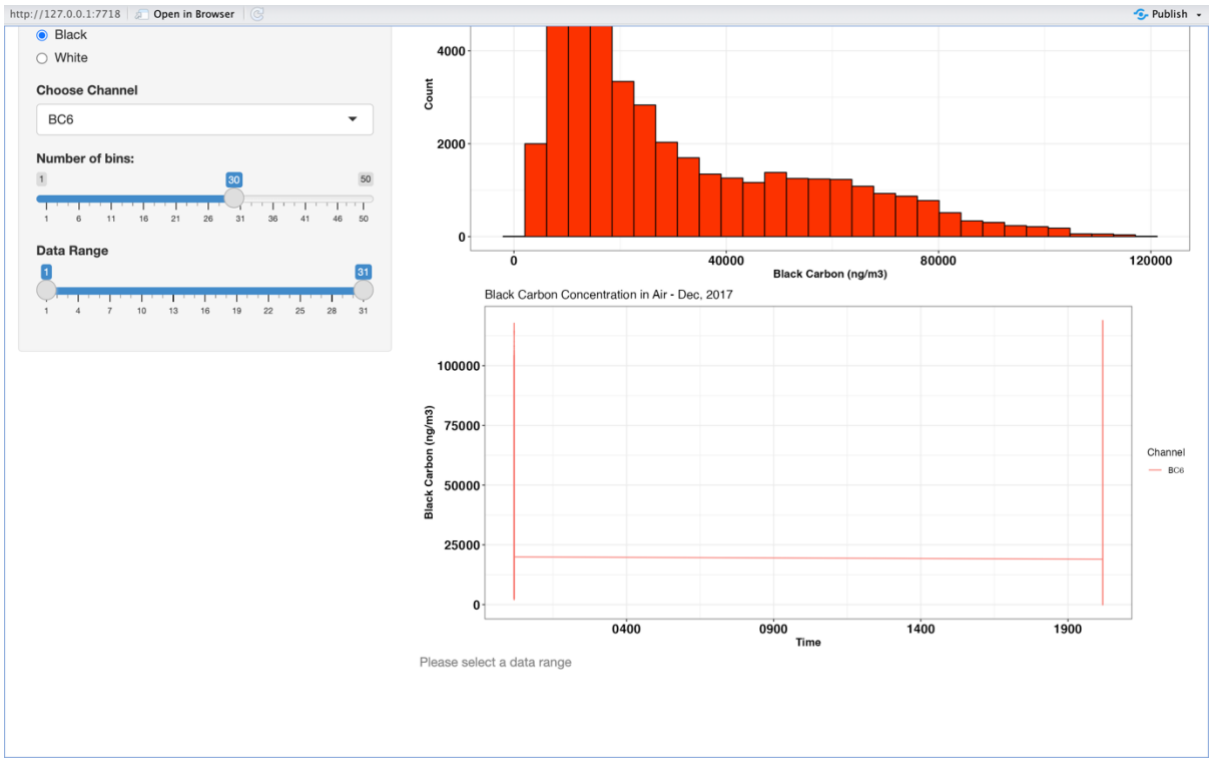
Statistical Analysis

1. **Descriptive Statistics:** Calculate mean, median, standard deviation, and other summary statistics for key parameters.

2. **Hypothesis Testing:** Performed hypothesis tests to compare different groups or conditions.

Output


http://127.0.0.1:7718
Open in Browser
Publish
Shiny - First Interactive Visualization Example
Choose Color
Red
Select Border
Black
White
Choose Channel
BC6
Number of bins:
Data Range
Black Carbon Concentration Histogram BC6
Count
Black Carbon (ng/m3)
Black Carbon Concentration in Air - Dec, 2017
Channel
BC6


http://127.0.0.1:7718
Open in Browser
Publish
Black
White
Choose Channel
BC6
Number of bins:
Data Range
Count
Black Carbon (ng/m3)
Black Carbon Concentration in Air - Dec, 2017
Time
Channel
BC6
Please select a data range

Analysis of the Dashboard

1. **Histogram of Black Carbon concentration in various channels (BC1, BC2, BC3, BC4, BC5, BC6):**
    - The dashboard displays histograms for Black Carbon concentration, allowing users to visually analyse the distribution of concentrations for different channels.
    - Users can choose a specific channel (BC1, BC2, BC3, BC4, BC5, BC6) through a "choose channel" option, indicating the flexibility to focus on data from a particular source or location.
2. **Number of bins and data range:**
    - The dashboard includes parameters such as the number of bins and data range. Bins refer to the intervals into which the data is divided in the histogram.
    - Users can adjust these parameters, providing a customizable aspect to the visualization. Changing the number of bins or data range can impact how the histogram displays the concentration distribution.
3. **Time vs Black Carbon concentration plot based on channel, number of bins, and data range filter:**
    - In addition to the histograms, the dashboard includes a plot that shows the relationship between time and Black Carbon concentration.
    - This plot is further filtered based on the selected channel, the number of bins, and the data range, providing a more detailed and dynamic analysis.
    - The time axis likely represents the chronological order of data points, allowing users to observe trends or patterns in Black Carbon concentration over time for a specific channel.

Conclusion

In summary, the dashboard offers a comprehensive analysis of Black Carbon concentration data. Users can explore histograms for various channels, customize the visualization by adjusting the number of bins and data range, and examine the temporal patterns through a time vs Black Carbon concentration plot, with the ability to filter based on channel, number of bins, and data range. This functionality provides a powerful tool for researchers or analysts to gain insights into the distribution and trends of Black Carbon concentration across different channels and periods.