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Plot, Salt, Smooth (JFreeCharts & Apache) Essay

The objective of this portion of the project was to visualize and process a set of data points in Java, after the data has been both salted and smoothed, using the JFreeChart library for visualization and the Apache Stats and Math libraries for data processing. The project consisted of five Java classes, each with a specific purpose:

**ChartCreator.java**: This class is responsible for creating a JFreeChart panel that displays an XYLineChart with a given dataset. The method createChart() takes an XYSeriesCollection dataset as input and returns a ChartPanel object containing the created chart.

**ChartData.java**: This class acts as a container for storing and retrieving data for creating an XYLineChart using JFreeChart. It contains an ArrayList to store the data as string arrays and provides methods for adding data and retrieving data at a specified index.

**DataProcessor.java**: This class provides methods to generate and process data for a chart. It has methods to generate data with linear Y values and add salt to the data to create "salted" data, smooth the salted Y values in the ChartData object using a sliding window, and print a table of the initial Y values and the corresponding salted and smoothed data.

**DatasetCreator.java**: This class provides a method to create a JFreeChart dataset from ChartData and a corresponding array of smoothed data. The method createDataset() creates an XYSeriesCollection dataset from the ChartData and the array of smoothed data.

**PlotSaltSmoothDriver.java**: This class acts as the main driver for the program. It prompts the user for input, such as the window size and salt range, creates a DataProcessor object with the given inputs, generates and processes the data, and finally, creates and displays a chart using the ChartCreator and DatasetCreator classes.

My learning process involved understanding the different Java classes and libraries used in the project. I familiarized myself with the JFreeChart and JFreeCommon libraries, which were essential for creating the charts and visualizing the data. I also gained a better understanding of the Apache Stats and Math libraries, which were used for data processing tasks like smoothing the data using a sliding window and calculating the mean. Throughout the project, I found that combining these libraries allowed me to create a powerful and flexible data visualization and processing tool. The use of JFreeChart and JFreeCommon made it easy to create visually appealing and informative charts, while the Apache Stats and Math libraries provided the necessary tools for processing and analyzing the data. This was very different when compared to the first component of this project where we completed these tasks without the use of external libraries. These libraries made the task so much easier and more intuitive. Through the use of these five classes it not only prints out the resulting table that shows the X, Y, salted Y, and smoothed Y values but it even generates a labeled graph for you. The charts created by the program effectively display the original data, salted data, and smoothed data, allowing for easy comparison and analysis.

In conclusion, my work with the JFreeChart, JFreeCommon, Apache Stats Library, and Apache Math Library has not only expanded my knowledge in data visualization and processing but has also given me practical experience in applying these libraries to real-world problems. The combination of these libraries allowed for the creation of an efficient and powerful tool for generating, processing, and visualizing data.