Code Documentation for PSSPart3 Project

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Overview

The purpose of the PSSPart3 project was to create classes and methods that calculate a function, salt the y values of the function, smooth the salted y values, and save the x and y values to a csv file. This project had an additional goal of learning how to use dependencies and APIs (Application Programming Interface). This project has two dependencies: JFreeChart, for displaying the datapoints on a graph, and Apache Commons Math, which was used to compute a rolling mean for the Smoother class. I also took the opportunity to use this project to learn how to use Maven. I used Maven specifically to manage the dependencies of this project and to create a package on github. This project has five classes.

How It Works

Function

The Function class contains methods that calculates the answer to a mathematical function and saves the x and y values. This class has two variables, one constructor, and three methods:

Variables

- ArrayList<Integer> xValues
- ArrayList<Double> yValues

Constructor

- Function
    - Parameters: None
    - Functionality – Constructs the Function object and initializes the ArrayList variables
    - Returns: Nothing

Methods

- logFunction
    - Parameters: int startingValue – The starting x value (inclusive), int finishingValue – The last x value (inclusive), int width – The width for the graph, int height – The height for the graph

    - Functionality – Calculates the value of ln(x), saves the x and y values in ArrayLists and plots the values
    - Returns: Nothing
- getXValues
    - Parameters: None
    - Functionality – Getter for the xValues variable, returns the ArrayList of x values
    - Returns: ArrayList<Integer> - The ArrayList of x values
- getYValues
    - Parameters: None
    - Functionality – Getter for the yValues variable, returns the ArrayList of y values
    - Returns: ArrayList<Double> - The ArrayList of y values

Plotter

The Plotter class is responsible for creating the dataset for the graph and creating and displaying the graph for the user to see. The class contains two methods:

- createXYDataset
    - Parameters: ArrayList<Integer> xValues – The ArrayList of x values, ArrayList<Double> yValues – The ArrayList of y values, String title – The title for the graph / key for the series
    - Functionality – Creates the XYDataset needed to create the graph
    - Returns: XYDataset – The XYDataset object with the x and y values from the ArrayLists loaded in
- plotXYData
    - Parameters: XYDataset dataXY – The XYDataset object with the x and y values loaded in, String titleOfChart – The title for the chart, int width – The width of the chart, int height – The height of the chart
    - Functionality – Creates the chart, panel, and frame needed to display the chart to the user
    - Returns: Nothing

Salter

The Salter class contains a method that salts (adds a random value to) the data. The class contains one method:

- addSalt
    - Parameters: ArrayList<Double> yValues – The ArrayList of y values calculated using the function and the x values, int origin – The origin of the random function (inclusive), int bound – The upper bound of the random function (exclusive)

    - Functionality – Adds a random value to the y values to hide the original values
    - Returns: ArrayList<Double> - The yValues that have been salted

Smoother

The Smoother class contains methods that smooth out salted data and make it more understandable. The class has two constructors, the default constructor and an additional constructor that accepts an ArrayList<Double> of the salted y values. The class contains two variables:

- ArrayList<Integer> xValues
- ArrayList<Double> yValues

The class also contains two methods:

- smoothData
    - Parameter: int windowValue – The number of data points to be averaged to smooth the data
    - Functionality – Takes the salted values and finds a rolling mean of the dataset
    - Returns: Nothing
- runSmoother
    - Parameters: int windowValue – The number of values to the left and to the right of each value to find the average of, int numberOfRuns – The number of times to run the smoothData method, int width – The width of the frame for the graph, int height – The height of the frame for the graph
    - Functionality – Runs the smoothData method the number of times the user would like and plots the results of the smoothing
    - Returns: Nothing

PSSPart3Tester

The PSSPart3Tester class contains the main method and is used to test the methods from the Function, Plotter, Salter, and Smoother classes.

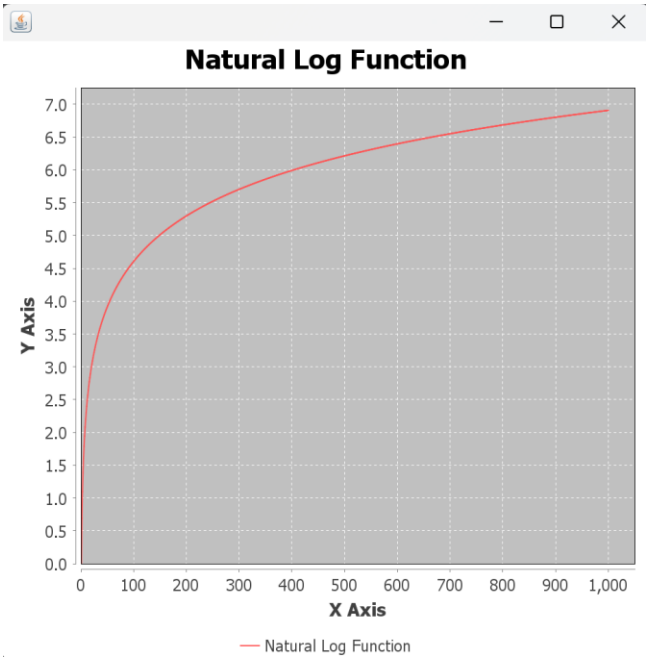
Extra credit

For extra credit, I attached my GitHub to my maven project through my settings.xml and pom.xml so I could deploy a package. I was successfully able to do so and will show this in the output section of this documentation.

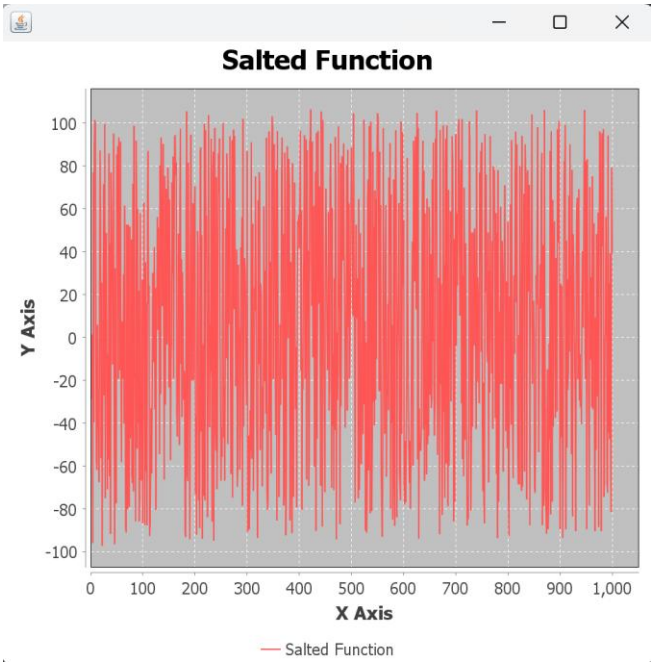
Output

Screenshots

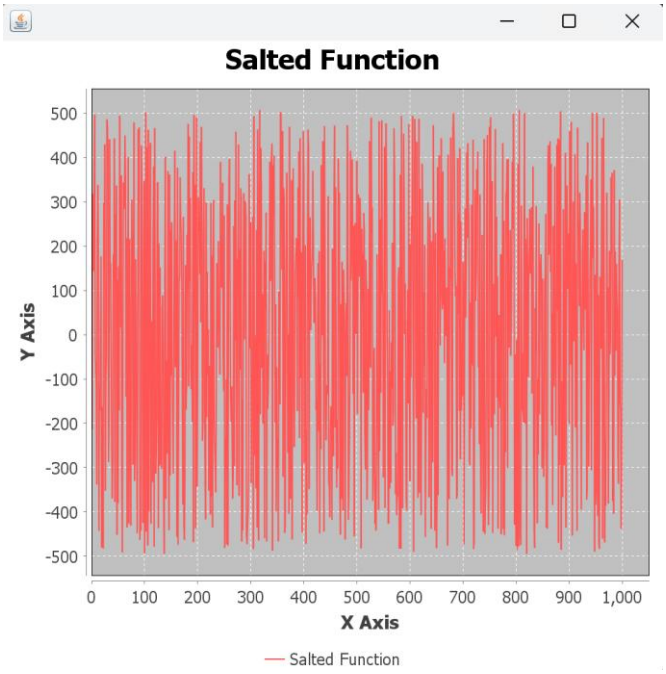
Natural Log Function Output



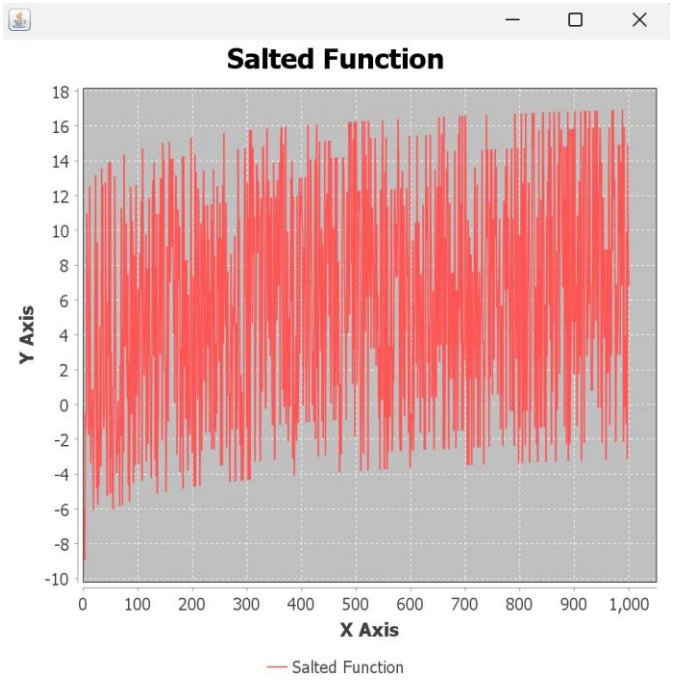
Salted Function from -100 to 100



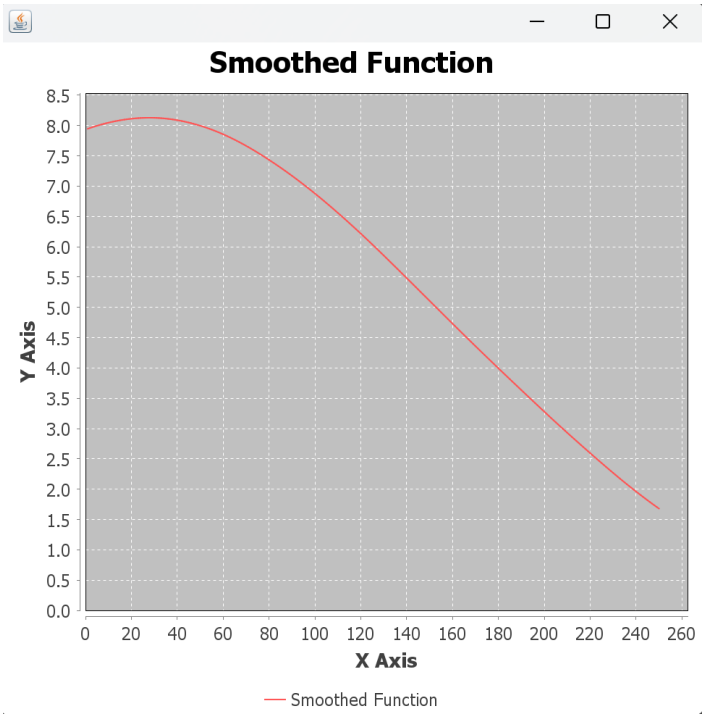
Salted Function from -500 to 500



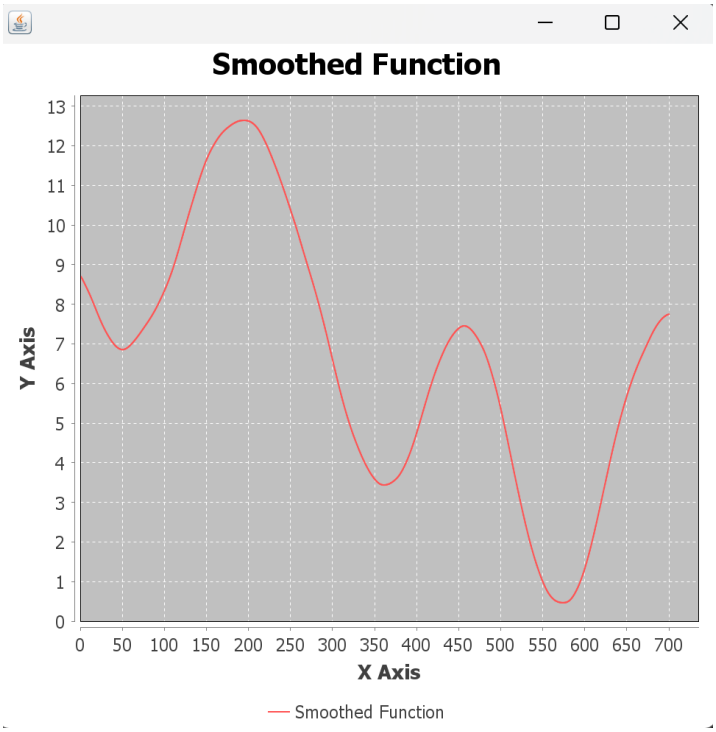
Salted Function from -10 to 10



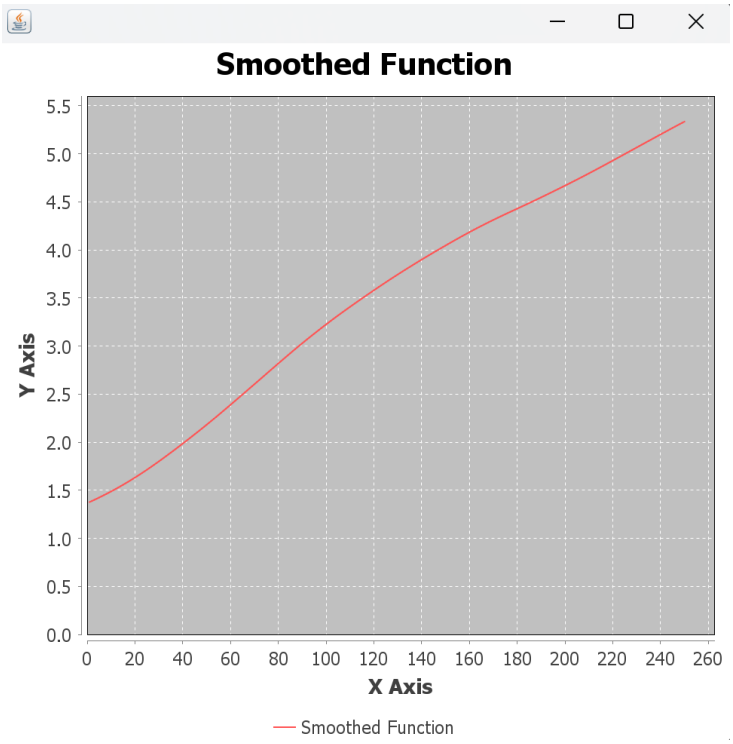
Smoothed Function from -100 to 100, windowValue = 250 , numberOfRuns = 3



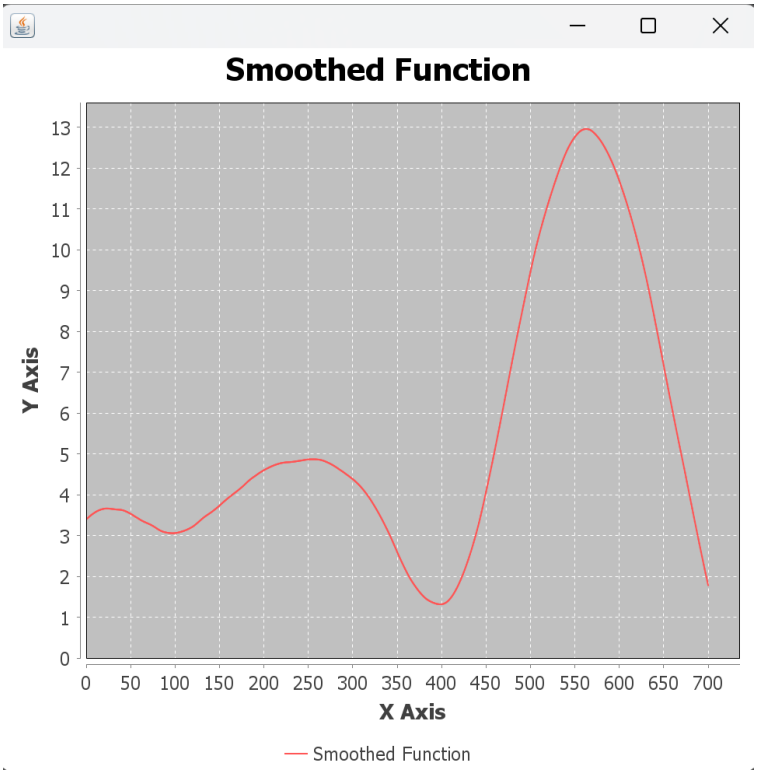
Smoothed Function from -100 to 100, windowValue = 100 , numberOfRuns = 3



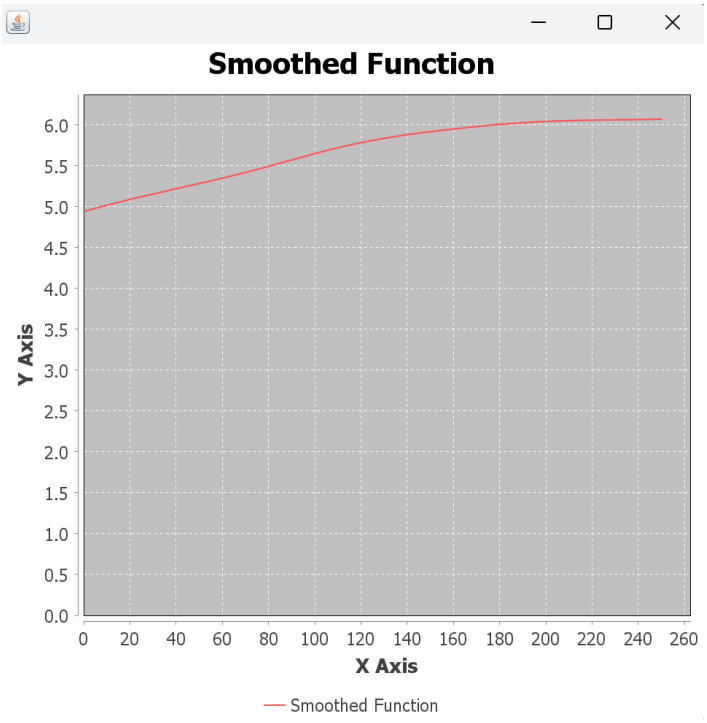
Smoothed Function from -500 to 500, windowValue = 250, numberOfRuns = 3



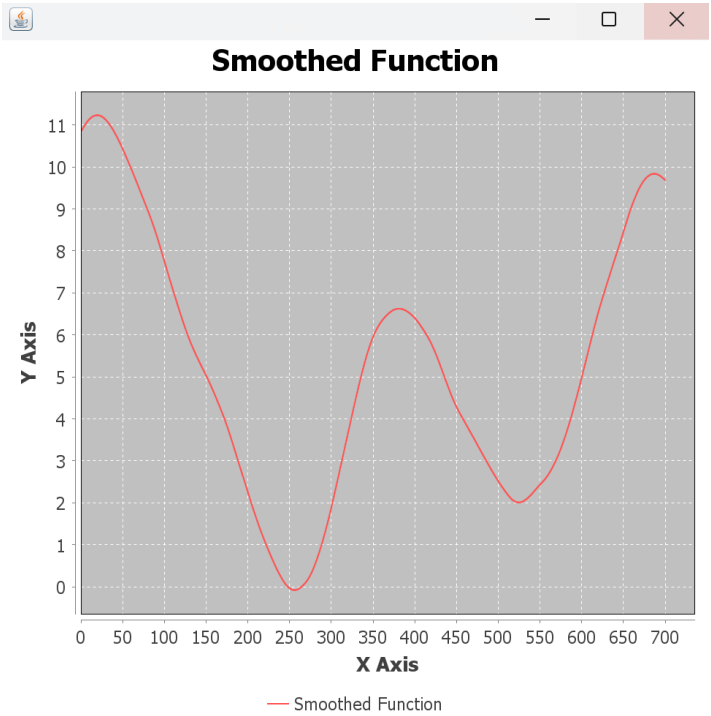
Smoothed Function from -500 to 500, windowValue = 100, numberOfRuns = 3



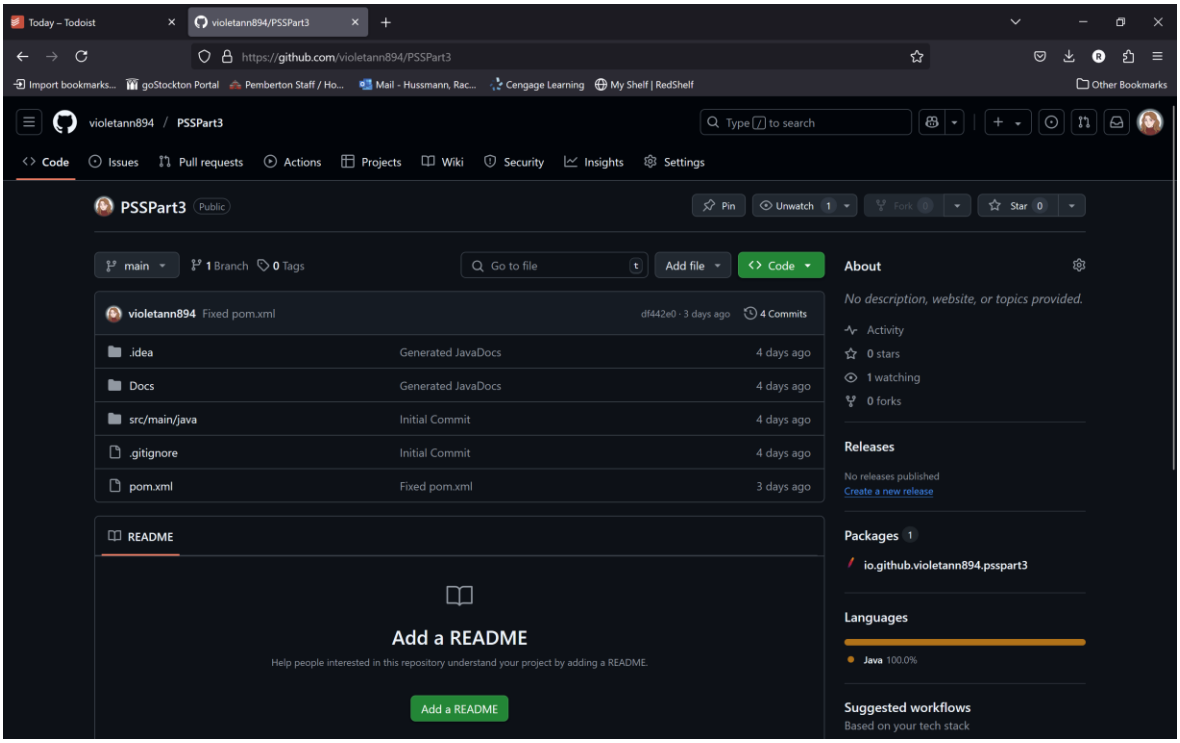
Smoothed Function from -10 to 10, windowValue = 250, numberOfRuns = 3



Smoothed Function from -10 to 10, windowValue = 100, numberOfRuns = 3



GitHub repository with the package deployed



Screenshot of the package