User Guide

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github.com/ashyphrodite

Before anything, this project is hosted on Github Pages if you don't want to set up this project yourself. Link: https://ashyphrodite.github.io/diet-solver/.

Note: Please use Chrome-based browsers such as Google Chrome, Opera, Brave, etc.

I. Setup

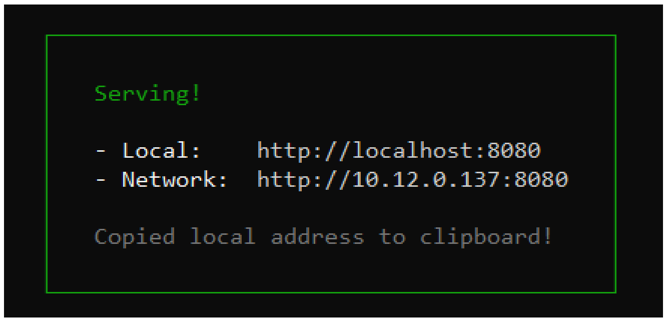
You need to set up an `http-server` to run this locally on your browser. The following steps is one of the easiest ways to do so.

1. Install Node.js at https://nodejs.org/en. Make sure to install the proper version for your machine.
2. Open your terminal running the following command in the current directory of the files:

```
npx serve ./ -p 8080
```

   a. If it asks to install `serve`, then do it.

   This or something similar should appear afterwards.



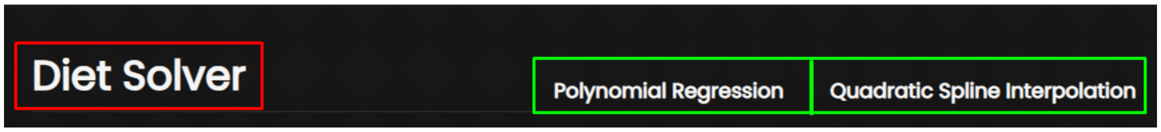
```
Serving!

- Local:    http://localhost:8080
- Network:  http://10.12.0.137:8080

Copied local address to clipboard!
```

3. Go to `localhost:8080` on your browser.

II. Usage

A. General

1. The top bar is the navigation bar.



The bigger text *(enclosed in red rectangle)* shows you the section you're currently in. The smaller text *(enclosed in green rectangle)* navigates you to the other sections. Click to go to the desired section.

2. The project assumes that the `.csv` files to be uploaded follow this format:

```
x₁,f(x₁)
x₂,f(x₂)
…
```

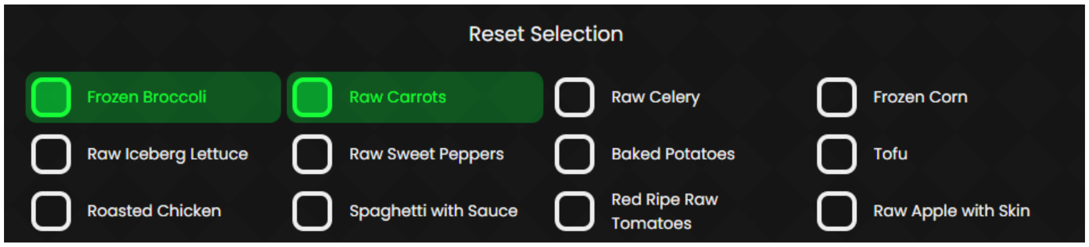
This is an example of a valid `.csv` file:

```
-1.0,0.038
-0.8,0.058
-0.6,0.10
-0.4,0.20
```

B. Diet Problem Solver

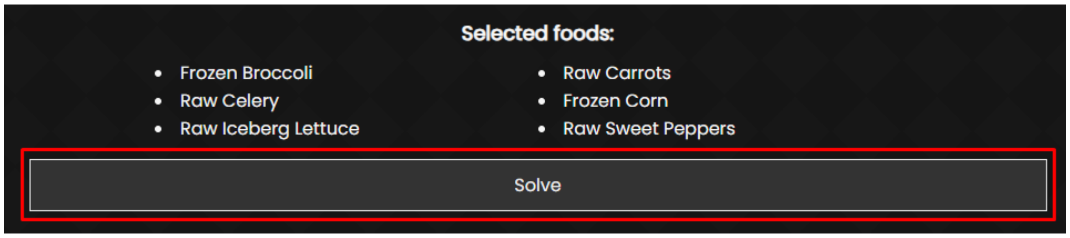
The list of foods and their nutritional values is stored in `/js/foods.json`.

1. Select the foods that are going to be included in the diet. The included foods will be highlighted in green.

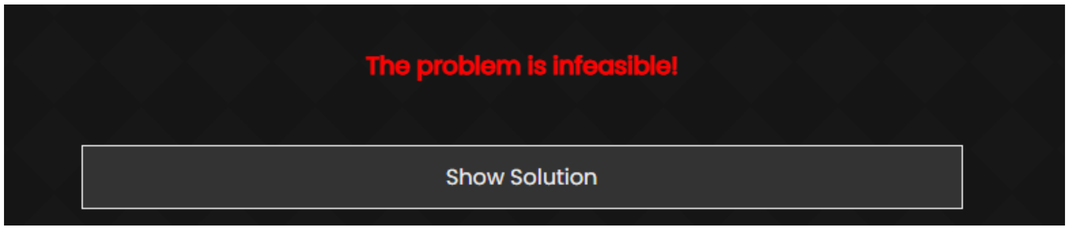


You can click again to unselect the foods. The Reset Selection text when clicked unselects all the selected foods.

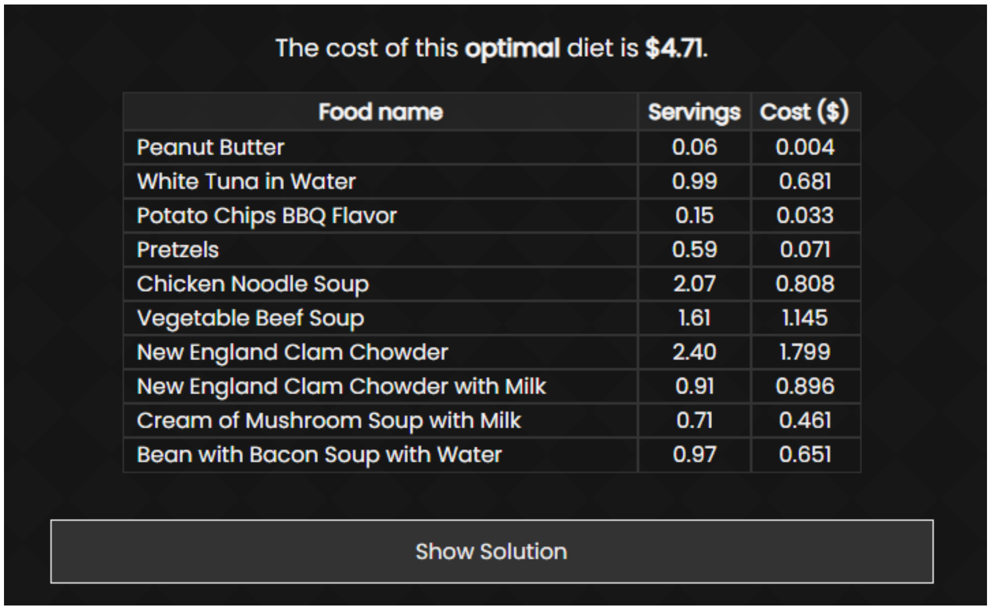
2. Scroll down to the bottom of the page and click on the Solve button.



3. There are two possible results.
   a. If the problem is infeasible, which means that the simplex algorithm does not converge for the selected foods, the following should appear.


The problem is infeasible!

b. On the other hand, if the problem is feasible, then it will give you the optimal cost for that diet of the selected foods and the breakdown by servings.



The cost of this **optimal** diet is **$4.71**.

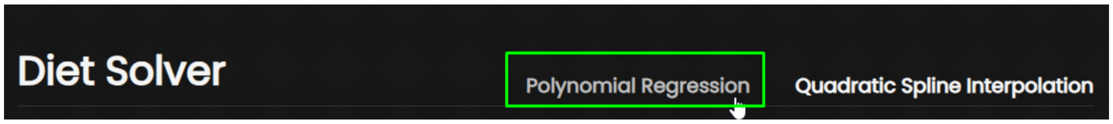
Food name	Servings	Cost ($)
Peanut Butter	0.06	0.004
White Tuna in Water	0.99	0.681
Potato Chips BBQ Flavor	0.15	0.033
Pretzels	0.59	0.071
Chicken Noodle Soup	2.07	0.808
Vegetable Beef Soup	1.61	1.145
New England Clam Chowder	2.40	1.799
New England Clam Chowder with Milk	0.91	0.896
Cream of Mushroom Soup with Milk	0.71	0.461
Bean with Bacon Soup with Water	0.97	0.651

Note: Due to the nature of the simplex algorithm, some foods may not be included at all in the breakdown.

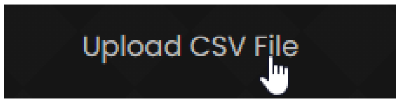
4. Click on the Show Solution button. This will show you the summary of objective function and constraints, the initial tableau and the tableau and basic feasible solution for each iteration of the algorithm. In each iteration, the row and column that it pivoted is highlighted.
   Note: The tableaus are expected to be horizontally long. Scroll to the right to see the rest of the tableau.

C. Polynomial Regression

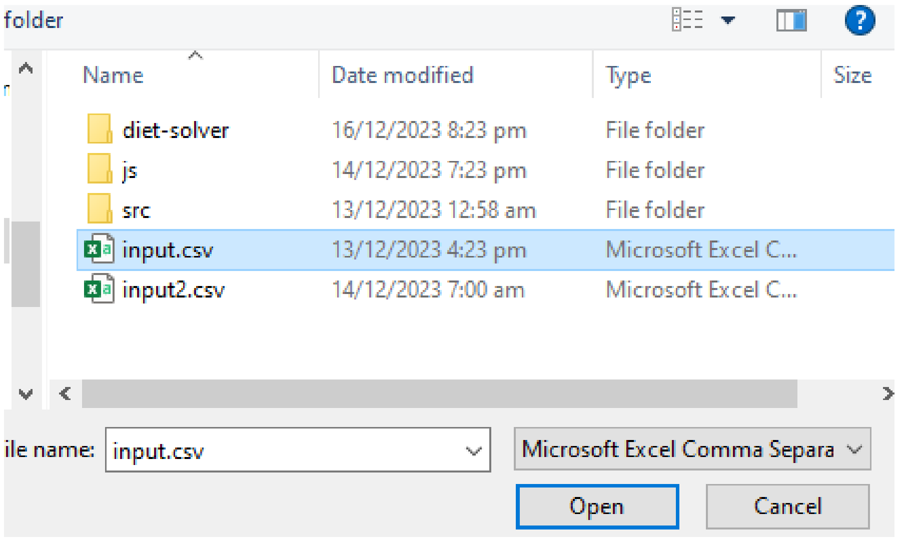
To go to the polynomial regression calculator, click on the Polynomial Regression text on the navigation bar.



1. Click on the Upload CSV File text.



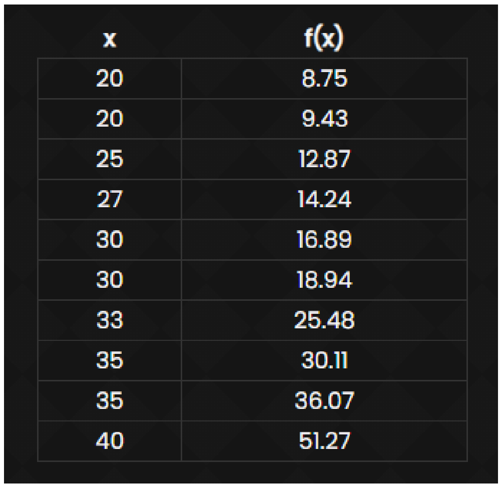
It will open the file system manager. Select the appropriate `.csv` file. *(To know which `.csv` files are appropriate* ***see Section II.A.2****.)*



Name	Date modified	Type	Size
diet-solver	16/12/2023 8:23 pm	File folder	
js	14/12/2023 7:23 pm	File folder	
src	13/12/2023 12:58 am	File folder	
input.csv	13/12/2023 4:23 pm	Microsoft Excel C...	
input2.csv	14/12/2023 7:00 am	Microsoft Excel C...	

File name: input.csv — Microsoft Excel Comma Separa

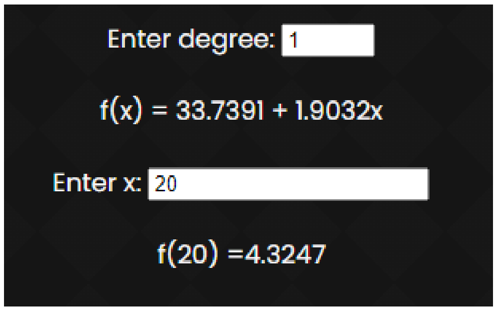
2. The table of x and f(x) values should be displayed.



x	f(x)
20	8.75
20	9.43
25	12.87
27	14.24
30	16.89
30	18.94
33	25.48
35	30.11
35	36.07
40	51.27

Note: The program automatically sorts the data points by x-value in non-descending order. In cases where x-values are equal, it will be sorted by f(x)-value in non-descending order.

Moreover, the initial values for the regression polynomial and estimate at specified x-value are displayed. By default, the degree is initialized to 1 and the x-value is initialized to the lowest x-value in the data points.



Enter degree: 1

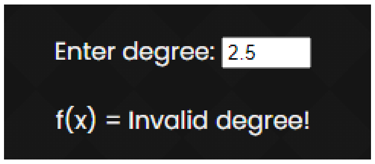
f(x) = 33.7391 + 1.9032x

Enter x: 20

f(20) =4.3247

3. You can set the degree of desired regression polynomial and value of x to estimate f(x) at in the input fields. The valid value for the degree is an integer from 0 to `number of points - 1`.

If the set degree is not valid, it should display `Invalid Degree!`

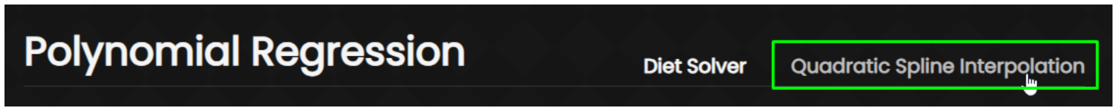


Enter degree: 2.5

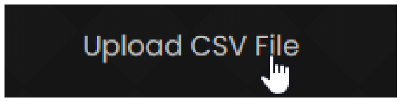
f(x) = Invalid degree!

D. Quadratic Spline Interpolation.

To go to the quadratic spline interpolation calculator, click on the Quadratic Spine Interpolation text on the navigation bar.

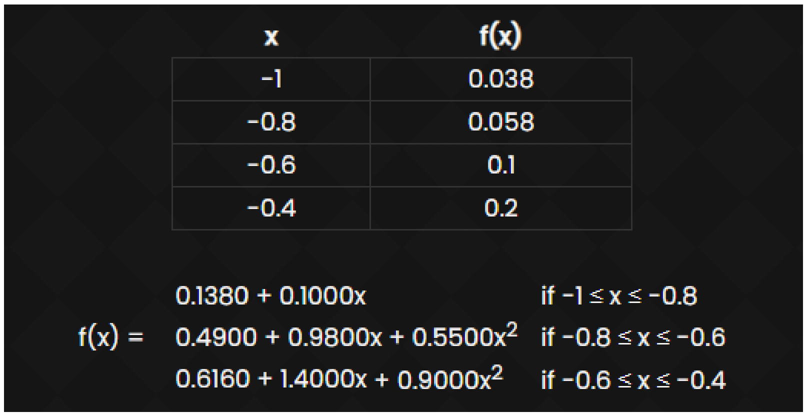


1. Click on the Upload CSV File text.



It will open the file system manager. Select the appropriate `.csv` file. *(To know which* `.csv` *files are appropriate* ***see Section II.A.2****.)*

2. The program should display the table of x and f(x) values and the interpolating functions for each interval.

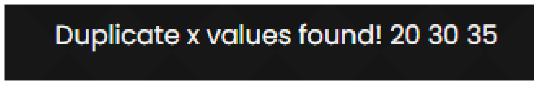


x	f(x)
-1	0.038
-0.8	0.058
-0.6	0.1
-0.4	0.2

$$f(x) = \begin{cases} 0.1380 + 0.1000x & \text{if } -1 \le x \le -0.8 \\ 0.4900 + 0.9800x + 0.5500x^2 & \text{if } -0.8 \le x \le -0.6 \\ 0.6160 + 1.4000x + 0.9000x^2 & \text{if } -0.6 \le x \le -0.4 \end{cases}$$

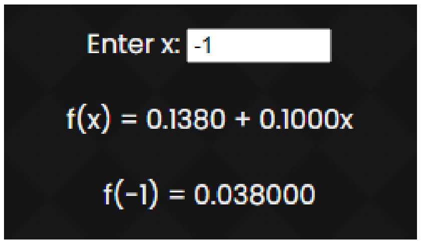
Note: The program automatically sorts the data points by x-value in non-descending order. In cases where x-values are equal, it will be sorted by f(x)-value in non-descending order.

Quadratic spline interpolation requires the x values to be unique. If this isn't the case, then the program should display an error and list the repeated x values.



Duplicate x values found! 20 30 35

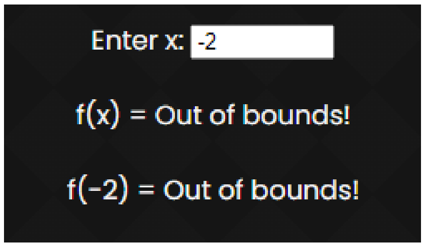
3. You can set the x-value to estimate at in the input field. By default, it will be initialized to the lowest x-value in the data points. The program should display the appropriate function to use and the estimate at that x-value.


Enter x: -1

f(x) = 0.1380 + 0.1000x

f(-1) = 0.038000

In cases where the set x-value is not bounded by any interval, then it should display `Out of bounds!`


Enter x: -2

f(x) = Out of bounds!

f(-2) = Out of bounds!

III. Feedback

For recommendations and feedback:

1. Feel free to email me at `rddimaano2@up.edu.ph`.
2. The Github repository is at https://github.com/ashyphrodite/diet-solver. Feel free to make a pull request.