User Manual

For the Normal Distribution Graph Application

By William Baker

Contents

Introduction

This user manual will cover what the Normal Distribution Graph webpage is, and how to use it. The webpage is a web-based application designed as a graphical, interactive way of viewing a Normal Distribution Graph. It is designed for anyone doing mathematics covering the normal distribution topic. This includes teachers as well as students, as a way to gain first-hand experience of what the Normal Distribution is, or a way of teaching it to others. They are also able to access the application themselves and use it. (This user manual is valid for both teachers and students' use). Figure 1 shows what the user is expected to see when loading the application.
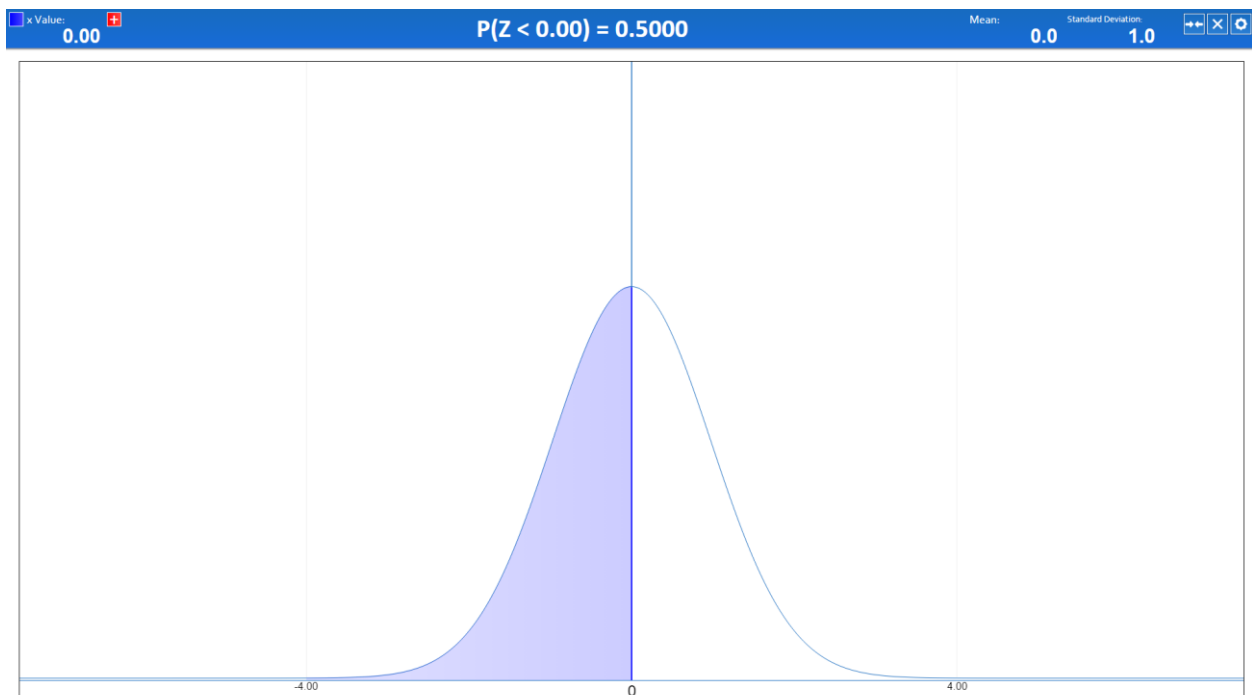

Figure 1. Interface for the webpage

Appendix
Section Two

Installation and Requirements

To be able to run this application a web browser, such as Google Chrome, and an internet connection is required. It must be able to recognise HTML5.

To view the webpage the URL, http://wjbaker.com/project/normal-distribution-graph/normal-distribution-graph.php must be entered into the address bar of the web browser. Nothing else is needed to be installed onto the computer to be able to use the application as everything is web-based.
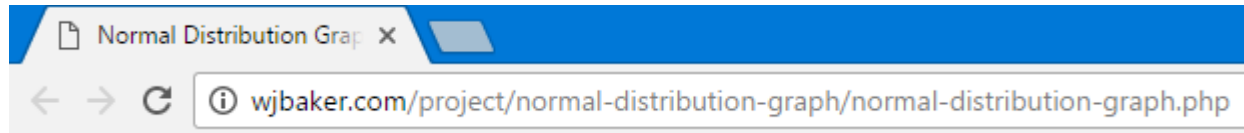

Figure 2. URL of the webpage entered into the address bar of the web browser

Usage

Changing z values of the lines

To change the z values of the lines you can drag the lines that are visible on the graph. The cursor will change to a double ended arrow when it is moved over a line, when this happens the line is able to be moved. This will move them to the horizontal position of the cursor and as long as the cursor is in the boundaries of the graph the position and z value of the line will change.
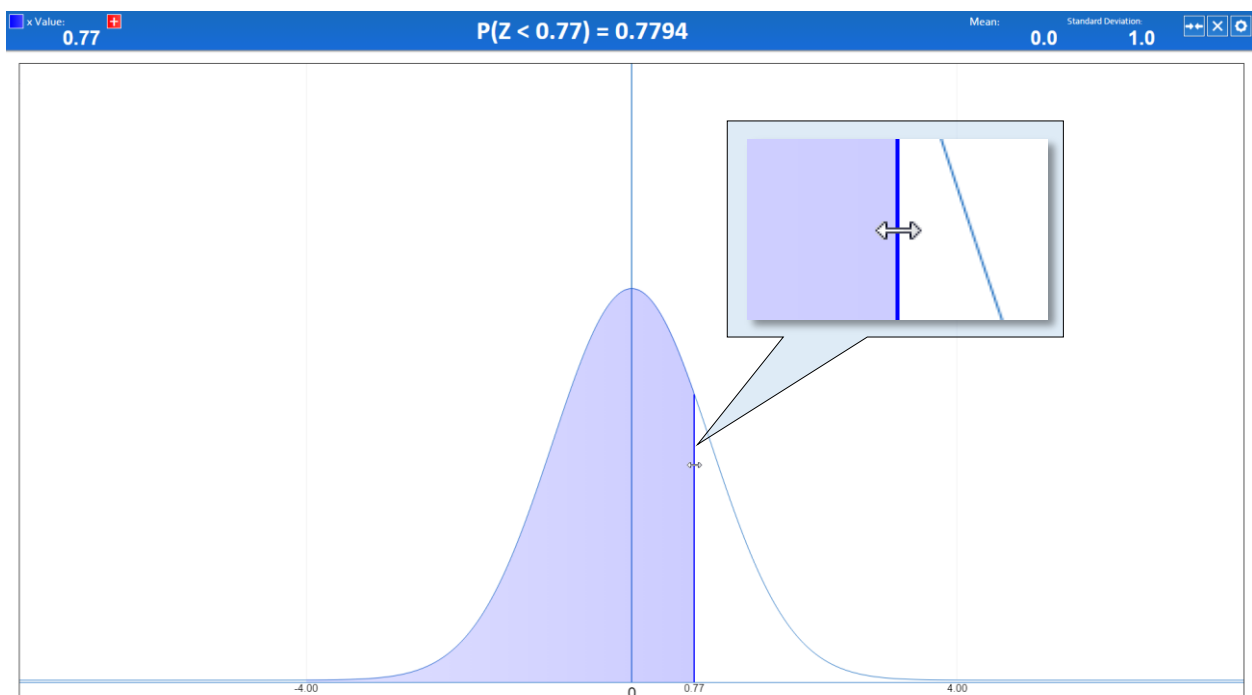
Figure 3. When dragging the line the cursor changes

Alternatively you are able to enter a value into the textbox. When the enter key is pressed the graph will update with the new value. An animation will play which may take a few seconds to complete, the lines will not be able to be moved with the cursor whilst this is happening.

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## Changing the Mean and Standard Deviation of the graph

To change the mean or standard deviation of the graph, you must enter the value you wish to use into the textboxes labelled as "Mean" or "Standard Deviation". For the mean, a value between 0 and 100 inclusive must be entered to be valid and for the standard deviation a value of 0.1 to 100 must be entered to be valid. Figure 4 shows what the interface will look like once you have changed the values.

Figure 4. The textboxes with updated Mean and Standard Deviation

Calculating the Probability

The probability is outputted at the centre-top of the screen. This will change automatically when the x value, secondary line, mean or standard deviation is changed. Figure 5 shows the interface showing the probability.
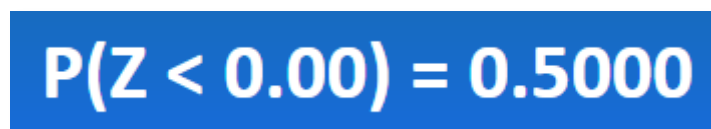
Figure 5. Interface showing the probability

Graph Control Buttons

There are 3 buttons on the top-right corner of the screen. From left to right they are: the change direction button, reset button and the toggle toolbar button. Figure 6 shows what these buttons look like.

Figure 6. Change direction button, Reset button and toolbar button

The graph direction button will change the direction of the area being calculated. By default the graph direction will be from left to right or, if the secondary line is visible, between the lines. When clicked the shaded region on the graph will change to display where the probability is being calculated from, either right to left or outside of the lines, if the secondary line is visible.
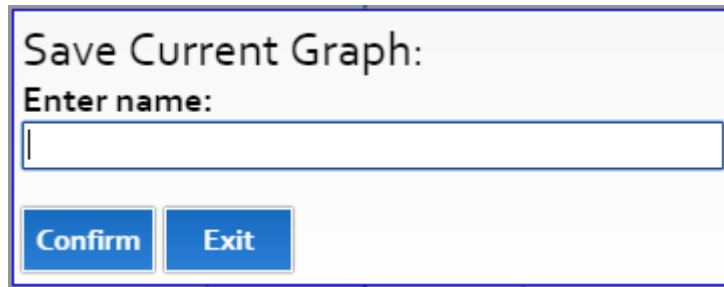
The graph reset button will sets all values to their default value, as though the webpage had just been loaded. The default values will be:

Default Line x Value	0.00
Default Line Position	0
Secondary Line x Value	0.00
Secondary Line Position	0
Secondary Line Visible	No
Graph Mean	0.0
Graph Standard Deviation	1.0
Graph Direction	Normal (Left to Right)

The toolbar button will toggle the visibility of the toolbar. If the toolbar is visible and the button is pressed the toolbar will disappear, whereas if the toolbar is not visible and the button is pressed, the toolbar will appear.

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Saving the Graph

To save the current graph open the toolbar and click on the "Save" button. This should open the Save screen.
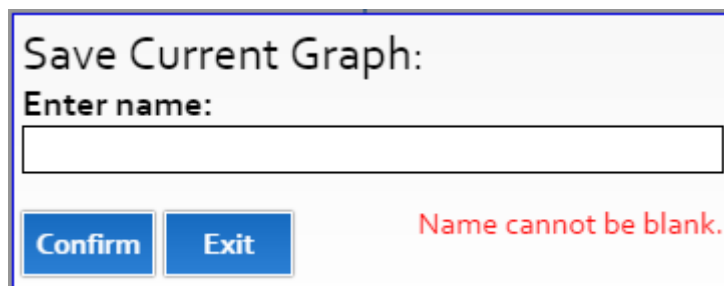

Figure 7. The save screen

The save screen contains 2 buttons and a textbox. The textbox is where the name of the graph will be, and this will be what is displayed when loaded in the load screen.

The confirm button will complete the process of saving the graph. A loading icon will appear, showing that the request is currently being processed. Once it has completed the save screen will disappear where the graph will be able to be changed again. If there is an error, for example if the textbox is blank, a red message will be displayed on the bottom right corner of the save screen (Such as in Figure 8).
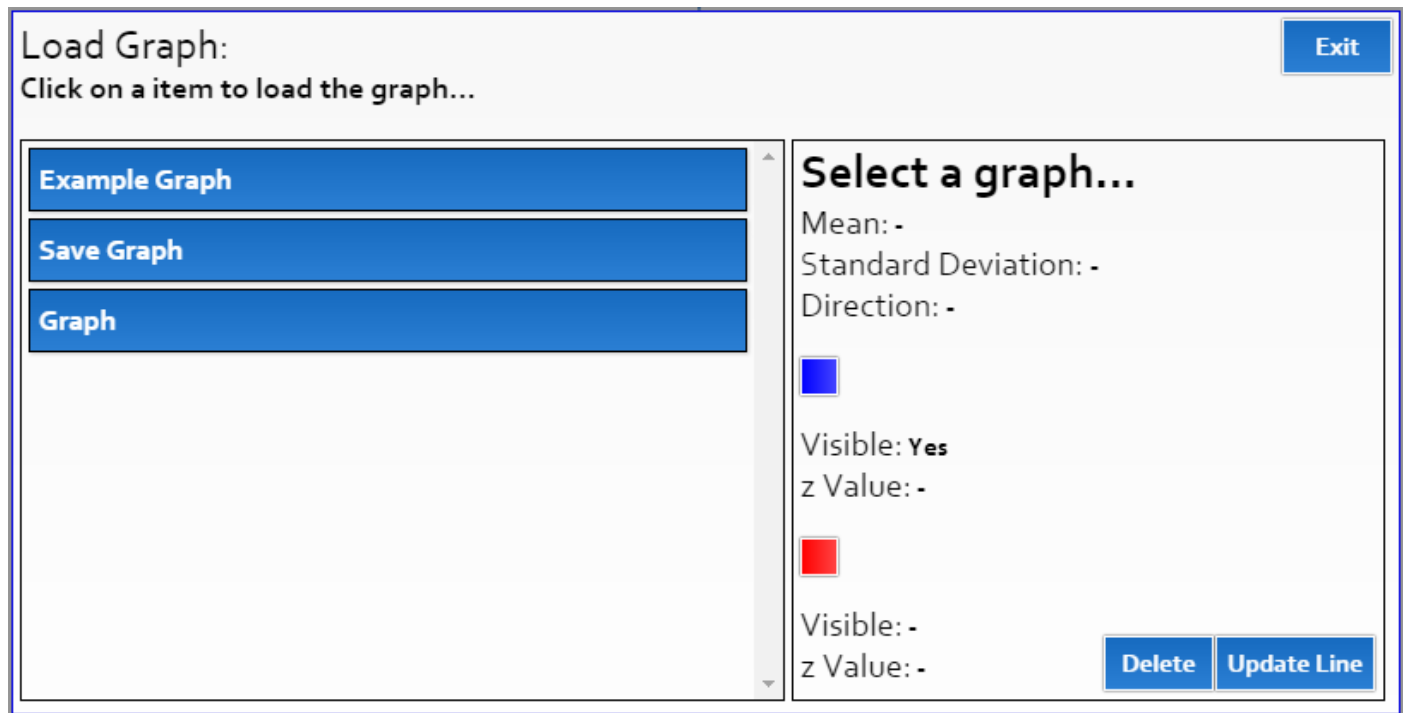

Figure 8. Error message being displayed because the textbox is blank

If another error occurs, a similar message will be displayed.

When the "Exit" button is clicked the save screen will disappear allowing the graph to be changed again.

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Loading a Graph

To load a graph open the toolbar and click on the "Load Graph" button. This should open the load screen.

Figure 9. The load screen

The screen consists of 3 main buttons.

To load a graph and replace the current graph, click on the "Update Line" graph. This will load the currently selected graph. If no graph is selected no action will be taken.

The "Exit" button will close the load screen allowing the graph to be changed again.

To select a graph to update or delete, click on one of the items in the list on the left side of the load screen. This will display all of the attributes of the graph on the right side of the load screen.

To delete the selected graph, click on the "Delete" button. This will remove the graph from the list and will not show up anymore when the load screen is opened.

Viewing the Probability Table Webpage

To navigate to the probability table webpage, you open the toolbar and click on the "Normal Distribution Table" button. This will navigate to a different webpage.

Figure 10. Interface for the Normal Distribution Probability Table webpage

Searching for a z value

Enter text into the textbox with the label of "Search z value". This will only show z values that start with the inputted text in the table below.

Figure 11. Table showing result for "0.1" z value

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Searching for a probability

Enter text into the textbox with the label of "Search z value". This will only show z values that start with the inputted text in the table below.

The Normal Distribution Probability Table

Return to graph...

Search z Value	0.5

z Value:	Probability:
0.00	0.5000
0.01	0.5040
0.02	0.5080
0.03	0.5120
0.04	0.5160
0.05	0.5199
0.06	0.5239
0.07	0.5279
0.08	0.5319
0.09	0.5359
0.10	0.5398
0.11	0.5438
0.12	0.5478
0.13	0.5517
0.14	0.5557
0.15	0.5596
0.16	0.5636
0.17	0.5675
0.18	0.5714
0.19	0.5753
0.20	0.5793
0.21	0.5832
0.22	0.5871
0.23	0.5910
0.24	0.5948
0.25	0.5987

Graph Values:	Standardized z Value:
Mean:	
0.0	
Standard Deviation:	
1.0	
x Value:	
0.00	0.00

Figure 12. Table showing results for "0.5" probability

Standardising z values

There are 3 textboxes which store the mean and standard deviation of the graph and the x value. With these values you are able to calculate the standardized version of the x value. The equation for this calculation is defined as:

$$z = \frac{x - \mu}{\sigma}$$

If an invalid input is entered, such as a letter, then it will not be accepted and the previous valid value will be displayed.

Graph Values:	Standardized z Value:
Mean:	
5.0	
Standard Deviation:	
23.0	
x Value:	
44.00	1.70

Figure 13. Changing the values of the textboxes to display the standardized z value

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Limitations

All inputs have a boundary of values you can enter. The mean must be a value between 0 and 100, and the standard deviation must be between 0.1 and 100. If a value outside of this range is entered the program will return to a previous valid input. The x value is dependent on the mean and standard deviation. There is a minimum and maximum point on the graph. The x value must be between these values, otherwise it will also return to a previous valid input.

To view the webpage you must have an internet connection, however if the files are downloaded onto the user's computer they are able to use the application offline, however they would not be able to connect to the database as there must be an internet connection.

Another limitation is that the graph is not 100% accurate because the equation used to find the probability is very complex, which the computer will not be able to calculate. As a result the probability is an approximation of a set list of predetermined values. As a result you are not able to enter an exact z/x value and the probability will be a rough estimate of the actual probability.

This application is to calculate the probability of Normal Distribution. It does not utilise the Poisson or Binomial Distribution to calculate probabilities.

Backups

This program does not make backups of the data stored in the database. The data is not very important and acts as an extra layer for the application to be able to do. The data is of saved graphs which can easily be replicated manually if the saved graphs are unable to be viewed.