Probabilistic Nomograms User Evaluation

Thank you for participating in my survey for my fourth year project / dissertation.

This user evaluation aims to test an application that creates interactive visualisations of nomograms, which may have probability distributions representing one or more axes, to provide evidence regarding its effectiveness and ease of use and to gather feedback.

As this program was designed for anyone interested in nomograms or someone who might not have heard of it beforehand, user testing will be necessary to produce an impartial usability evaluation.

This evaluation will go in the following steps:

1) You will be asked to convert an existing nomogram which does not involve any probability distributions into machine-readable format through a Python Tkinter application and interact with it.

2) You will be asked to complete a questionnaire regarding your experience.

The results will be stored anonymously, using Microsoft Forms, with results stored on the University of Glasgow account of the survey creator. Only data requested in this form will be stored.

No personally identifiable information will be collected.

Your participation is entirely voluntary. If you are doing this experiment in the physical or virtual presence of the survey creator you are free to ask questions.

This survey adheres to all ethical guidelines required by the School of Computing Science at the University of Glasgow.

Please remember that it is the system, not you, that is being evaluated.

You are welcome to withdraw from the experiment at any time. If you do so, then it will not be possible for you to be debriefed about the purposes of the experiment.

For further information or to raise a concern, please contact:

Program / Survey creator: Barkin Bryce, 2452842b@student.gla.ac.uk

Project advisor: Dr John Williamson
https://www.gla.ac.uk/schools/computing/staff/johnwilliamson/

You can contact the chair of the University of Glasgow School of Computing Science Ethics Committee

1

Do you consent to taking place in this user survey? *

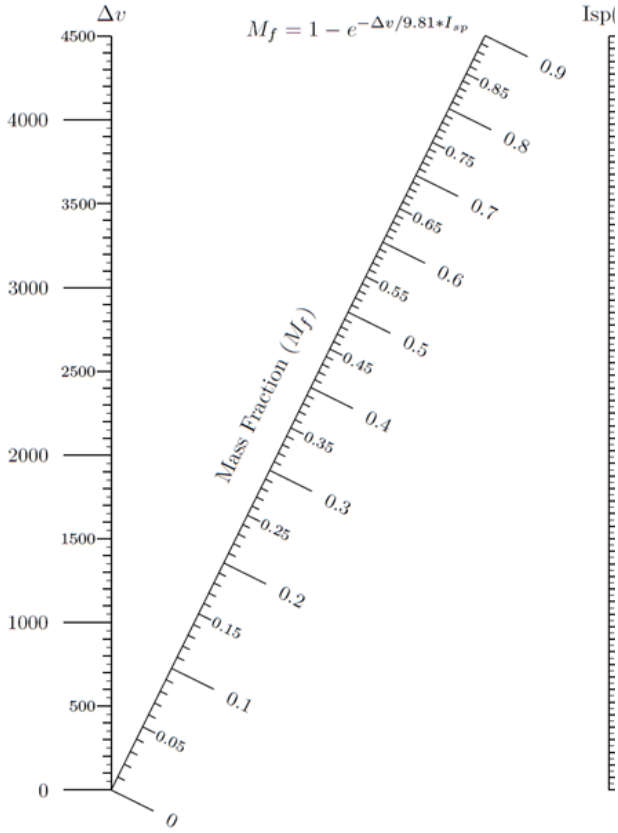
- ◯ Yes
- ◯ No

2

Are you above the age of sixteen? *

- ◯ Yes
- ◯ No

Background on Nomograms



Before the invention of scientific calculators and computers, nomograms were used to quickly calculate the value of a missing value in a mathematical formula.

Nomograms, also known as alignment charts, are graphical instruments designed to calculate the value of a missing parameter in a mathematical calculation by extending a thread or straightedge along a graph to find the point of interception with the axes of the missing variable.

3

How often do you use applications or software for data visualization purposes?

- ◯ Daily
- ◯ Weekly
- ◯ Monthly
- ◯ Yearly

4

Is this the first time you have heard of what a nomogram is? *

- ◯ Yes
- ◯ No

Task one: Creating a Digital Representation of the

5

How well were you able to create an accurate representation of the nomogram on the canvas? *

- Extremely well
- Somewhat well
- Neutral
- Somewhat not well
- Extremely not well

6

How many axis measurements/yellow points did you need to add to get an accurate representation of the first axis (height)? *

7

How many axis measurements did you need to add to get an accurate representation of the second axis(BMI)? *

8

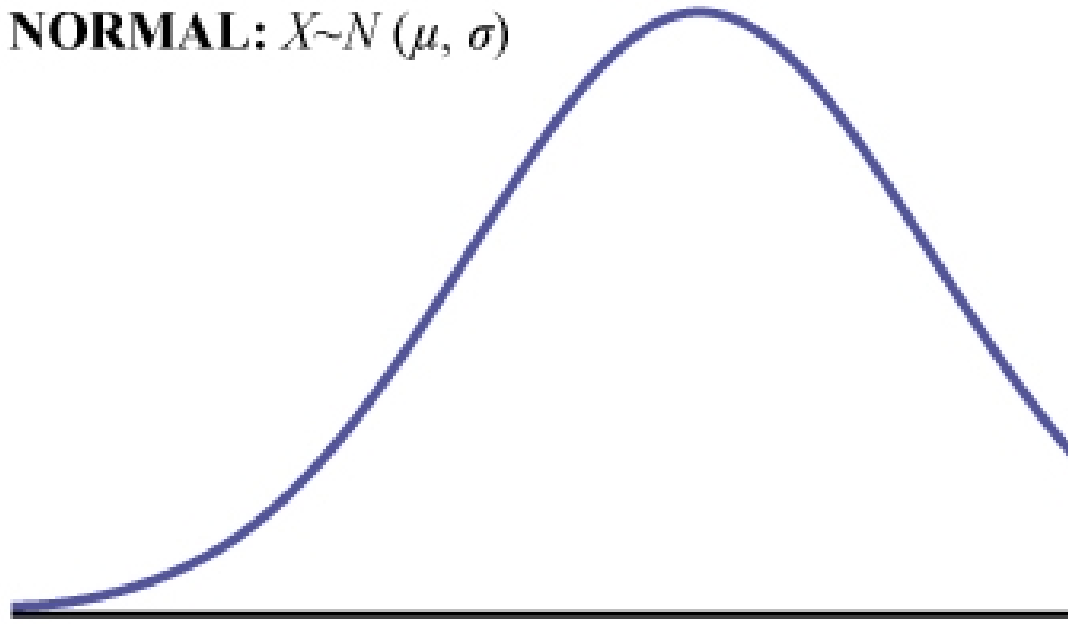
How many axis measurements did you need to add to get an accurate representation of the third axis(weight)? *

9

If you had any other difficulties while creating a digital representation of the nomogram, please explain them here. *

Probabilistic Distributions

Probability distributions can take many shapes and forms and represent the probability of an event occurring. In the case of a nomogram, a value can be represented by a probability distribution, such as the Normal distribution, by a bell curve. The higher the probability at a given point, the more likely a value will equal it.



Task two: Adding a Distribution to the Axis

The body mass index was chosen for this user survey as it is a well known calculation. The purpose of this step is to draw a probability distribution to represent each value instead of a fixed value if you were to be in a situation where you did not know what the height or weight of a person is, and to make a reasonable guess.

For height, please insert a normal distribution by typing Normal(175,7.5) into the text field, ensuring that you have the height axis selected. Then press 'Save Distribution'.

After you have added a distribution, it will visualise the probability density or mass function on the axis.

For weight, please insert a normal distribution by typing Normal(68,10) into the text field, ensuring that you have the weight axis selected. Then press 'Save Distribution'.

Now, you can click on the "Create Isopleth" button and interact with the nomogram.

10

Can you identify the probability density or mass function on the axis? *

- ◯ Yes
- ◯ No

11

How well were you able to interact with the isopleth and see statistical information ? *

- Extremely well
- Somewhat well
- Neutral
- Somewhat not well
- Extremely not well

12

Do you see yourself using nomograms to create interactive visualisations of calculations you make frequently? *

- Yes
- No

13

Which calculations do you see nomograms useful to make? *

14

What features or functionalities do you think could be improved or added to enhance the application's usability?

15

Did you encounter any technical issues or bugs while using the application? If yes, please describe.

Ethics Debrief

Do you have any questions relating to the program or the experiment?

If you would like to discuss the project at any time, we can be contacted at,

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You can contact the chair of the University of Glasgow School of Computing Science Ethics Committee for any other query Matthew.Chalmers@glasgow.ac.uk

Thank you for your participation.