User Experience in Educational Technologies

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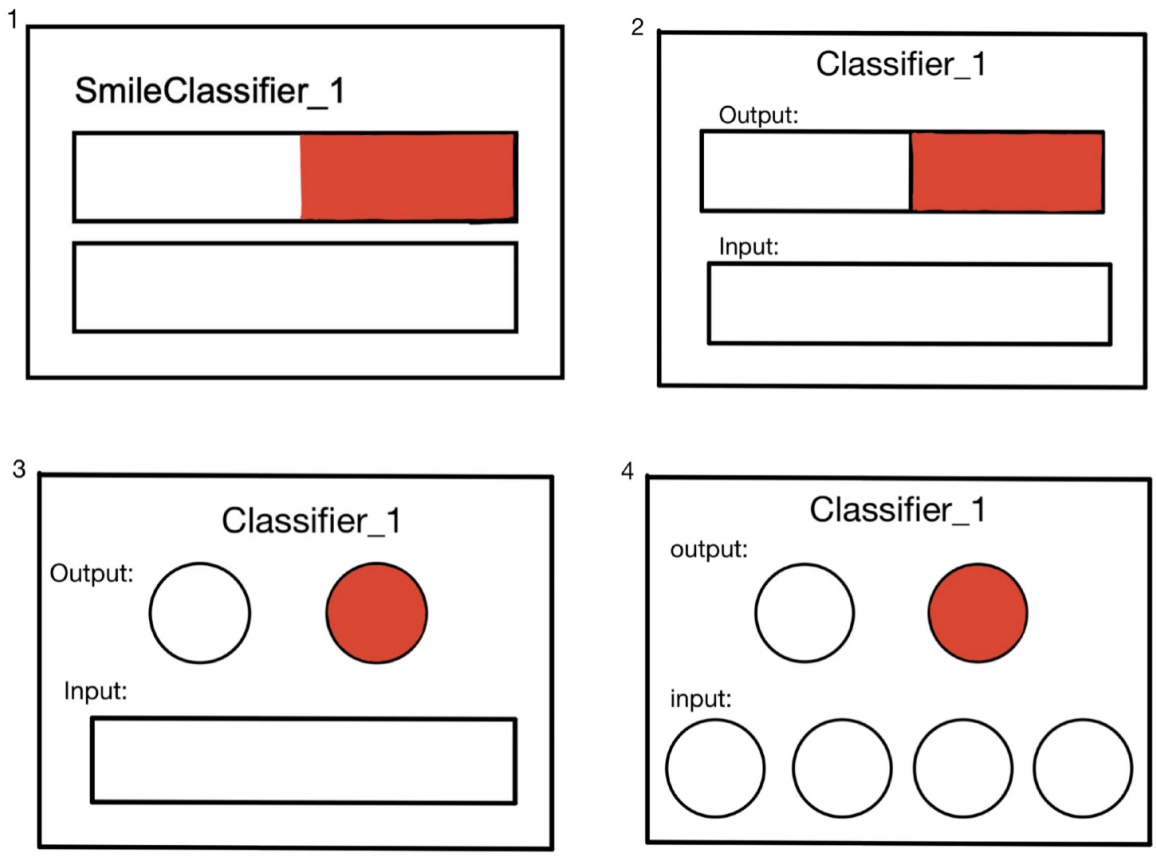
Introduction

Education derives from many different forms such as a teacher to online courses. Learning, in general, is important, but finding ways to make learning simpler and easier is just as essential. Educational technologies are more apparent now than ever due to the advancements in digital technology. There are many different types of educational technologies that are made not only to facilitate learning but also to inculcate scientific learning. Specifically, Simbrain is an educational tool for analyzing neural networks through computer simulations. There are a variety of simulations Simbrain can run but this study will focus on the Smile Classifier simulation using a split experiment design to test the optimal display of a binary classifier.

Methods

In this paper, researchers will attempt to find the optimal display for binary classifiers to show a neuron turning on. The study will use a survey-based method that will ask participants to rank from the provided drawings of binary classifiers, which is more intuitive and best represents a neuron turning on. The subjects participating in the survey are undergraduate and graduate students from the University of California, Merced.

The specific feature used in Simbrain for this study is the Smile Classifier. The Simbrain Smile Classifier, when connected to a neuron collection, creates a diagonal matrix. Within the Smile Classifier, it has two sections. One is an input section that just reproduces the weights from the neuron collections and an output that reflects what group the trained classifier belongs to. The neurons in the classifier represent on or off. For example, if the neuron turns red on the right side, the classification for the set is (0,1) and if it turns red on the left-hand side, the classification is (-1,0). This study will focus on the specific display methods of the trained classifier and determining which representation best suits intuitive learning. Participants will be displayed with the following images.



The first image is the graphics in Simbrain currently, the following are different ways to display or simulate the neurons turning on. The remaining graphics were inspired by material.io website. The subjects will not know one of the designs is already placed in Simbrain. As mentioned previously, the study is focusing on the output section of the Smile Classifier.

Before participants are given the survey, they will receive some background of what they are looking at. Some participants may or may not know what neural networks are and how they can be used to simulate neuron connectivity. Each participant will get an overview of the topic and after looking at all the designs before they can rank each design. After looking at the images, and ranking the best from worst graphics in order. Additionally, the subjects will answer a few demographic questions and if they had prior experience in user design.

Anticipated Results

Based on the survey rankings, the majority of participants picked the second image. In comparison to the image already instilled in Simbrain, the second graphic has labels that helped subjects further understand the connection of the neuron collection and the Smile Classifier. Further, the Smile Classifier has two rectangular boxes which are the input and output boxes but

the input box can vary depending on the number of nodes in the neuron collection. But with the output, there is not much room for variation. The second image puts a line going down the middle of the output box since there are only two possible outcomes (0,1) or (-1,0). Adding the line possibility clarifies the classification of the neurons.

The second most ranked graphic was the third image that has the rectangular box as inputs and has circular nodes as output. Since the classifier was representing if a neuron was on or off, having a circular graphic could have helped participants understand since they associated neurons with nodes.

Conclusion

In conclusion, there are small changes researchers can make to different educational technologies that can improve understanding. The Smile Classifier was an example of how changing a few aspects can help with more intuitive learning. The different shapes can convey or be associated with different aspects of the simulation and having participants rank them, helped to see how they interpreted the graphics of the simulation. Although the graphics aren't the purpose of the simulation itself, it can be seen that user experience is an important part of educational technologies.

References

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