Thesis Portfolio

Utilizing Multi-threading in order to Optimize Processing

(Technical Report)

An Analysis of Social Factors in High Stress Situations

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

For the technical/capstone portion of this thesis, a project was worked on to make some substantial, modern updates to an existing program. These updates included, making the program utilize multiple CPU threads and run multiple requests concurrently and updating the interface so that once the program is used in UVA's Rivanna servers, it can more easily divide up tasks to different computing nodes. The program itself is a modified Dijkstra's algorithm that takes in map data from Google and determines all the different possible paths one can take via different transportation methods. It is to be used for research purposes to determine evacuation routes during emergencies. The STS research thesis explored the idea of people trusting an algorithm, specifically during high-stress, high-risk situations. This was done by examining human behavior in disasters and other emergency situations, ethical responses during the same situations, and looking at the social groups that were involved.

The use of the program was the inspiration for the thesis. It was interesting to see how something that was taught in one of the introductory level Computer Science courses be used in such a manner. Alongside that, one of the main topics of the STS 4500 course was how social factors impacted technology. Because of the nature of the program being used in evacuation situations, a question was brought up on whether or not people would even listen to the directions produced by the algorithm. Another inspiration was the growing trend of people's distrust in technology and science in general, most notably seen in areas such as climate change and artificial intelligence. Because of this trend, an early speculation was formed where it was thought to be more likely that people would fall into mass hysteria and completely ignore the results and findings of an algorithm. These questions and presumptions led to the thesis that is presented in this paper.