Thesis Project Portfolio

CGI Internship: Refining an Old Database through Rule-based and Decision-based Cleaning

(Technical Report)

Augmented Reality: A Growing Technology with Risks and Rewards

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

(Executive Summary)

A Necessity to Overhaul Systems Proactively

According to the World Health Organization (WHO) there are 21 million people worldwide that are affected by Schizophrenia, and one in every two schizophrenia-afflicted subjects does not receive care for the disease. Schizophrenia is one of many mental illnesses that influeces an individual's day to day life. The issue of mental health has become a commonplace issue within American society and solutions to mental health are scarce. Not to mention the treatments that do exist for schizophrenia still have side effects such as medications with serious side effects. Schizophrenia is one of many psychological disorders that plague many people while having few options. My STS research topic focuses on a possible solution to this issue in the new technology of augmented reality. In my research, I came to the conclusion that augmented reality has a strong potential to become a useful tool for society to use in order to help cure mental disorders, but currently it lacks a strong societal momentum that will cause it to become widely used. I proposed that once a strong societal appreciation or usage of augmented reality in mental health would cause it to become widespread in treating mental health disorders because augmented reality has shown to have positive results in treating mental disorders, such as schizophrenia, in a non-invasive way. My technological project on the other hand did not focus on schizophrenia or augmented reality, but instead focused on various techniques, such as machine learning or SQL statements, to clean a database.

The technical portion of my thesis focused on cleaning an old database that was not well-maintained. My team was tasked with data cleansing, through two methods: decision-based cleaning (machine learning and AI algorithms) and rule-based cleaning (database queries and conditional restraints). Our solution utilized a variety of databases (SQLite3 and Postgres), AWS, sagemaker, Microsoft teams for communication, CSV files, gitlabs, and machine learning and AI algorithms. My task was to create scripts that inserted the contents of CSV files to SQLite3 or postgres databases, based on certain rules from the client. We achieved a certain confidence level by first using a rule-based process to filter the easier conditions, and then using the ML and AI algorithms to address the harder entries. Future work could be directed towards improving the confidence levels of the AI/ML algorithms, as well as improving ways the rule-based team can perform null detection based on SQL queries and other conditions.

In my STS research, I wanted to find a medical issue that could possibly have a CS solution to it and came across this intersection with mental health and augmented reality. I originally was confused as to why augmented reality seemed to not be as useful in trying to solve the mental health issues that many encounter but gained a better understanding through Thomas P. Hughes framework called technological momentum. This framework states that a technology cannot truly flourish without the proper infrastructure or conditions to support it. For instance, the development of phones was an amazing accomplishment that changed the way people communicated. However, it wasn't as revolutionary when it first emerged since very few people

had phones due to its cost and lack of infrastructure. I came to the conclusion that augmented reality fits this framework since it has a strong potential to be a revolutionary technology in the field of mental health but currently lacks the infrastructure to support it. Some of these issues include the cost implications and the equipment necessary to find widespread usage in hospitals across the country.

I learned from my STS research project that in order for a technology to gain usage it must be able to solve the problem and must also have the necessary resource and infrastructure to support such a change to society. From my technical research I realized that overhauling an old database for misinputs can be hard from a technical point of view, but is also frustrating to know that there were people who did not take into consideration the amount created from their laziness. While researching both of these projects I realized that systems are extremely hard to improve even if something beneficial could arise from such a change. I realized this when I thought about how much mental health treatments could be improved just by introducing augmented reality as a widespread option in clinics, and how databases wouldn't need complex machine learning solutions if the database was well maintained from the beginning. Hopefully through my research I can help raise awareness of the importance of trying to improve systems based on the benefits rather than trying to act when the problem becomes too out of hand.