Thesis Portfolio

Analysis of Endocrine Interactions and Sex Differences Via Tissue Pair Gene Expression Correlations

(Technical Report)

The Aftermath of The Snowden Leaks and Its Impact on Big Data: A Look at How Stakeholder Perspectives Influence a Technology's Application

(STS Research Paper)

An Undergraduate Thesis

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In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Department of Biomedical Engineering

Sociotechnical Synthesis

The technical report of this STS portfolio will discuss the capstone project of a group of biomedical engineering undergraduate students. The objective of this project was to design an R package that would perform gene expression correlations to identify inter-tissue interactions in the endocrine system, with the hopes of applying this same R package in the analysis of endocrine interaction differences between human males and females. Understanding the physiology of these two systems and how they differ has yet to be extensively researched. As such, this group of students hopes to equip the scientific community with a bioinformatical tool that will assist future studies. This technical portion presents the results of utilizing their R package, as well as one example of the novel findings that resulted from the analysis.

The STS paper in this portfolio covers the case of Edward Snowden, an American national responsible for the revelation of privacy breaches by the National Security Agency (NSA) of the United States. This ordeal is examined through the use of the Social Construction of Technology (SCOT) theory, a framework used by social scientists to discuss the relationship between technology and society. Specifically, SCOT argues that society is what influences technology. This is articulated by decomposing society into four components that elucidate how a technology and its iterations are impacted by society. The STS paper applies SCOT to the Snowden v. NSA case and identifies the key stakeholders, their values, and why it's important for scientists to remain aware these dynamics in similar situations that involve technologies that utilize personal information.

The connection between the works presented are the ethical concerns surrounding the use of personal information in the field of data science. Work in this field relies on the use of an individual's information, as seen in the technical report. This has the potential to create an

unbalanced dynamic, like the one presented in the thesis, where one group has limitless access to the information of another. It is important for scientists and researchers to consider this power imbalance when creating new technologies that are based on information collected from individuals. Due to the infancy of this field, rules and frameworks have yet to be concretely developed. As such, it is important to understand and consider previous instances of privacy violations when crafting a new iteration of this kind of technology.