Thesis Portfolio

Plastic Waste Awareness Mobile Application
(Technical Report)

Understanding the socio-political causes and effects of bias in data
(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

Elias Haddad
Spring, 2021

Department of Computer Science

Table of Contents

Sociotechnical Synthesis

As we increasingly become more data reliant, data increasingly establishes an important role in our life. This motivated my research question to ask what are the causes and effects of biased data in systems and applications. The current understanding in the field is that bias usually occurs during the beginning of the data lifecycle from possible underlying political, religious, or social biases that social actors may have that affect their judgment towards bias. It is also known that outliers and missing data in datasets can offset the other values creating bias, however, different solutions to this issue are simple and applied normally. An example of a possible solution would be to delete outlier values and fill missing values with the average of their respective columns. Even though it is best practice to conduct a validation step before the data gets processed, as we have seen, that is not always effective in detecting and eliminating harmful bias. Therefore I concentrated on building a framework around the general data lifecycle as a result of my findings during the past few weeks. This allows social actors to follow my framework for every step of the data lifecycle and ideally prevent bias from entering the system.

As for my technical portion of my research, I am teaming up with a team of the Earth Ambassadors to develop a cross-platform mobile application for primary level students in Jamaica, which ranges from ages 7 to 9, to learn about the effects of plastics on the environment. The application is meant not only to inform students but also allows the students to integrate safe plastic decisions into their daily lives. To do this we have created an activities tab in the app that allows students to participate in fun and educational activities regarding plastic. We also intend to add a feature that allows students to take pictures of areas where garbage needs to be picked up and that picture will get its GPS coordinates geolocated on a map that allows other users to see

where the garbage areas are. This mobile application is developed in React Native with a Firebase database integration.

“The technical and STS theses are not related”