Thesis Project Portfolio

Developing Models to Predict Giving Behavior of Nonprofit Donors

(Technical Report)

Donor Mining as a Socio-technical System and the Ethics of Using It In Competition Amongst Nonprofit Organizations

(STS Research Paper)

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Sociotechnical Synthesis

As the nonprofit sector grows more competitive each year, organizations have started to incorporate data mining techniques into their development strategies. As a relatively new technology, many nonprofits are still relying solely on traditional data analysis techniques, and are potentially losing out on the benefits that data mining (a combination of traditional analysis, AI, machine learning, and statistical analysis) can provide. One such nonprofit is the Children's Inn (CIN) at the National Institute of Health (NIH), an organization that is a "place like home" for children undergoing experimental treatments at the NIH, along with their families. As CIN fights for funding in their competitive space, it is crucial to both retain current donors as well as attract new donors. In performing this technical work for CIN, it became apparent how expensive data mining can be if a nonprofit outsources this work. Many do not have the resources within the organization to perform the work themselves, and the companies that do perform this work are very costly. Therefore, data mining becomes a competitive advantage if used correctly within a nonprofit. My STS work this past year has examined how data mining works in this sector, and if it should be allowed at all given that not all organizations (especially small nonprofits) can afford to perform this work.

In performing research with CIN this past year, our capstone team hopes that we will leave them with models and insights they will continue to be able to use in order to have sufficient income to stay up and running. CIN provides crucial services to the families that stay there, and if CIN were to no longer be active, many families would struggle to afford housing during their children's treatments at NIH. Throughout this past year, my team has built several models that will educate CIN on which donors have the capacity to be larger donors (monetary-wise), as well as donors which may be about to drop off CIN's radar. A large part of our work featured the recency, frequency, and monetary (RFM) metrics. The team adapted these metrics

specifically for CIN, and modeled each donor of CIN as existing in a state made up of these three metrics. The team examined transitions between these states and identified donors with the potential to move up or down in the states, so that CIN can properly allocate its resources towards donors with a high propensity to move states. In addition to this RFM analysis, the team examined how CIN can tailor its acquisitions to increase their return on investment each year.

Our recommendations also include possible future asks of companies that CIN outsources work to in order to obtain the best results possible from those groups (such as a company that is in charge of sending out acquisition appeals to possible new donors). We also recommended continuing to use the work on RFM state transitions to educate how the CIN employees use their time. Finally, some of the proposed recommendations included future work that could take place, such as exploration of donors that drop or jump states.

Tightly coupled with my technical work, my STS work has been an exploration of the use of data mining in the nonprofit sector as a sociotechnical system, and as a competitive mechanism. I am not arguing for or against its use, my goal is simply to educate others about this new technology being used in a unique field. I examine this technology using the social construction of technology framework in order to examine how society has (and will continue to) play a role in its development. I also explore the ethics of how nonprofits use data mining to compete with one another, looking at this from the lenses of multiple ethical frameworks, including consequentialism and deontology. My goal with this work is to educate nonprofits who are already using data mining or who may be thinking about incorporating it into their strategies, as well as firms who perform data mining, in order to see the bigger picture surrounding this technology.