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Ethics and Professionalism in Data Science

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The use of predictive analytics, big data, machine learning, artificial intelligence, etc., is sweeping through every aspect of our lives in one way or another. Advancements in these fields have been fast and continuous. As new techniques and utilization of big data has become more prevalent, questions about the appropriateness of how and where this information and techniques should be used have arisen. These questions have made the public and institutions think about ethical usage of the technology and data for all industries.

Nowadays it's not hard to find examples of unethical issues in predictive analytics and big data highlighted in the media. It can really make one question how fast-moving technology can have ramifications and effects not fully considered when initially developed. Many of these examples involve privacy issues, profiling of individuals and discrimination.

A good example of privacy issues was highlighted in the case of a father who finds out that his teenage daughter is pregnant thanks to targeted advertising by Target.[1] In this case, the company had started targeted advertising towards pregnant women. The father of the teenager went to the local Target to complain about his daughter receiving these ads, just to call some time later to apologize after learning that his daughter was indeed pregnant.

An example of profiling of individuals and discrimination can be found with the risk assessments produced by software being used across the country in the criminal justice system.[2] This software is used to predict "future criminals" and has been shown to be biased against ethnic groups.

In her book, "Weapons of Math Destruction," Cathy O'Neil[3] describes many ways data analytics can damage peoples' lives and further increase inequality of certain groups of people. She highlights how using predictive models can further marginalize certain populations by using proxies for data that can't directly be measured: For example the use of zip codes as a proxy for race or income. It is an interesting read that demonstrates emerging issues related to the use of predictive models via real-life examples.

In her examples, O'Neil describes how some models can become less transparent and seem like black boxes. This lack of transparency contributes to the inability of individuals to know what data was used to come up with the responses the model's algorithms may produce. It is clear that the lack of transparency offered by some models can potentially hide ethically questionable practices.

After reading many of these examples and O'Neil's book, I started to think about the ramifications predictive models can have. I wanted to learn more about the root of these problems. While doing so, I stumbled across a good study which helps frame the ethical issue problems in a slightly different way. In the study, "Ethical Implications of Big Data Analytics"[4], which is a Delphi study of academic and practitioner experts, the authors categorize big data analytics as a social process. By viewing big data analytics as a social process, the authors segment the different stakeholders into three groups: individuals, organizations and society. This allows one to indicate differences in the roles each of these stakeholders have in the overall process of big data analytics.

The social process of big data analytics is described as follows. Individuals contribute data by using social media, using digital devices (internet-of-things), and having transactions with different organizations. Organizations then try to identify patterns and relationships in the data with monetary goals. The data from the individuals is also shared and sold to data brokers or other aggregators that parse information from possibly many sources. From the societal perspective, big data analytics has introduced new markets and new practices from distinct companies and entities. These innovations and new markets may require some form of regulation in order to protect and maintain fairness amongst all members of society.

Throughout this process, there are many areas in which ethical issues applied to each of the stakeholders can arise. The study goes on and identifies ethical issues associated with the three distinct stakeholder groups. Some of the issues mentioned are privacy issues, algorithmic decision-making with less than optimal data as opposed to human decision-making responsibilities, profiling of individuals by grouping them into cohorts, control and surveillance of individuals by limiting their choices and obtaining their data, and lack of transparency in the analytics value chain since there is an asymmetrical knowledge by different stakeholders.

As the world of predictive analytics and big data invades the insurance industry, it's easy to see how the issues highlighted in the Delphi study just mentioned come into play. This is where being an actuary may be an advantage against many other data analytics practitioners. As members of a U.S. actuarial organization we are bound by well-defined standards of practices (ASOPs) and a professional code of conduct (Code), which we need to uphold.

The American Academy of Actuaries' Big Data Task Force recently released a monograph "Big Data and the Role of the Actuary"[5] that discusses ethical and professional issues for actuaries working within the analytics fields. Every actuary who works or wants to work with predictive analytics should read this document. This document contains a discussion of the effects that big data have on the consumers (individuals), insurers (organizations) and regulators (society). It also provides considerations for actuaries in the use of predictive analytics and data sources. It contains a section on regulatory considerations outlining the benefits and challenges to different stakeholders, framing the existing regulatory environment as well as emerging regulatory developments. The document ends with a section on professionalism, highlighting the code of conduct precepts that are relevant for working with big data analytics and outlines the ASOPs that are applicable.

This monograph acknowledges that when there is demand for new skills evolving from the traditional actuarial practices, a wide range of ethical and professional challenges may emerge. In other words, it provides a reminder that the Code and the ASOPs can guide us through these emerging challenges while we as actuaries continue to acquire new skill sets, allowing us to keep up with emerging technologies. It also remind us of the "look in the mirror" test that is implied in the Code, which means that we should always think about our qualifications based on education and experience and make a judgment about whether we can fulfill our obligations under the code to:

- *"Act honestly, with integrity and competence—perform actuarial services with skill and care (Precept 1); and*

- *Perform actuarial services only when qualified to do so (Precept 2)."*

Predictive analytics will continue to evolve with new applications and techniques appearing rapidly in all aspects of our lives. Working at the boundaries of big data analytics will continue to shed light into potential ethical issues that we may not even think are a possibility today. Regardless of this ever-shifting environment I rest assured that we, actuaries, will continue to be at the forefront acting in a professional and ethical way. ■

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ENDNOTES

1 Duhig, C. 2012. "How Companies Learn Your Secrets?," New York Times (available at *http://www.nytimes.com/2012/02/19/magazine/shopping-habits.html?_r=0).*

2 Angwin, Julia & Larson, Jeff & Mattu, Surya & Kirchner, Lauren. 2016. "Machine Bias, There's software used across the country to predict future criminals. And it's biased against blacks." ProPublica. (available at *https://www.propublica.org/ article/machine-bias-risk-assessments-in-criminal-sentencing*)

3 O'Neil, Cathy. 2016. "Weapons of Math Destruction, How big data increases inequality and threatens democracy", Crown Books. ISBN 0553418815.

4 Asadi Someh, Ida & Breidbach, Christoph & Shanks, Graeme & Davern, Michael. (2016). ETHICAL IMPLICATIONS OF BIG DATA ANALYTICS. (available at *https://www. researchgate.net/publication/308024119_ETHICAL_IMPLICATIONS_OF_BIG_DATA_ ANALYTICS*)

5 American Academy of Actuaries Big Data Task Force. 2018 "Big Data and the Role of the Actuary" (available at *http://www.actuary.org/files/publications/ BigDataAndTheRoleOfTheActuary.pdf*)