

# Responsible machine learning

## Living up to our professional code of conduct, ASOPs, and corporate requirements

By Jim Dolstad and Abby Steele

Block chain, immunotherapies, and robotics are technologies that continue to have a large impact on the health care industry. However, the technology expected to have the biggest impact in health care is artificial intelligence (AI), with over 65% of respondents selecting that technology in a January 2020 Statista survey<sup>1</sup>. Numerous use cases for AI's impact to the health care industry are emerging on a daily basis, and an April 26, 2021 article in *Toward Data Science*<sup>2</sup> highlighted a wide range of applications including: predicting heart failure in mobile health; mental illness prediction, diagnosis, and treatment; personalized therapy in ovarian cancer treatment; and supply chain management.

Machine learning (ML) is a subset of artificial intelligence (AI) that many actuaries are using more frequently in their daily work as it can increase both accuracy and insights into projections and solving business problems. The SOA commissioned a research paper in December 2019 titled "Literature Review: Artificial Intelligence and Its Use in Actuarial Work"<sup>3</sup> that lays out numerous use cases. In addition to the use cases laid out in the SOA literature review there are other use cases specific to health care including but not limited to product strategy, reduction in total cost of care in specific service areas, block of business review, provider performance assessment, and reserving. One of the main benefits of using ML is it allows us to use a much broader set of data that enables us to not only increase our accuracy, but also understand the drivers of the prediction, and what

drivers are addressable. Actuarial Standard of Practice 564 – Modeling<sup>4</sup> provides guidance on the issues actuaries should be considering when developing and applying predictive models. In addition, the Society of Actuaries has provided several classes and webinars on this topic.

While this information remains relevant and useful, the world has changed significantly over the last few years. Statistical bias continues to be a primary concern, but other biases now are equally important including potential biases against underserved populations. In addition, some states are now enacting legislation around the types of data that can be used, and requirements to demonstrate that any models used have been tested for biases. Governments, corporations and our own professional organizations are all focused on how ML and the underlying data can be used in a responsible manner.

Duke's Margolis Center for Health Policy released a paper on July 26, 2022 "Preventing Bias and Inequities in AI-Enabled Health Tools"<sup>5</sup> that discuss not just the potential bias in AI models but the challenges of under representative data, biased training data, issues around model selection and several other key areas of consideration to ensure responsible model development. The article concluded by noting there are no simple checklists to test for bias, and there is a growing need to "build toward consensus on standards and framework"<sup>5</sup>.

The use of ML also raises a caution flag for some as it is thought to be a black box, without the ability to see inside as to what is happening and therefore no ability to trust the output. Because of this, requirements for model explainability, or transparency to how a prediction is achieved, are becoming more important in certain uses. The health care industry sees the tremendous benefits of leveraging AI and ML to improve outcomes and reduce the total cost of care, but that use comes with challenges. Challenges that can be overcome.

Actuaries have a great opportunity to work with their data science, legal and compliance colleagues to be part of the solution. As actuaries familiarize themselves with the issues at hand, they often reach the same solution as their data science colleagues – there are currently no best practices, only better practices. There are also far more questions than answers. The Federal Trade Commission released a blog in April of 2021<sup>6</sup> which provided guidance in this area that also appears to recognize there are currently no best practices.

### **It consists of the following 7 directives:**

- 1. Start with the right foundation**
- 2. Watch out for discriminatory outcomes**
- 3. Embrace transparency and independence**
- 4. Don't exaggerate what your algorithm can do or whether it can deliver fair or unbiased results**
- 5. Tell the truth about how you use data**
- 6. Do more good than harm**
- 7. Hold yourself accountable - or be ready for the FTC to do it for you**

Health care actuaries are used to working with imperfect data, and challenging situations. This situation, however, comes with more sensitivity and scrutiny than most of the work we do. Stakeholders, including the FTC are particularly focused on the use of AI or ML that leads to decisions that deny things of value to consumers, recalling prior focus on algorithms to assign credit scores, and inflamed by recent media attention on the use of AI to assess prisoners for parole. The FTC blog specifically

acknowledges that intention can be good and still result in biased outcomes. As a result, it comes with more risk to us personally, the profession, and our employer. To address this issue the SOA has developed a 5-month Ethical and Responsible Use of Data and Predictive Models Certificate Program with the first program starting in March of 2022. Many companies are also focused on augmenting internal standard practices and governance with formal responsible use of AI programs to help achieve responsible ideation, development, and use of ML models.

These programs typically include internal guidance for all teams, education initiatives, mechanisms to inventory and provide oversight and governance of ML models developed internally or accessed through third-party vendors. Actuaries can play an important role in helping to develop such standards, working with data scientists, legal, compliance and other subject matter experts, such as clinicians, to develop oversight and governance frameworks that will address the evolving expectations of our stakeholders.

Such efforts will place increasing importance on standardized documentation of machine learning models, including clear definitions of the intended use of the model, data used in its development and standardized performance measurement. They will help focus the organization on standardizing approaches to assess the data and the model itself for potential unintended consequences, including bias. A cross-discipline governance model will help provide consistent oversight and open discussion to help identify sources of risk and approaches to mitigate.

Guidance is based on emerging federal and local policies and a growing body of research that also helps bring into focus the ways in which ML can have unintended consequences. Corporate guidelines for data custodianship and privacy principles, as well as for developing and using ML responsibly, offer guideposts to follow. Employees also need a guide with specific recommendations for thinking through possible implications around ML systems through every phase of ML creation and use. Given the relative maturity of this field, guidance should be revisited and refined periodically to reflect new external perspectives and key learnings from internal teams. Accordingly, actuarial teams will need to be prepared to review and revise standard practices and to provide feedback that help shape the overall capability.

Any employee involved with developing, deploying and maintaining an ML solution will need learning resources to understand the evolving expectations related to responsible development and use of ML. Learning may need to contemplate foundational understanding of related topics such as bias, equity and new policies or regulations.

Actuaries will need to identify how these emerging expectations should be implemented in the specific context of their work. They will play an invaluable role in the design and execution of responsible use of ML programs in their organizations.

1. <https://www.statista.com/statistics/1091107/technologies-impact-on-health-care-prediction/> Technologies with most impact on healthcare 2020 | Statista
2. <https://towardsdatascience.com/8-exciting-case-studies-of-machine-learning-applications-in-life-sciences-and-biotechnology-97c1b0b43688> 8 Exciting Case Studies of Machine Learning Applications in Life Sciences and Biotechnology | by Isabelle Flückiger | Towards Data Science
3. <https://www.soa.org/globalassets/assets/files/resources/research-report/2019/ai-actuarial-work.pdf> Literature Review: Artificial Intelligence and Its Use in Actuarial Work (soa.org)
4. <http://www.actuarialstandardsboard.org/asops/modeling-3/?msclkid=ad170057aa2811ecb03761eae6ebdbf6> Modeling - Actuarial Standards Board Actuarial Standards Board
5. <https://healthpolicy.duke.edu/publications/preventing-bias-and-inequities-ai-enabled-health-tools> Preventing Bias and Inequities in AI-Enabled Health Tools (duke.edu)
6. <https://www.ftc.gov/business-guidance/blog/2021/04/aiming-truth-fairness-equity-your-companys-use-ai> Aiming for truth, fairness, and equity in your company's use of AI | Federal Trade Commission (ftc.gov)

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