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“Back When I Was an Actuary ...”

By Dave Snell

Have you ever heard the joke about the doctor and the plumber? A famous doctor was hosting a party at his house, and 30 minutes before the first guests were to arrive, he discovered to his horror that the bathrooms had all backed up and were unusable. Panicked, he called an emergency plumbing service. Just 10 minutes later, a plumber arrived, took one quick look at the situation and fixed the problem in five minutes. She then presented the surgeon with a bill for \$350.

The doctor was amazed. “Are you kidding me? I am a physician, and even I don’t make \$350 for five minutes’ work.” The plumber smiled and said, “I know just how you feel. Back when I was a physician, I didn’t make that much either.”

My point here is that artificial intelligence (AI) and machine learning are changing the relative values of many professions. Initially, it was thought that telemarketers and others with routine tasks were the targets for replacement by AI. In fact, a 2013 study at Oxford University listed 702 occupations and showed telemarketers and basic insurance underwriters as having a 99 percent likelihood of being replaced by AI automation, while doctors, actuaries and lawyers were considered practically immune from such replacement.¹ Yet on May 12, 2016, *Fortune* magazine announced: “Ross, the first artificially intelligent attorney, just got a job. Global law firm Baker & Hostetler, one of the nation’s largest, recently announced that it has hired a robot lawyer created by ROSS Intelligence, Futurism reports. Ross will be employed in the law firm’s bankruptcy practice which currently employs close to 50 lawyers.”² Oh, and in case you need similar capabilities and can’t afford a staff of attorneys, you can rent Ross for \$125 per month.³

Likewise, IBM’s Watson, and other AI programs, are being employed every day to form diagnostic opinions for doctors for several diseases. Earlier this year, for diabetes, it was announced that “a team of Australian-Brazilian researchers led by RMIT University have developed an image-processing algorithm that can automatically detect one of the key signs of the disease, fluid on the retina, with an accuracy rate of 98%.”⁴



Yes, telemarketers are still likely to be replaced by AI. But a bigger return on AI investment is to replace any person who basically just looks at lots of data and makes a judgment call—for high compensation. A doctor looks at your lab reports, asks you questions for perhaps 15 minutes a year and then draws upon a knowledge base of perhaps hundreds or even thousands of patients. An AI program can read lab reports, streaming data from your wearable or embeddable monitors, and thousands of articles on interactions with your medications and your genetics and draw upon a database of millions of patients. The AI can assimilate facts faster and from more sources. Soon it will make better-informed diagnostic summaries and make tailored recommendations for you.

Yet not all professions are in danger of near-term replacement by AI. Many futurists (including me) believe that nurses will be around decades after most surgeons have been replaced, because they must use cross-functional skills. They are the professionals personally caring for the sick. They must exhibit compassionate interaction with the patient about to get a needle injection, help with physical movement, decide when the sheets must be changed and administer medications—while also providing comforting conversation. Likewise, plumbers—and several other tradespeople—are going to be tough to automate, as they must combine physical dexterity, code requirements and diagnostic knowledge skills in such varied environments as residences and businesses of all types. A robot could not depend upon a sterile operating room and standardized equipment.

Now let's take an honest look at actuaries. Where do we fit in the spectrum of potential replacement by AI? I hear at so many actuarial meetings that we possess business knowledge that cannot be replicated by AI. Yet in the past few years, various models are being developed that show what we claim as business knowledge might also be unconscious bias. In life insurance, the biggest three usable factors on longevity have been thought to be age, smoker status and gender. AI models of hundreds of potential features and interactions now show that various credit and lifestyle parameters can be combined to form new metrics, such as the TransUnion TrueRisk Life⁵ score, that may be more impactful predictors of longevity and persistency than even smoker status. Our business knowledge and experience is certainly an asset, but we must realize that it also comes with the baggage of bias based upon it. An AI model has no such inherent bias (unless preprogrammed). No human matches (experience) were input as part of the training for Alpha Zero, and it became the master of chess, Go and shogi.⁶ That vast human experience can sometimes be an obstacle to more innovative thinking.

All [the articles in this issue] contribute to an awareness of the need to broaden our thinking and consider new skill sets.

If all you do is assimilate data on mortality and morbidity, or reserve needs, and determine a best-estimate premium for the combination, why would you think that could not be automated via AI machine learning? On the other hand, if you are among the group of actuaries who can embrace the predictive analytics and AI machine learning tools, and also can explain the financial risk concepts and consequences for your external clients (or your internal management) in understandable terms and can guide them to better paths, you probably need not fear automation for a long time.

One reason actuaries still have not been encountering much danger yet is because only 35,000 or so SOA members is still a small target for replacement versus over a million U.S. doctors⁷ and even more lawyers.⁸ But it is time to rethink your skill set.

This issue of our newsletter has fewer articles than usual, but some are longer than usual, and they all contribute to an awareness of the need to broaden our thinking and consider new skill sets:

- In “How Significant Is Statistical Significance?” Rosmery Cruz discusses the p-value that we often use and perhaps overuse to determine significance. Sometimes we place too much reliance upon canned metrics and lose the ability to notice when something is mathematically sound but not sensible. Rosmery gives three simple examples that require no complicated mathematics to follow yet provide a basis for some deep thought about statistical significance versus substantive significance.
- Next, Jeff Heaton gives us new insights into applications of a relatively recent and amazing type of neural network in his article “Semi-Supervised Learning with Generative Adversarial Networks” (GANs). By now, you likely have heard of GANs being used to create original artwork that fits into a specific genre, but the question I get most about GANs from actuaries is “how can they be useful for insurance?” Jeff provides a tantalizing example of generating fake (but usable for underwriting and actuarial studies) medical records. This is part one of a two-part set of articles. He also provides a link to a video in which he shows how to get started with GANs using the free Google CoLab facility.
- Moving along from statistics, numbers and code to predictions from humans, Xiaojie (Jane) Wang and I interviewed two visionaries involved in start-up FinTech. In the interview article “Startup Heads Share Visions of the Future of Insurance,” they share some interesting insights. One notable quote: “As a data scientist or a modeler, your results are more powerful and useful, when you can articulate what it means to a wider organization. Reach out to the underwriter or the client manager as to why your models predict a certain behavior for a certain client demographic.” This is completely in harmony with our theme this issue.
- The results are out for the 2019 Actuarial Speculative Fiction contest, and the winner for our section was “We All Have a Green Heart” by Anna Bearrood. This story is such a great example of how actuaries can transform themselves and others to advance the profession and the world that we have included it here in its entirety. Yes, it is long, but it is well worth reading. As a profession, we have been politically complacent for too long. We have the skills to bring about positive change. In doing this, we can elevate the public awareness and appreciation of actuaries. Congratulations to Anna for a very upbeat and well-researched story!
- Finally, I have written an article, “Come Visit Philadelphia This September,” about why you ought to consider

attending this year's Predictive Analytics Symposium (September 19–20). We are the section sponsoring this meeting of various experts, novices, managers and just plain kindred spirits among the actuarial community. It is an educational and networking bargain. I hope to see you there!

I started this editorial with some pessimistic scenarios about the future for doctors, lawyers and actuaries. But if you read through the various articles in this issue, you will see that our future does not have to be gloomy. It could be great. Some doctors, some lawyers and hopefully many actuaries can start enhancing their skills now (in predictive analytics, emotional intelligence and presentation abilities) and have very productive careers—perhaps even more meaningful ones than in past times. And we might even initiate a collaborative solution to the global warming issue!

Enjoy our issue, and please continue to give us feedback on what you like and what you want to see more of in future issues. ■



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ENDNOTES

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- 2 Addady, Michal. Meet Ross, the World's First Robot Lawyer. *Fortune.com*, May 12, 2016, <http://fortune.com/2016/05/12/robot-lawyer/> (accessed June 3, 2019).
- 3 According to the company website, *www.rossintelligence.com*, "ROSS retrieves the most relevant cases and passages and organizes them into a collection of winning authority."
- 4 RMIT University. Saving sight: Using AI to diagnose diabetic eye disease. *MedicalXpress.com*, January 8, 2019, <https://medicalxpress.com/news/2019-01-sight-ai-diabetic-eye-disease.html> (accessed June 9, 2019).
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- 6 Silver, David, Thomas Hubert, Julian Schrittwieser, and Demis Hassabis. AlphaZero: Shedding new light on the grand games of chess, shogi and Go. *DeepMind.com*, December 6, 2018, <https://deepmind.com/blog/alphazero-shedding-new-light-grand-games-chess-shogi-and-go/> (accessed June 9, 2019).
- 7 U.S. Physicians—Statistics & Facts. *statista.com*, <https://www.statista.com/topics/1244/physicians/> (accessed June 9, 2019).
- 8 Number of lawyers in the United States from 2007 to 2019 (in 1,000s). *statista.com*, <https://www.statista.com/statistics/740222/number-of-lawyers-us/> (accessed June 9, 2019).

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