



SOCIETY OF ACTUARIES

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# 精算师 **Master of Accurate Calculations** ... Really?

By Dave Snell

**A** Chinese word for Actuary (精算师 Jīngsuàn shī) is very flattering. It can be translated as master, or teacher, of accurate calculations. That is far nicer than the English counterpart, which might be confused with a place to store dead actors. The implication is that we are the experts when it comes to accuracy. We are the rock stars of all things mathematical.

Alas, the actuarial profession is being assailed on several fronts by other professionals with excellent mathematical and business skill sets; and we have to prove our continued worth as masters of the calculations of risk management.

I sometimes feel a bit like Alice, in chapter two of *Through the Looking Glass*, by Lewis Carroll:

“Well, in our country,” said Alice, still panting a little, “you’d generally get to somewhere else—if you run very fast for a long time, as we’ve been doing.”

“A slow sort of country!” said the Queen. “Now, here, you see, it takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that!”

Our world of risk management is moving very fast. The tools and skill sets we learned in previous years may not be adequate for the complexities of market risks, country risks, credit or default risks, systemic risks, political risks, foreign exchange risks, interest rate risks, reputational risks, social media risks, pandemic risks, organizational and operational risks, innovation risks, employee risks, compliance risks, behavioral risks and on and on ...

In this new world, we must not expect that a career will remain the same for decades. Our incoming chair of the Forecasting & Futurism Section, Doug Norris, describes the new paradigm in his article “Five Years is a Lifetime (Personal Forecasting).” Doug chronicles how dramatically his own career has changed in the past five years, and how the Forecasting & Futurism Section has become an increasingly important part of it. His article leads up to a thought provoking sequel to the interview question of “where do you want to



be in five years,” with “what can you do today to help you get there?”

When I first entered the actuarial profession, we made “best estimate” assumptions about interest, mortality, and expenses. That three-factor approach was pretty much the universe of risks for most actuaries. Now, best estimate approaches alone seem naïve and we wrap stochastic runs around them. We build sophisticated models and then lament that our models based strictly on logic must also consider the illogical—behavioral economics has emerged as an important discipline in the risk management world.

In this issue, Ben Wolzenski gives us a short course in behavioral economics through his review of *Predictably Irrational*, a best seller written by Dan Ariely. Dan is a professor of both psychology and behavioral economics. His experiments and resultant insights suggest that in order to

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remain “masters of accurate calculations” we have to better understand which calculations are relevant and which ones are naïve, based only on logic, not on the reality of some irrational behavior.

Sometimes we get so focused on the complex, that we overlook the simple. Kurt Wrobel makes that point very well in his article “Risk Management and the Power of Simplicity,” which we are reprinting from *The Actuary* (April/May, 2014). Kurt explains the “Diderot effect,” and how it can result in a dangerous escalation of complexity in our actuarial models. Quoting from Kurt, “these complex models often lead to a false sense of security among senior managers.”

Brian Holland teaches us about “Unsupervised Methods: an overview for actuaries.” How can you learn to model a business solution based on key parameters when you have not figured out yet what the parameters are? Given perhaps thousands or even millions of data points with hundreds of dimensions, how do you reduce the dimensions and cluster the data into meaningful groups; and what does it mean to train a model when you do not have the answers ahead of time to facilitate training?

Richard Xu and DiHui Lai continue this lesson with “Data Clustering and its Application in Insurance,” where they teach us a procedure for clustering and useful measures for proximity; and then they apply the theory to an application involving the risks associated with foreign travel. They conclude with an observation that can help us better understand client behavior and market segmentation.

Rounding out our focus on clustering and regression, Geof Hileman and Claire Bobst give us an interesting application for the health insurance area with their article, “A Nearest Neighbors Approach to Risk Adjustment.” They sum the algorithm in three simple steps (calculate distances, determine the neighbors, and weight results to determine new data points) and they tackle the non-trivial issues of determining distance for points more complex than (x,y), and how to determine an optimal value of K—the number of neighbors.

Jeff Heaton introduces another new modeling language to us. In “Agent Based Modeling with RePast Py,” he takes us through a simulation with this free modeling extension to Python. If you remember John Conway’s *Game of Life*, from 1970, this is taking the automaton concept and putting it on steroids. Jeff uses 10,000 consumer agents and 10 insurer agents and he has them interact to show how consumer demand may impact, and be impacted by, changing insurer product offerings.

As usual, Jeff provides his sample code on [www.GitHub.com/JeffHeaton/soa](http://www.GitHub.com/JeffHeaton/soa) for download. He also contributed a second article. This one is “Modeling with Python and Scikit-Learn.” Jeff shows how you can use yet another free Python extension to run linear regressions, build and draw decision trees, and even model with ensemble gradient boosting. Ensembles are popular with Kaggle competitions, where world-class data scientists compete in predictive modeling contests.

At our home, our son likes to say the alliterative phrase “Prior Planning Prevents Poor Performance.” Doug Norris shows he is the new master of alliteration though in “Parables and Prophecies Prevent Proper Predictive Prowess (Human Biases in Forecasting).” Despite the whimsical title, Doug makes a serious point: that we often tend to bias our own predictions. As Doug aptly explains, “Actuaries also like to be right, because being right feels good.” His warnings are worth heeding; and his mitigation strategies make sense.

Our professional inclination to be right sometimes means we reject new ideas that sound less precise. I hope to temper the obsession with precision by continuing my introduction to fuzzy logic: “Warm and Fuzzy ... and Real! – Part 2.” Here, I have tried to explain why you should be considering fuzzy logic and why the concept seems new even though it isn’t. Along the way, I try to explain hedging, fuzzification, and defuzzification. The terms are not familiar to most people even though we perform them every day—probably thousands of times each day.

Finally, we want to let you know about an extension of the time limit for our forecasting contest. Doug Norris and Leslie Smith have composed an announcement for our website. We have copied it here in the Forecasting & Futurism newsletter for you. The articles in this issue may trigger some ideas to help you win \$500 Apple Store Credit!

This is an issue packed with a lot of new and sometimes non-intuitive concepts and techniques. I won't pretend that every article is a quick read. Then again, the goal is not a trivial one. We want to continue to be known as:

## 精算师



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