Article from:

Forecasting & Futurism

July 2013 – Issue 7

Build a Genetic Algorithm

By Alberto Abalo

The Forecasting & Futurism Section has been at the forefront of educating actuaries in the area of complexity. Over the course of the past few years, our section has presented its members with insights into applications as diverse as predictive modeling, agent-based modeling, artificial intelligence, and genetic algorithms. We now look to you to advance our research efforts.

Our third annual iPad contest is looking for new actuarial applications of genetic algorithms.

In addition to bragging rights, the winner will receive a new iPad (or cash equivalent). More importantly, your work will serve to advance the actuarial state of the art. The winning submission (and solid runner-ups) will be profiled in a future edition of our newsletter and potentially be presented at future SOA events.

"WHAT IS A GENETIC ALGORITHM?"

To quote our former chairperson, complexity and the study of complexity have been around a LONG time. That said, complexity science as we think of it today is fairly new. While many of the subtopics of complexity science emerged at different times, one of the landmarks was the invention of the genetic algorithm by John Holland in the 1960s at the University of Michigan.

Genetic algorithms sound very complicated, but they don't have to be. A genetic algorithm is simply another technique to find solutions to problems that we do not know how to solve deterministically. They are not a panacea for all problem solutions; but they can be very useful for problems that exhibit the following characteristics:

1. There is no direct deterministic solution known; or, if there is, it is prohibitively difficult to implement in real time.

2. The number of possible solution sets is very large—too large to try them all in the desired time frame.

3. We can devise a sufficient scoring system or ranking scheme to quickly compare the relative value of any two possible solutions.

"WHERE DO I BEGIN?"

Several resources, including examples are available.

*   ***Forecasting & Futurism Newsletter***

    -   "Genetic Algorithms—Useful, Fun and Easy!" by Dave Snell on page 7 of the Dec. 2012 issue. A workbook is also available.

    -   "Are Genetic Algorithms Even Applicable to Actuaries?" by Ben Wadsley on page 6 of the July 2011 issue.

*   ***The Actuary Magazine***

    -   "Complexity or Simplicity" by Dave Snell on page 16 of the December 2012/January 2013 issue.

*   2012 SOA Annual Meeting Presentation

    -   Complexity Science: Genetic Algorithm Applications to Actuarial Problems by Dave Snell & Brian Grossmiller

"HOW WILL MY ENTRY BE JUDGED?"

Entries will be judged winner on the basis of several criteria:

*   Usefulness to the actuarial profession—solving some meaningful problem. This will be the most heavily weighted criterion.

*   Sophistication of the algorithm—what techniques are covered (simple in/out genes, range of discrete or continuous function values, case tables or some other recognition of ambient conditions).

*   Clarity of implementation—an actuary familiar with (Excel, VB, R, NetLogo or whatever language is used) should be able to follow the logic.

Alberto Abalo

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- Extensibility—to other similar or non-similar types of problems.

- Speed to a solution—in generations, or calendar time.

"HOW DO I ENTER?"

Please submit your final entries by Aug. 31, 2013, to Christy Cook at ccook@soa.org. The only requirement is that you are a member of the Forecasting & Futurism Section. Entrants should verify section membership status on the online Actuarial Directory.

The winner will be announced at the 2013 SOA Annual Meeting Forecasting & Futurism Section breakfast (attendance at annual meeting is not required to win).

RULES

- Entrants must be current members of the SOA Forecasting & Futurism Section.

- The Forecasting & Futurism Section Council reserves the right to not award any prize in the event all entries are wide of the mark.

- The Forecasting & Futurism Section and the Society of Actuaries may choose to use information about any of the entries submitted in publications or other venues of the SOA without further involvement of the entrant.

- The Society of Actuaries reserves the right to substitute the cash equivalent value of the contest prize.

- The competition winner is responsible for taxation issues as they are appropriate to his/her region.

If you have any questions on the contest rules, feel free to contact Alberto Abalo at *alberto.abalo@oliverwyman.com* or Doug Norris at *doug.norris@milliman.com.* ▼