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The CAS Institute Special Issue

A Note *from the Editor*

A Special Issue of *Variance* for an Evolving Profession

Welcome to the first "special issue" of *Variance*! In this issue appear six papers related to the topics of the first two programs being developed by iCAS, The CAS Institute: predictive analytics and catastrophe modeling.

It's interesting to note that each of the papers here would be publishable in *Variance* even without the existence of iCAS. Indeed, the papers were all submitted to our journal for general consideration—they were not submitted as part of a special call for papers—and were reviewed and accepted on that basis. This is significant because it demonstrates the evolution of our casualty actuarial profession.

According to our website, "*Variance* is a peer-reviewed journal published by the Casualty Actuarial Society to disseminate work of interest to casualty actuaries worldwide. The focus of *Variance* is original practical and theoretical research in casualty actuarial science." That these papers belong in *Variance* demonstrates the many ways in which actuarial science and, for example, data and predictive analytics have come to intersect. Some manifestations of this development:

- **Nature of the actuarial profession:** Actuaries have always been "data scientists" to some degree. As data has accumulated exponentially and become more accessible, and as computation speed and efficiency have exploded, the data analytics aspect of actuarial work has become more prevalent and important. Add to an actuary's technical skills an understanding of the insurance and risk domain, and you have an ideal recipe for data science.

- **Actuarial exams:** The CAS's newest professional exams, Modern Actuarial Statistics (MAS) I and II, were designed in reflection of the increasing importance, prevalence, and necessity of data and predictive analytics in actuaries' lives.

- **iCAS:** The CAS Institute is a subsidiary of the CAS, and its first credential (CSPA) was created, in part, to support and acknowledge the critical role that data analytics and predictive modeling are now playing in the careers of many actuaries.

So it's no accident that, among the general submissions to *Variance*, we easily found a half-dozen strong papers in areas relevant to the credentials being developed and offered by iCAS, and decided that, together, they would make a nice special issue.

More specifically, here's what you'll find in this issue regarding predictive modeling and analytics:

- **Gross and Evans** describe a combination of minimum bias and credibility methods for predictively modeling losses (pure premiums, claim counts, and/or average severity, etc.) based on explanatory risk characteristics, and provide an empirical case study for comparisons with GLM approaches.
- **Xia, Hua, and Vadnais** propose a GLM framework that allows for an embedded predictive analysis on misrepresentation risk. The usefulness of the method is demonstrated by simulation studies, as well as a case study using the Medical Expenditure Panel Survey data.
- **Aminzadeh and Deng** explore a composite exponential-Pareto distribution, and assess the accuracies of Bayes and other predictive estimators via simulation studies.
- **Spedicato, Dutang, and Petrini** explore the applicability of novel machine learning techniques to optimize the proposed premium on prospective policyholders, and analyze both the advantages and disadvantages of their use.
- **Hong, Kuffner, and Martin** undertake an investigation of the effects of model selection on the validity of classical prediction tools for insurance claims, and make some recommendations for practitioners.

In addition to these five papers related to predictive modeling, we present one paper related to catastrophe modeling, the subject of the second iCAS credential:

- **Walhin** advocates for the use of the generalized logarithmic mean as the midpoint of property catastrophe reinsurance layers when fitting rates on line with power curves, and addresses implementation and other issues.

Again, welcome to the first special issue of *Variance*! With the continuing evolution of our profession, I dare to predict that it won't be the last…

Rick Gorvett, editor in chief, *Variance*

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Dr. Aminzadeh is a 1985 Ph.D. in Statistics from Department of Statistics, Oregon State University. Before joining the Mathematics Department/Towson University and Johns Hopkins University in 1988, he taught in the Department of Statistics at Temple University (1985-1988). He is currently a full professor at Towson University and a graduate lecturer at Applied Physics lab (APL), Johns Hopkins University. He has taught a variety of applied and theoretical courses in mathematics, statistics, and stochastic processes. Several of his research papers were published in *Applied Statistics, Statistical Computation and Simulation, Computational Statistics, IEEE Transactions on Reliability, and Communications in Statistics*, and *Theory and Methods*.

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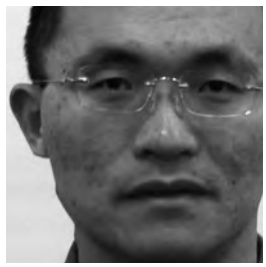

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Liang Hong is a Fellow of the Society of Actuaries and an associate professor in the Department of Mathematics at Robert Morris University. He received his PhD from Department of Mathematics at Purdue University in 2009. Liang's research interests include Bayesian and Bayesian-like methods, credibility theory, optimal insurance level, and predictive modeling.

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