SSAI Newsletter
statistical society of australia incorporated
December 2006 Number 117

# Dr Mu Zhu visits Australia

*The inaugural visit to Australia by an AusCan Scholar has just been completed. Dr Mu Zhu, Assistant Professor, Department of Statistics and Actuarial Science, University of Waterloo, Ontario, Canada, took some time during his 7-week visit to Australia to answer a few questions about statistics, being a statistician and what his research means to him.*

**What inspired you to choose a career in this area?**

I still remember this very vividly: One day when I was still a freshman in college, my roommate and I were looking through that thick catalog trying to declare a major. I flipped through the pages and saw "statistics." I immediately said to my roommate, "Look! There is even a major called *statistics*. That must be the most boring subject in the whole world." Needless to say, I didn't pick it as my major.

I didn't really appreciate mathematics for a long time. In high school, a math teacher once encouraged me to train for various math competitions. I wasn't interested. I was also very afraid of being associated with the stereotype. I didn't like the image at all and felt very uncomfortable around the "geeks." I didn't exactly *dislike* mathematics; I just didn't care too much about the subject. When I first learned about eigenvectors in my college linear algebra course, for example, I simply could not understand why anyone should care about them. To me, mathematicians just seemed to invent all these funny and useless things.

This all changed when I enrolled in a year-long course in probability and statistics when I was in my junior year. All of a sudden, integrals and vectors all became meaningful and relevant. For me, that course was a real eye-opener; I saw mathematics with real context for the very first time.

After college, I went to work for a litigation consulting firm in New York. The work required very little intelligence

but the working hours were terrible. During a certain period of time which lasted weeks, I was getting off from work at 6 o'clock *in the morning* everyday! I discovered how much I loved to be back in a more intellectual environment and quickly decided that my time would have been much better spent in a graduate program. But I wasn't sure what I really wanted to do. I knew I enjoyed my statistics courses back in college, and it also seemed to me that statistics would be a very flexible subject as well. So I applied.

Soon after I received that admissions letter, I quit my job in New York and spent three months hiding in a cheap apartment in western Massachusetts, spending most of my time reading philosophy and poetry. Three months later, I flew to California and formally started to do statistics.

**What does your job involve?**

My job is typical of a junior academic. Even though research is what the job is really about, my duties also involve teaching, supervising graduate students and serving on various committees both within the department and for various statistical societies and professional organizations.

**Can you tell us a little about some of your research, and why it is important?**

These days, we are all expected to say that our research is important. This is very unfortunate. I think it is much more important for researchers to be able to say that their work is fun. As far as I am concerned personally, the only reason why I should enjoy doing any work is because the work is *fun*, and not because the work is important.

I brought along three seminars on this trip to Australia. Two of them are about works that are quite fun. In one [1], we developed an efficient algorithm using ideas from a board game. In the other [2], we developed a variable selection method by carrying out "Darwinian evolution in parallel universes."

If I must talk about importance, I think these works are important in two ways. What most people care about is whether these works have any practical value. Fortunately, the answer is "yes": our algorithms tend to work faster and/or better than competitor algorithms out there on the market, but, for me, this is not the main point and certainly not the main reason why I *myself* am excited about them. What's important to me is whether they contain any interesting ideas that could lead us to think differently. Again, I think the answer here is "yes".

In [1], what we showed is that, for a particular type of classification problems, we can "handcraft" a decision function of the support vector machine type very efficiently if we think carefully about the unique nature of the underlying problem. Here, by "handcraft," I mean we can justifiably specify the model parameters a priori, without having to optimize them, which is very unusual. Of course, there will still be tuning parameters that must be chosen by empirical procedures such as cross-validation, but you can't bypass this step regardless of what method you are using. Even if you are just using a linear regression model, for example, there is the question of how many variables to put into the regression equation.

In [2], what we showed is that, by using a very simple "trick," one can "boost up" the performance of an imperfect variable selection criteria such as the AIC. To me, whether our algorithm can beat all the other variable selection methods out there is not the issue; what I find most interesting and the reason why I wrote the paper in the first place is the fact that we can easily "boost up" a wrong criterion.

Some people just don't seem to get this point. They keep on challenging me with different methods: Here is a method developed by so and so; can your method beat it? Our algorithm actually works very well and is certainly very competitive, but of course, no single method can consistently beat everything under all possible circumstances. These people don't care whether your work contains any interesting ideas at all. They are fully utilitarian. They are the American architects of the 1960's who designed all these ugly, concrete buildings that are perhaps very strong but come with absolutely no artistic taste whatsoever! I think this is very sad — and, in fact, very dangerous, because, when these people serve as referees, they can prevent a "Mona Lisa" from being displayed because it is nothing more than an ordinary portrait of an unknown woman. They don't ask whether there is any intellectual value in a piece of work, or whether you can learn anything interesting from it, which, to me, is actually the only criterion that matters and perhaps the only one that should.

**What do you like most/least about your job?**

I like having some freedom to choose what I want to work on and how I would like to go about doing so. I don't like rude, irresponsible and hostile referees or undergraduate students who care only about their marks and nothing else.

**What is the most unusual or fun thing you've done in your job?**

I once taught a section of a rather bizarre introductory course which every student hated. Someone had made up some very strict guidelines for the teaching assistants about how they should grade the quizzes, which often contained some rather open-ended questions. For example, if you wrote that "the target population of this study is all Canadians," you would be wrong; you must say "the target population of this study is all Canadians, past, present and future." The students used to complain to me bitterly — and I don't blame them. But spending hours everyday listening to complaints from students isn't exactly how I wanted to spend my academic career. In this case, I was particularly annoyed because it wasn't even my fault! It's like someone else had made this terrible decision but I was the one who had to live up with the consequences! So, during one of the quizzes, I sat down in the last row and wrote the quiz myself. On the cover sheet, I simply put down my name as "student" and handed it in; I thought this was particularly appropriate since the quiz was mostly on the t-test. Well, my quiz was graded and I scored something like 87%. I mean, this was very basic stuff — do the t-test, count the degrees of freedom, find the p-value, and so on. There was no reason why anyone with a PhD in statistics should not get 100% on this quiz even if blind-folded! For one question, I put down the model as "$y_i = \mu + \varepsilon_i$" but that wasn't correct because I had apparently forgotten to put down "$i=1, 2, \ldots, n$."

**Tell us about one of your career highlights.**

I'd say that this trip to Australia should make a pretty memorable highlight for my career, don't you think?

**Who or what has been an inspiration to you?**

This is a hard question to answer. You get inspired by different people in different areas of your life. But for doing the kind of work that I am doing right now, the one person that has influenced me the most has to be Professor Jerry Friedman.

**What's the best advice you've been given?**

Professor Jeremy Knowles, who was the dean of the Harvard faculty of arts and sciences while I was there, once said [3], "I have the old-fashioned view that we do well at things we enjoy and we tend to enjoy what we do well at." That, to me, was the best advice I had ever received.

**What are your career goals/plans for the future?**

I don't really have a concrete career goal. I would like to live a happy life if I can, and, if any of my work can change the way people think, that'll be more than enough for me.

**What advice would you give to new statistics graduates?**

I am still learning myself, so I don't really have much advice to offer. If anything, I am in great need for some good advice myself.

**References**

[1] Zhu M, Su W, Chipman HA (2006). LAGO: A computationally efficient approach for statistical detection. *Technometrics* **48**(2), 193 – 205.

[2] Zhu M, Chipman HA (2006). Darwinian evolution in parallel universes: A parallel genetic algorithm for variable selection. *Technometrics* **48**(4), 491 – 502.

[3] Knowles, JR (1991). Speech delivered on September 8th, 1991 at the opening exercises for the Class of 1995, Harvard University.

*Melissa Dobbie*

Dr Zhu has a PhD in Statistics from Stanford University (1996-2001) AB magna cum laude in Applied Mathematics, Harward University (1991-1995).

## In this issue