Mathematics Colloquium

Statistical Issues in the Assessment of Air Quality Model Performance

Dr. Jenise Swall
Environmental Protection Agency
Thursday 6 May, 4pm, CMC 206

During this talk, we will examine statistical problems involved in evaluating the performance of the Community Multi-scale Air Quality (CMAQ) model, an air quality model developed by EPA. We begin with a brief introduction to CMAQ and a discussion of the importance of model evaluation. We describe the observational data available for consideration in such assessments, with special attention to the differing protocols used by the various monitoring networks. We then consider the implications of spatial correlation and incommensurability for evaluation techniques, using both simulation studies and actual summer ozone measurements to help visualize the impact of these factors. Lastly, we discuss future directions and opportunities for statistical work in model evaluation and related areas.

The Galovich Prize

Steven P. Galovich taught mathematics in this department for twenty years. After a short stint in the Dean’s Office he left Carleton in 1994 to become the Dean of Lake Forest College in Illinois. He died in December 2006. William Lang graduated from Carleton with a degree in mathematics in 1974 and gave the department a gift to honor the memory of his teacher, Steve Galovich. The department faculty have used that gift to endow the Steven P. Galovich Prize in Mathematics. The prize will be awarded each year to that graduating senior who best embodies the qualities that made Steve so special to us – his enthusiasm for mathematics, his love of people, his zest for life and, not least, his sense of humor. The second annual Galovich Prize will be awarded this year at Honors Convocation to Danny Wells. Congratulations, Danny!

Research Analyst Position Open

The LECG office Cambridge, MA is looking to hire a Research Analyst for the Transportation group. This position is demanding and offers many intellectual challenges. Research Analysts assist senior staff members in analysis, litigation support and management consulting in sophisticated matters involving economics and finance. Research Analysts perform economic, statistical, and financial data collection and synthesis, spreadsheet and database creation, and document management preparation. Interested? For more information see the job description posted on the 2nd floor CMC bulletin board. Applications are due May 7.
Douglas Adams showed us in his series *The Hitchhiker’s guide to the Galaxy* that 42 was the answer to the ultimate question. On March 17th, 2009, the MAA NumberADay blog told us that $42 = 2 \times 3 \times 7$; that 42 is a Catalan number, that 42 lies between a twin prime pair, 41 and 43, and that 42 is the number of spots on a pair of dice. The blog, started in 2008 features a number (roughly) every day. Check it out at [http://maanumberaday.blogspot.com/](http://maanumberaday.blogspot.com/)

**Math in the News**

Steven Strogatz’s New York Times column continues! The latest installment, titled “Chances Are” takes on conditional probability. The column, published every Monday, deals with math “from basic to baffling” and is truly a joy to read. Check it out!

**PROBLEMS OF THE WEEK**

1. a) It's not hard to divide a parallelogram into two triangles of equal area. Show, however, that a parallelogram can never be divided into three triangles of equal area.
   
   b) Does there exist a quadrilateral (four-sided figure) that can be divided into two triangles of equal area, and that can also be divided into three triangles of equal area? If so, give an example of such a quadrilateral; if not, show that none exists.

2. A particle starts somewhere in the plane and moves 1 unit in straight line. Then it makes a "shallow right turn", abruptly changing direction by an acute angle $\alpha$ and moves 1 unit in a straight line in the new direction. Then it again changes direction by $\alpha$ (to the right) and moves 1 unit, and so forth. In all, the particle takes 9 steps of 1 unit each, with each direction at an angle $\alpha$ to the previous direction.

   a) For which values of $\alpha$ does the particle end up exactly at its starting point?
   
   b) For how many values of the acute angle $\alpha$ does the particle end up at a point whose (straight-line) distance to the starting point is exactly 1 unit?

Even after continued poring over them, I haven’t been able to resurrect the reasoning of two of the attempted solutions to the first problem posed April 16 (even though they both arrived at the correct answer). That problem was solved by Henry Luo, and he should stop by CMC 217 for the usual reason. There was also a serious attempt on the second problem posed that week. Also, Shunji Li essentially solved the second problem posed April 9, and he too should stop by CMC 217. Finally, Henry Luo essentially solved the first problem from last week; there was another serious attempt on that problem. Meanwhile, my own solutions to the problems posed April 2 and April 9 have been posted in the hallway outside CMC 217.

Have a good midterm break, and good luck on the new problems!

- Mark Krusemeyer

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Problems of the Week: Mark Krusemeyer

Subscriptions & Web: Sue Jandro