

MSCS Mess

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Department of Mathematics, Statistics, and Computer Science
St. Olaf College, Northfield, MN 55057

31 October 2014
Vol. 43, No. 7

This Week's Colloquium

Title:	Sequential Designs for Computer Experiments
Speaker:	Marian Frazier
Date:	Monday, November 3
Time:	3:30 - 4:30 pm
Location:	RNS 310

About the talk: The federal government wants to understand how much people depend on their retirement pensions, which is related to income, expenses, and interest rates. NASA is designing a new reusable rocket booster and wants to understand how flight characteristics like lift, drag, and pitch will change as a function of speed and angle of attack. Ossur wants to build a stronger prosthetic limb and needs to understand the relationship between durability and explanatory variables like material and weight.

What do all of these situations have in common? In all of them, performing a traditional physical experiment is infeasible. Instead, we perform a computer experiment.

In this talk, Marian Frazier will discuss the two major questions we must answer in order to investigate the situations above: How do we design these experiments? And how do we develop a model to understand the relationship between the explanatory variables and the response? After answering these questions, she will present an investigation of the retirement pension situation using a specific model-design combination.

This Week's Seminar

Title:	Aligned Hierarchies for Sequential Data
Speaker:	Katherine Kinnaird
Date:	Friday, November 7
Time:	3:35 pm
Location:	RNS 204

About the talk: Katherine Kinnaird presents *aligned hierarchies*, a novel solution to the dimension reduction problem, representing high-dimensional and noisy sequential data as a low-dimensional object that encodes relevant information. In this work, the presentation and discussion of aligned hierarchies are motivated through the lens of Music Information Retrieval (MIR), constructing aligned hierarchies by finding, encoding, and synthesizing all repeated structure present in a song. Given a particular MIR task, such as locating the chorus of a given musical song or finding all copies of a particular recording of a song, we compare songs based on their aligned hierarchies. Considering the fingerprint task and the cover song task, we present comparisons for two music data sets, one based on digitized scores and the other on performances of scores. Results from these comparisons on clean data had very high precision-recall values and provide a proof of concept for the aligned hierarchies. Results on noisy data were not as successful, but demonstrate the effect of different pre-processing techniques on the comparisons.

Stats Grad School Panel

When: Dinner served at 6:00 (gyros, salad, pizza!!); Panel discussion from 6:30-7:30 PM

Where: Regents Hall 207 (the CIR room)

What: Three panelists who are currently/recently in graduate programs in statistics or biostatistics will provide insights and answer questions such as: what is graduate school like? how does one choose a program? how does St. Olaf prepare you? what can one do with an advanced stats degree? and, is it true they really pay you to go to grad school?

Panelists: Marian Frazier - Gustavus Statistics Professor with PhD in Stats (2013) from Ohio State
Andy Lithio '11 - PhD student in Iowa State Statistics Dept
Jess Musselman - University of Minnesota MS in Biostatistics (2009) and PhD in Epidemiology (2013)

Applied Mathematics Classes for Second Semester

Modern Computational Mathematics (Math 242, MCM)

The structure of the class is a sequence of relatively independent short modules, typically about two weeks long. Each module addresses a computation of historical or contemporary interest. Examples include Euclid's Method for finding greatest common divisors, public key cryptography, image processing, digital signal processing, the Google page rank algorithm, etc.

While absolutely no computer programming experience is expected, we (you) will use the R language to implement many of the algorithms we discuss in the class. All necessary R instruction will be provided.

The point of the course is to give students an understanding of how large scale computation is based on theoretical understanding as well as how these computations support modern society.

MCM is one of three transition courses in the math major. (The other two are Elementary Real Analysis and Abstract Algebra I.) All math majors are required to take two of these transition classes. Linear Algebra is the prerequisite.

Operations Research (Math 266)

Operations Research (OR) is also known as Management Science and Industrial Engineering. It is the study of optimizing the operation of a complicated entity. The usual example is a large company that has access to a stream of raw materials and has a collection of products it produces. The goal of OR is to determine the optimal production schedule for such a company. Specific examples from the real world include how to schedule flight crews and aircraft for a large airlines (the person who does this for Delta is a St. Olaf grad) and how to allocate money to

different media buys in political campaigns. My personal research involves, in part, using OR techniques to help the US Forest Service manage its huge system of national forests and grasslands.

Linear Algebra is the prerequisite for this class. Probability is helpful for some of the topics near the end of the course, but is by no means required.

For more information on either of the classes described above, contact Steve McKelvey (mckelvey@stolaf.edu)

Mathematics Education in Budapest!

Budapest Semesters in Mathematics Education (BSME) is a semester-long program in Budapest, Hungary, designed for those interested in teaching middle or high school mathematics. BSME was conceived by the founders of Budapest Semesters in Mathematics (BSM), and the two programs share a common goal: to provide their participants with an opportunity to experience the mathematical and general culture of Hungary. BSME is specifically intended for students who are not only passionate about mathematics, but also the teaching of mathematics. Come enjoy a shared experience with other passionate future teachers, forming a rich support network and professional community that will extend beyond your time in Budapest.

You do not need to be enrolled in a teaching program (like our Math Education Program) to apply to BSME. Moreover, BSME welcomes those who are within one or two semesters after graduation by the time they enter the program—thus, it could be a valuable gap year experience. For more details, see bsmeducation.com or contact Ryota Matsuura (matsuura@stolaf.edu).

Prepare for the arrival of the SPONGE!

Fall Speaker Colloquium presented by Pi Mu Epsilon

There is going to be a Fall Speaker Colloquium on Monday, November 17th, organized by Pi Mu Epsilon. The speaker is one of our very own MSCS professors! A clue about the identity of the professor will be released in each week's Mess. Here are the clues so far:

1. This MSCS professor prefers blackboards over whiteboards.

2. This MSCS professor's favorite fall activity is to shuffle his or her feet through the leaves.

3. When this MSCS professor was a kid, he or she wanted to be a dairy farmer.

Cast your guess on the the 3rd floor of RMS!

and for Your Reading Pleasure...

a Math Poem

Im sure that I will always be,
a lonely number like root three.
The three is all thats good and right,
why must my three keep out of sight?

Beneath the vicious square root sign,
I wish instead I were a nine
For nine could thwart this evil trick,
with just some quick arithmetic.

I know Ill never see the sun,
as 1.7321.
Such is my reality,
a sad irrationality.

When hark! What is this I see,
another square root of a three!
As quietly co-waltzing by,
together now we multiply
to form a number we prefer,
rejoicing as an integer.

We break free from our mortal bonds
with the wave of magic wands.
Our square root signs become unglued
Your love for me has been renewed.

-Dave Feinberg

and a Riddle

What has a head but never weeps,
a bed but never sleeps,
can run but never walks,
and has a bank but no money?

(The answer can be found in the next Mess!)
(Last week's answer: an umbrella)

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If you would like to submit an article or event to be published in the Math Mess, e-mail greimann@stolaf.edu