

MSCS MESS

Department of Mathematics, Statistics, and Computer Science
St. Olaf College, Northfield, MN 55057
March 3, 2017 Volume 45, No. 20

Monday's Colloquium

Title: Using Data Visualization to Find
Find Patterns in Multidimensional
Data
Speaker: Amelia McNamara
Time: Monday, March 6, 3:30pm-4:30
Place: RNS 310

About the talk: While machine learning methods have made great strides in predictive analytics, there are many components of data science that still require human intervention. In particular, people are great at finding visual patterns in data. John Tukey was talking about exploratory data analysis in the 1970s, but advances in computer graphics have given us additional powers. I'll demonstrate methods for finding patterns in high-dimensional data, including the generalized pairs plot, the Grand Tour, and the lineup protocol for graphical inference. Of course, we will be implementing these methods using R.

About the speaker: Amelia McNamara is a Visiting Assistant Professor of Statistical and Data Sciences at Smith College. She is a MassMutual Faculty Fellow and 2016-2017 Project TIER Fellow. Amelia received her BA in mathematics and English from Macalester College, and her PhD in statistics from UCLA. Her research is at the intersection of statistical computing, statistics education, and data visualization. She is committed to open source tools and transparency in data science. Outside of statistics, she enjoys reading novels and hip hop dance.

Friday's Research Seminar

Title: Graph Coloring Problems:
Proper Colorings and Injective
Colorings
Speaker: Shanise Walker
Time: Friday, March 10, 3:40pm
Place: RNS 204

About the talk: In this talk, two types of graph coloring problems will be introduced. A proper coloring of a graph G is an assignment of colors on G such that no two adjacent vertices receive the same colors. A graph G is k -colorable if it can be colored properly with k colors. Proper colorings have applications in committee-scheduling as well as coloring the regions of a map with common boundaries different colors. We discuss various well-known theorems of proper colorings. An injective coloring of a graph G is an assignment of colors to the vertices of G so that any two vertices with a common neighbor have distinct colors. A graph G is injectively k -choosable if it has an injective coloring where the color of each vertex v of G can be chosen from any list $L(v)$ of size k . Injective colorings have applications in the theory of error-correcting codes and are closely related to other notions of colorability. We show that a subcubic planar graph with girth at least 6 is injectively 5-choosable, which improves several known bounds on the injective chromatic number of planar graphs.

We will spend most of the time discussing injective colorings of graphs, which is a project done last summer at a workshop with faculty and other students.

About the speaker: Shanise Walker is a fifth-year student at Iowa State University, who is interested in coloring problems, forbidden subposet problems, and coding theory problems. Most of her work lies in extremal graph theory.

Pi(e) Day 5k

March 14th is fast approaching, and that means it's time for some Pi Day festivities brought to you by SAC and the Math Club! So if you are just itching to go for a run on the beautiful St. Olaf campus and enjoy a reward of a fresh piece of pie, sign up for the Pi(e) Day 5K! Sign-ups will take place outside Stav Hall from 5-7pm on March 8th and 9th, but you can show up the day of and still participate (no pie guaranteed unless you sign up in advance!). Check-in for the race will start at 3:30pm on March 14th in the Tomson Hall West Lantern (the one closest to Larson), and the race will start at 3:45pm. Feel free to direct any questions about the event to Andrew Petterson (petter1@stolaf.edu).

Videographer wanted!

The MSCS department is seeking a videographer to film research seminars and colloquia. If you like taking videos and want to get paid to attend MSCS talks, stop by and talk to Ellen in RMS 307. Typically, seminars are held Mondays from 3-4:30pm and colloquia are Fridays from 3:30-4:30pm.

Would you like to edit the Mess?

The current MSCS Mess editor being a senior, we are looking for an MSCS-affiliated student to compile and distribute the Mess next year. This work-study job involves communicating with members of the MSCS faculty, student leaders, and—the biggest treat of all—Mess Czar Ellen Haberoth in order to provide a resource keeping the St. Olaf community abreast of exciting MSCS happenings. The editor next year should be familiar with typesetting in L^AT_EX, be excited about networking within the department, and be (ideally but not necessarily) a current sophomore. If in-

terested, email the current Mess editor, Corey Brooke, at brooke@stolaf.edu.

Women's history in MSCS

It is now March, marking the beginning of Women's History Month, so we at the Mess would like to offer you some inspirational math herstory in the next few issues. Professor Kay Smith has also very graciously provided two book recommendations for those interested in looking more closely at the tapestry of women's participation in and invigoration of mathematics: *Complexities: Women in Mathematics*, edited by mathematicians Betty Anne Case and Anne Leggett (available online with St. Olaf login credentials) and *Pioneering Women in American Mathematics* by Judy Green and Jeanne LaDuke (available in the St. Olaf Science Library collection). Conscious also of the intersections of black experiences and women's experiences in mathematics, explore the link below¹ as well.

This week, we offer some information about Emmy Noether, a German mathematician whose contributions—in spite of astonishing sexism and antisemitism—laid cornerstones of algebra *and* theoretical physics. Noether, born in 1882, attended university during a time when most academics viewed her presence as a threat to the social fabric of Germany; during much of her career, universities would not pay Noether to teach, and she at times had to deliver her lectures with David Hilbert listed officially as professor. Nevertheless, she inspired and mentored a prolific generation of mathematical progeny; famously unfocused on her own ego, Noether contributed much of her energy to developing and promoting the ideas of her students (of course, this in no way undermined her position as one of the most important twentieth-century mathematicians).

Mathematically, Noether's contributions were enormous, especially in laying the groundwork for abstract algebra (developing the ideas of ideals of rings and the ascending chain condition) and fueling the fields of commutative algebra and algebraic geom-

etry. Startlingly not confined to algebra, however, Noether also accomplished significant work regarding conservation laws in physics (Noether's theorem). By straddling these different fields of mathematics, Noether's list of peers and collaborators is astonishing: Hilbert, Einstein, Artin, van der Waerden, Krull, Alexandrov, Weyl, and more all found their careers enriched by her mind.

In spite of her aloof political attitude that, in one episode, led her to laugh at a student dressed in a Nazi paramilitary uniform, Germany expelled Noether from her university po-

sition for being a Jew, following which Noether moved to the United States. Though Einstein lobbied vigorously to bring Noether to Princeton, the university's policy of discrimination against women barred her from working there in any official capacity; instead, Noether took up a position at Bryn Mawr College. Her work remains of central significance today, more than eighty years after her death, though the fields she sowed have expanded astronomically in that time.

¹ <http://www.math.buffalo.edu/mad/wmad0.html>

To submit an article or event for publication in the Mess, email brooke@stolaf.edu; to receive the Mess digitally each Friday, email freking@stolaf.edu; visit <http://wp.stolaf.edu/mscs/mscs-mess/> for a digital archive of previous MSCS Mess issues.

Corey Brooke, Editor
Bruce Pell, Faculty Adviser
Ellen Haberoth, Mess Czar