Statistics Seminar

Department of Mathematical Sciences

DATE:	Thursday, October 5, 2017
TIME:	1:15pm – 2:15pm
LOCATION:	WH G02 (note special location)
SPEAKER:	Alan Edelman, Massachusetts Institute of Technology
TITLE:	The Generalized Singular Value Decomposition: Matrix Trigonometry or Where are the Ellipses?

This talk is part of the Dean's Speaker Series in Statistics and Data Science.

Abstract

The SVD ellipse picture for a matrix A is a very familiar visual for the action of A on the unit ball. We are not aware of any ellipse pictures in the literature nor even a notion that a natural ellipse picture exists for the generalized SVD (GSVD) of two matrices A and B. We believe that the lack of a geometric view of the GSVD is part of the reason that the GSVD is not as widely understood or as widely used as it should be in data science. In this talk, we reveal the trigonometry, the ellipse picture, and further geometry of the GSVD. In particular, we show how the GSVD reveals whether B is ``small" relative to A in the same way that B/A is the slope of a vector in 2d. In higher dimensions, B may be small relative to A in some directions, and large in others. Numerical demonstrations will use Julia. (Joint work with Bernie Wang)

About the speaker: Alan Stuart Edelman is an American mathematician and computer scientist. He is a Professor of Applied Mathematics at the Massachusetts Institute of Technology and a Principal Investigator at the MIT Computer Science and AI Laboratory (CSAIL) where he leads a group in Applied Computing. In 2004 Professor Edelman founded Interactive Supercomputing, recently acquired by Microsoft.

Edelman's research interests include high-performance computing, numerical computation, linear algebra, and stochastic eigenanalysis (random matrix theory).

- In Random Matrix Theory, Edelman is most famous for the Edelman distribution of the smallest singular value of random matrices (also known as the Edelman's law), the invention of beta ensembles, and the introduction of the stochastic operator approach.
- In High Performance computing, Edelman is known for his work on parallel computing, as the co-founder of interactive supercomputing and an inventor of the Julia (programming language), and for his work on The Future Fast Fourier Transform.