AGENDA

1:00-2:40

RESEARCH POSTER XPO

Featuring 40+ poster presenters from ICME and our colleagues.
View a full list of the Xpo poster session presentations here.

2:00-2:40

HANA IMMERSIVE VISUALIZATION ENVIRONMENT (HIVE) DEMOS

Visit the HIVE (Huang B050) to see demonstrations of research in action.

2:45

THE SHAPE OF BIG DATA

Gunnar Carlsson, Professor of Mathematics, Co-Founder of Ayasdi

There is a lot of discussion around "Big Data", which refers to the large and complex data sets currently being gathered about scientific, engineering, and commercial problems. Although the size of the data is certainly a significant roadblock to the goal of obtaining useful information and knowledge from the data, the complexity of the data is often a more significant hurdle. This means that there is a need for a new organizing principle and modeling mechanism, and it turns out that topology (the mathematical study of shape) can be used to provide such an organizing principle. I will talk about these ideas, with examples coming from the biomedical world and social sciences.

3:00

SCALABLE MACHINE LEARNING

Reza Zadeh, Consulting Professor, Founder and CEO at Matroid

The emergence of large distributed clusters of commodity machines has brought with it a slew of new algorithms and tools. Many fields such as Machine Learning and Optimization have adapted their algorithms to handle such clusters. This 10 minute talk will touch upon widely used systems and applications of scaled machine learning.

3:15

HIGH PURPOSE COMPUTING FOR NATURAL DISASTER REDUCTION

Jenny Suckale, Assistant Professor of Geophysics

The motivation behind my research is to create knowledge that reduces the risks associated with natural disasters like volcanic eruptions, induced earthquakes, tsunamis and ice-sheet collapse. The common denominator of what at first glance might seem like disparate systems is multiphase flow. The dynamic interactions between multiple solid and fluid phases, such as ice and melt-water; rocks and wastewater; lava and gas; vegetation and waves, give rise to drastic nonlinearities that govern abrupt change. My group develops original computational methods for advancing our fundamental understanding and predictive capabilities of the multiphase nonlinearities responsible for abrupt changes in many Earth systems.

3:30

EXPERIMENTS WITH NETWORK EFFECTS

Johan Ugander, Assistant Professor of Management Science and Engineering

A/B testing is a standard approach for evaluating online experiments; the goal is to estimate the "average treatment effect" of a new feature or condition by exposing a sample of the overall population to it. A drawback with A/B testing is that it is poorly suited for experiments involving social interference, when the treatment of individuals spill over to neighboring individuals along an underlying social network. I will discuss recent work on this problem, including how randomization techniques that administer treatments at the level of graph clusters can significantly reduce the bias and variance of experiments in highly networked settings.

3:45

ICME XPO OVERVIEW AND WELCOME

Margot Gerritsen, ICME Director & Senior Associate Dean, School of Earth, Energy, and Environmental Sciences

4:00	**ESTIMATING ASSET PRICING FACTORS**
	Markus Pelger, Assistant Professor of Management Science and Engineering
	Statistical factor analysis based on Principal Component Analysis (PCA) finds factors that can explain most of the covariance structure in the data but has problems identifying factors with a small variance that are important for asset pricing. We propose a modification to the PCA analysis that finds factors with a high Sharpe ratio that can explain both the expected return and covariance structure. We derive the statistical properties of the new estimator. Factors that are weak, i.e. their variance is below a critical value, cannot be estimated with PCA even if a large amount of data is available. However, our estimator can reliably detect all factors that are important for asset pricing. Applying the approach to portfolio and stock data we find factors with Sharpe ratios twice as large as those based on conventional PCA.

4:15	**INTERPRETATION OF GENETIC VARIANTS**
	Wing Wong, Professor of Statistics and Biomedical Data Science
	Every genome carries millions of genetic variants. Many of these variants are expected to have profound implications on health and diseases. Currently we have reasonable confidence in interpreting some of the variants that affect gene-coding regions of the genome. However, the overwhelming majority of the variants are located in non-coding parts of the genome and current methods to interpret such variants are woefully inadequate. In this talk I will discuss strategies that may help to close this gap in interpretation. Advances in this direction will be critical for the routine incorporation of genome sequence information to support health care decisions.

4:30	**RECENT PROGRESS AND EXPLORATIONS OF LINEAR PROGRAMMING ALGORITHMS**
	Yinyu Ye, Professor of Management Science and Engineering
	We describe recent algorithmic progress on linear programming as well as explorations of alternative algorithms. The topics include strongly polynomial simplex and policy iteration methods for the Markov Decision-Game Process, faster interior-point algorithms for network flows, the first-order potential reduction algorithm for convex optimization, the iteration complexity of cyclic coordinate descent method, and convergence of the multi-block alternating method of multipliers for constrained optimization.

4:45	**THE FUTURE OF AUTONOMOUS SYSTEMS: FROM DRIVERLESS CARS TO SPACE ROBOTS**
	Marco Pavone, Assistant Professor of Aeronautics and Astronautics
	Mobile autonomous systems are poised to transform several sectors, from transportation and logistics all the way to space exploration. In this talk I will briefly review major computational challenges in endowing autonomous systems with fast and reliable decision-making capabilities, and discuss recent advances made at the Stanford Autonomous Systems Laboratory.

| 5:00 | XPO RECEPTION |

| Starting at 6:30 | ICME XTRAVAGANZA IN THE ICME SUITE (HUANG B060) |