



[Member Login](#)

[Print Page](#) [Email Page](#)

- ✧ [Home](#)
- ✧ [About the NAS](#)
- ✧ [Members](#)
- ✧ [Nomination and Election](#)
- ✧ [Awards](#)
- ✧ [Publications](#)
- ✧ [National Academies Studies](#)

ACTIVITIES

- ✧ [Koshland Science Museum](#)
- ✧ [Evolution Resources](#)
- ✧ [Sackler Colloquia](#)
- ✧ [Kavli Frontiers of Science](#)
 - [US Frontiers](#)
 - [Chinese-American Frontiers](#)
 - [German-American Frontiers](#)
 - [Indo-US Frontiers](#)
 - [Japanese-American Frontiers](#)
 - [UK-US Frontiers](#)
- ✧ [Keck Futures Initiative](#)
- ✧ [Cultural Programs](#)
- ✧ [Distinctive Voices@The Beckman Center](#)
- ✧ [Committee on Human Rights](#)

U.S. Kavli Frontiers of Science

19th Annual Kavli Frontiers of Science Symposium

U.S. National Academy of Sciences
Arnold and Mabel Beckman Center
November 8-10, 2007
Irvine, CA

Data Mining / Machine Learning

[-Presentation](#)

David Jensen, University of Massachusetts Amherst

Please click on the above link to watch the presentation - both slides and audio. This presentation file is in [Adobe Flash player](#) format, available free online.

Progress in science has long been driven by two complementary technologies: the languages available for making statements about the objects of study, and the algorithms available for deriving and evaluating those statements. More expressive languages make it easier to conceive and communicate new scientific concepts; more accurate and powerful algorithms allow researchers to infer and evaluate a wider array of those concepts.

In the past several decades, research in machine learning and data mining has made important advances in both languages and algorithms. One class of important milestones includes languages for modeling the joint probability distribution of large sets of variables, methods for learning the structure and parameters of these models from data, and methods for using those models to infer the value of unobserved variables. These methods have been extended to a wide array of data types, including temporal, spatial, and sequential data, and they have been applied to a diverse set of problems in data-rich fields including biology, sociology, astronomy, neurology, and ecology.

However, new frontiers await. Recent research in machine learning and data mining, combined with unprecedented changes in data availability, promises to enable investigation of the emergent behavior of large groups of interacting components. These include complex socio-technical systems such as the Internet, human social and organizational networks, and complex natural systems such as genomic and metabolic networks. The

Related Links:

Watch Cutting Edge Science on the Web

Chinese-American Kavli Frontiers (2006):

Alternative Energy Fuels, Bionics/Human Machine Interface, Black Hole Growth and their Host Environments, Bioremediation of Contaminated Elements, Smart Surface-responsive Materials, The Genetics of Race and Human Populations, Multiscale Modeling and Optimization, Nanomedicine: Navigating into the Cell

U.S. Kavli Frontiers (2006):

Artificial Photosynthesis/ Alternative Energy Sources, Biometrics: Identity Technologies, Evolutionary Origins of Human Cognition and Behavior, Extrasolar Planets, Frontiers in Population Biology using Ancient DNA, How Many Dimensions Does the Universe Have?, Memory and Learning, Prepare Immediately for Whatever Happens Next

Japanese-American Kavli Frontiers (2006):

Chemical Biology, Climate Change, DNA Based Nanosystems, Evolution of Modern Humans, Extreme Photonics, Meditation and the Brain,

technical progress to date within machine learning has been rapid, and the potential for powering discovery in other fields appears enormous.

Single Molecule Nano-Biology, Slow Light

Indo-American Frontiers

(2007): *Algebra and Computation, Climate Connection, Macromolecular Machines, The Magnetic Universe, Molecular Architectures and Assemblies, Stimuli Responsive Materials, Stress in Neurodegeneration, Systems Biology*

National Academy of Sciences
500 Fifth Street, NW
Washington, DC 20001

[Terms of Use](#) | [Privacy Policy](#)
[Contact Us](#) | [Site Map](#)