Indo-US Symposium on

New Directions in Machine Learning, Game Theory, and Optimization

Bangalore, November 12-13, 2010

HIGHLIGHT REPORT

With the virtual explosion in the magnitude of data being generated across the world -- in fields as diverse as astronomy, biology, geology, and even defense -- there is an urgent need for methods that can analyze such data and transform it into meaningful scientific conclusions. Machine learning, one of the fastest growing fields in computer science, holds the promise of providing such methods. For example, machine learning techniques are being used in computer vision to develop face recognition systems, in computational biology to discover new genes, and in drug discovery to prioritize chemical structures for screening.

Machine learning is a highly interdisciplinary field that brings together techniques from a variety of mathematical and engineering disciplines, including in particular computer science, statistics, and mathematical optimization, in order to analyze complex data. It is anticipated that future developments in machine learning will depend on a stronger understanding of the mathematical optimization tools that form the core of many modern machine learning algorithms, and on expanding the range of problems for which machine learning algorithms can be developed, for example allowing for situations involving multiple players (as is often the case with the internet or the healthcare industry) by incorporating techniques from game theory. In turn, machine learning techniques can be used for portfolio selection in optimization, and for mechanism design in game theory.

To this end, the **Indo-US Symposium on New Directions in Machine Learning, Game Theory, and Optimization**, supported by the Indo-US Science & Technology Forum and organized by **Dr. Shivani Agarwal** (Indian Institute of Science), **Prof. Chiranjib Bhattacharyya** (Indian Institute of Science), and **Prof. David C. Parkes** (Harvard University), brought together leading researchers from India and the US to share their perspectives on both recent advances in the fields of machine learning, game theory, and optimization, and challenges that lie ahead. The symposium included lectures by eminent researchers as well as poster presentations by graduate students and young researchers from industry. Speakers at the symposium included:

Dr. Shivani Agarwal (Indian Institute of Science)
Dr. Indrajit Bhattacharya (Indian Institute of Science)
Prof. Chiranjib Bhattacharyya (Indian Institute of Science)
Prof. Avrim Blum (Carnegie Mellon University)
Dr. Dinesh Garg (Yahoo! Labs Bangalore)
Dr. Ravi Kannan (Microsoft Research India)
Dr. Gert Lanckriet (University of California, San Diego)
Prof. Y. Narahari (Indian Institute of Science)
Prof. David C. Parkes (Harvard University)
Dr. Kameshwaran Sampath (IBM Research India)
Dr. Devavrat Shah (Massachusetts Institute of Technology)

The symposium generated much enthisuasm among faculty members, graduate students, and researchers from industry, and has led to several follow-up discussions on collaborative research as well as plans for longer-term exchange programs between some of the Indian and US institutions involved. In addition, the symposium helped to catalyze discussions on the development of a center for excellence in machine learning research at the Indian Institute of Science, with active participation from US partners and from industry research groups.