NATIONAL UNIVERSITY OF SINGAPORE

School of Computing

Advanced Systems Seminar

Title: **Fueling the Beast: Addressing the Computational Challenges of Ubiquitous Analytics and Learning**

Speaker: Prof. Anand Raghunathan
                Integrated Systems Laboratory
                Purdue University

Date/Time: 22 April 2016, Friday, 02:00 PM to 03:30 PM

Venue: Executive Classroom, COM2-04-02

Chaired by: Dr Mitra, Tulika, Professor, School of Computing
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Registration: https://goo.gl/gmjK7g

Abstract:

We are witnessing a profound change in the workloads that are driving the demand for computing. In data centers and the cloud, computing demand is driven by the need to organize, analyze, interpret, and search through exploding amounts of data from the virtual and physical worlds. In mobile, wearable and IoT devices, the need to make sense of and interact more intelligently with users and the environment drive much of the computing demand. These trends have led to the genesis of a new class of workloads for computing platforms that involve recognition, mining, analytics, and inference. Machine learning is squarely at the center of this trend - indeed, the past decade has seen tremendous developments in machine learning algorithms, and remarkable growth in their practical deployment.

In this talk, I will make a case for ubiquitous analytics and learning as a key driver in the design of future computing platforms. I will present a quantitative analysis of the computational requirements of deep learning networks - a class of machine learning algorithms that have attracted great interest and achieved remarkable success in recent years. The analysis highlights a large gap between the capabilities of current computing systems and the requirements posed by these applications. This gap will only grow due to the seemingly insatiable appetite of these applications, together with diminishing benefits from technology scaling. I will outline a roadmap of technologies that can help bridge this gap - accelerators for machine learning, approximate computing, neuromorphic hardware, and emerging post-CMOS devices.

Biodata:

Anand Raghunathan is a Professor of Electrical and Computer Engineering at Purdue University, where he leads the Integrated Systems Laboratory. His current areas of research include system-on-chip design, domain-specific architecture, computing with post-CMOS devices, and heterogeneous parallel computing. He holds a Distinguished Chair in Computational Brain Research at the Indian Institute of Technology, Madras. He is also co-founder and Director of Hardware at High Performance Imaging, Inc., a company formed to commercialize innovations in the area of computational imaging. Previously, he was a Senior Researcher and Project Leader at NEC Laboratories America and held a visiting position at Princeton University.

Prof. Raghunathan has co-authored a book, eight book chapters, and over 230 refereed journal and conference papers, and holds 22 U.S patents. His publications received eight best paper awards and five best paper nominations. He received a Patent of the Year Award and two Technology Commercialization Awards from NEC. He was chosen among the MIT TR35 (top 35 innovators under 35 years across various disciplines of science and technology) in 2006 for his work on "making mobile secure".

Prof. Raghunathan has been a member of the technical program and organizing committees of several leading conferences and workshops, chaired four premier IEEE/ACM conferences, and served on the editorial boards of various IEEE and ACM journals in his areas of interest. He received the IEEE Meritorious Service Award and Outstanding Service Award. He is a Fellow of the IEEE and Golden Core Member of the IEEE Computer Society. Prof. Raghunathan received the B. Tech. degree from the Indian Institute of Technology, Madras, and the M.A. and Ph.D. degrees from Princeton University.