Association for Computing Machinery

Advancing Computing as a Science & Profession

NEWS RELEASE

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ACM FEDERATED COMPUTING RESEARCH CONFERENCE COMBINES 13 COMPUTING CONFERENCES INTO ONE MAJOR EVENT

2018 Turing Award Laureates to Present Lecture on the State of Machine Learning

New York, NY, June 12, 2019 – ACM, the Association for Computing Machinery, will hold the Federated Computing Research Conference (FCRC), June 22-28 in Phoenix, Arizona. FCRC assembles a spectrum of affiliated research conferences and workshops into a week-long coordinated meeting. The FCRC model allows both a strong research focus within each represented subdiscipline of computing while also facilitating communication among researchers in different fields of computer science and engineering.

The FCRC is held only once every four years. Each morning, FCRC features a joint plenary talk on topics of broad appeal to the computing research community. To the extent facilities allow, attendees are free to attend technical sessions of other affiliated conferences being held at the same time as their "home" conference.

Turing Lecture

Two of this year's recipients of the ACM A.M. Turing Award—Geoffrey Hinton of Google, and Yann LeCun of Facebook—will present their Turing Lecture at FCRC. Hinton and LeCun, along with Yoshua Bengio of the University of Montreal, received the 2018 A.M. Turing Award for conceptual and engineering breakthroughs that have made deep neural networks a critical component of computing. Working independently and together, they developed conceptual foundations for the field, identified surprising phenomena through experiments, and contributed engineering advances that demonstrated the practical advantages of deep neural networks.

Hinton and LeCun will present their Turing Lecture as part of FCRC on June 23 at 5:15 p.m. at Symphony Hall of the Phoenix Convention Center. The titles of their presentations are:
Geoffrey Hinton: **"The Deep Learning Revolution"**
Yann LeCun: **"The Deep Learning Revolution: The Sequel"**

FCRC Plenary Speakers

"A Roadmap for Reverse-Architecting the Brain's Neocortex"
James E. Smith, University of Wisconsin-Madison
Understanding, and then replicating, the computing paradigm(s) used in the brain's neocortex is a computer architecture research problem that is of unquestionable practical and scientific importance, but one that will require an unconventional approach. Smith's talk lays out a potential roadmap, based on several years of study and experimentation, in a methodical, bottom-up manner. According to Smith, the first important milestone along the road is the development of feedforward biologically plausible neural networks capable of unsupervised, continual learning, and implementable with high energy efficiency. After the first milestone is reached and the roadmap going forward becomes a little clearer, reverse-architecting the higher level cognitive functions promises to be at the leading edge of computer architecture research for decades to come.

"Differential Privacy and the US Census"
Cynthia Dwork, Harvard University
Differential privacy is a mathematically rigorous definition of privacy tailored to statistical analysis of large datasets. Differentially private systems simultaneously provide useful statistics to the well-intentioned data analyst and strong protection against arbitrarily powerful adversarial system users –without needing to distinguish between the two. Differentially private systems "don't care" what the adversary knows, now or in the future. Finally, differentially private systems can rigorously bound and control the cumulative privacy loss that accrues over many interactions with the confidential data. These unique properties, together with the abundance of auxiliary data sources and the ease with which they can be deployed by a privacy adversary, led the US Census Bureau to adopt differential privacy as the disclosure avoidance methodology of the 2020 decennial census. Dwork's talk will motivate the definition of differential privacy, reflect on the theory-meets-practice experiences of the decennial census, and highlight a few pressing challenges in the field.

"The Role of Computer Science in Computer Science Education"
Shriram Krishnamurthi, Brown University
Computer science education is a difficult and fascinating problem, sitting at the intersection of the technical and human. It is also an increasingly urgent problem as countries around the world are rushing to add computing to their curricula and wrestling with broadening access to it. The needs are not limited to schoolchildren: working adults and the elderly use computers in ever more sophisticated ways. What role can computer scientists play in this movement? In this talk, Krishnamurthi will provide a look at some of those questions, and identify a few of the numerous challenges the field has barely begun to address.

"Data for Good: Data Science at Columbia"
Jeannette M. Wing, Columbia University
Every field has data. We use data to discover new knowledge, to interpret the world, to make decisions, and even to predict the future. The recent convergence of big data, cloud computing, and

novel machine learning algorithms and statistical methods is causing an explosive interest in data science and its applicability to all fields. Jeannette Wing is the Director of the Data Science Institute at Columbia University. The Data Science Institute promotes "Data for Good": using data to address societal challenges and bringing humanistic perspectives as—not after—new science and technology is invented. In this talk, Wing will present examples of research and education projects to illustrate how data science is transforming every field, profession, and sector.

"Heterogeneous Acceleration and Challenges for Scientific Computing on the Exascale"
Erik Lindahl, Stockholm University
Modern computer hardware has become tremendously powerful in terms of FLOPS, memory bandwidth, multithreading and accelerators—but while codes could get close to the theoretical peak performance 20 years ago, many of today's applications struggle to reach 10% due to the complexity of hardware. In this talk, Lindahl will showcase the challenges faced by real-world scientific applications that primarily focus on improving time-to-solution on increasingly powerful supercomputers rather than FLOP-counts, scaling, or relative acceleration. Among other topics, Lindahl will also discuss the strategies needed for all these applications to be able to turn Exascale computing investments into scientific discoveries and impactful industrial innovations.

Participating Conferences Include:

COLT: The 32nd Annual Conference on Learning Theory
e-Energy: The Tenth ACM International Conference on Future Energy Systems
EC: 20th ACM Conference on Economics and Computation
HPDC: The 28th International Symposium on High Performance Parallel and Distributed Computing
ICS: International Conference on Supercomputing
ISCA: The 46th International Symposium on Computer Architecture
ISMM: International Symposium on Memory Management
IWQoS: IEEE/ACM International Symposium on Quality of Service
LCTES: Languages, Compilers, Tools, and Theory of Embedded Systems
PLDI: Programming Languages and Programming Systems Research
SIGMETRICS/IFIP Performance 2019: Measurement-Based Performance Evaluation Techniques
SPAA: 31st ACM Symposium on Parallelism in Algorithms and Architectures
STOC: 51st ACM Symposium on the Theory of Computing

About ACM
ACM, the Association for Computing Machinery, is the world's largest educational and scientific computing society, uniting computing educators, researchers and professionals to inspire dialogue, share resources and address the field's challenges. ACM strengthens the computing profession's collective voice through strong leadership, promotion of the highest standards, and recognition of technical excellence. ACM supports the professional growth of its members by providing opportunities for life-long learning, career development, and professional networking.

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