

# APPROX 2014 – Edinburgh 13<sup>th</sup> June

## First SIGPLAN Workshop on Probabilistic and Approximate Computing

Co-located with [PLDI 2014](#) in Edinburgh, Scotland.

### About

Research is increasingly focusing on computing in the presence of approximation and inexactness, partly due to inexact data (for example, from sensors or from machine learning methods), and partly due to the performance and power benefits that arise from deliberate use of approximation. These methods require new approaches to every aspect of the hardware and software stack, ranging from new hardware to new algorithms to new languages and formal methods.

This workshop is an effort to bring together constituents from across these diverse areas to discuss challenges, opportunities, abstractions, and foundations. This research area has the additional exciting aspect that substantive research contributions often require diverse participation from research areas that include architecture, programming languages, machine learning, and distributed systems. Our goal is to bring together members of these diverse communities and build a shared understanding of concepts, applications, foundations, and systems.

### Friday 13<sup>th</sup> June

8:45 – 8:50

**Start / Welcome** – Emery Berger (University of Massachusetts Amherst) and Ben Zorn (Microsoft Research)

8:50 – 10:20

**Session 1 – Leveraging Approximate Computing**

**How to Answer “Haven’t We Done This Already?”, and Challenges/Opportunities in Approximate Computing**

*Luis Ceze (University of Washington) and Kathryn S. McKinley (Microsoft Research)*

	<p><b>Programming Language Compiler Support for Uncertainties</b> <i>Eva Darulova and Victor Kuncak (EPFL)</i></p> <p><b>In Defense of Probabilistic Static Analysis</b> <i>Benjamin Livshits and Shuvendu K. Lahiri (Microsoft Research)</i></p> <p><b>Accuracy-Aware Program Transformations</b> Sasa Misailovic (MIT)</p> <p><b>A Case for Runtime Coordination of Accuracy-aware Applications and Power-aware Systems</b> <i>Henry Hoffmann (University of Chicago)</i></p> <p><b>Panel discussion (10:05–10:20)</b></p>
10:20 – 10:50	Coffee break
10:50 – 12:05	<p><b>Session 2 Probabilistic Programming and Approximate Computing</b></p> <p><b>The relationship between probabilistic and approximate computing</b> <i>Vikash Mansinghka (MIT)</i></p> <p><b>Probabilistic Programming: Abstractions and Tools for Programming With Data</b> <i>Aditya Nori and Sriram Rajamani (Microsoft Research)</i></p> <p><b>Tabular: Probabilistic Inference from Excel</b> <i>Andrew D Gordon (Microsoft Research and University of Edinburgh), Thore Graepel and Nicolas Rolland (Microsoft Research), Johannes Borgstroem (Uppsala University), Claudio Russo (Microsoft Research), and Marcin Szymczak (University of Edinburgh)</i></p> <p><b>Extreme-Scale Randomized Algorithms for Approximate Parameter Discovery in High-Dimensional Parameter Spaces</b> <i>Sumit Kumar Jha and Narsingh Deo (University of Central Florida), Justin Oh (Brown University), Alvaro Velasquez and Faraz Hussain (University of Central Florida)</i></p> <p><b>Towards a Universal Probabilistic: Computer Programming Models, Architectures and Beyond</b> <i>Biplab Deka (University of Illinois), Swarat Chaudhuri (Rice University), and Rakesh Kumar (University of Illinois)</i></p>
12:05 – 13:20	Lunch

13:20 – 14:20

### Session 3 (Short Talks)

#### **Designing a MCMC library for Probabilistic Programming**

*Rob Zinkov and Chung-chieh Shan (Indiana University)*

#### **There's Something About Bayes: Effective Probabilistic Programming for the Rest of Us**

*James Bornholt, Todd Mytkowicz and Kathryn S. McKinley (Microsoft Research)*

#### **Probabilistic Programming: Concepts and Challenges**

*Angelika Kimming and Luc De Raedt (KU Leuven)*

#### **On the Probabilistic Symbolic Analysis of Programs**

*Antonio Filleri (University of Stuttgart, Germany) and Corina S. Pasareanu (Carnegie Mellon Silicon Valley, Nasa Ames, USA)*

#### **Systems Should Automatically Specialize Code and Data**

*Brandon Lucia and Todd Mytkowicz (Microsoft Research)*

14:20 – 14:50

Open Discussion

14:50 – 15:20

Coffee break

15:20 – 16:45

### Session 4 – Programming Abstractions and Trade-offs

#### **Programming Abstractions for Approximate Computing**

*Michael Carbin (MIT CSAIL)*

#### **Two Approximate-Programmability Birds, One Statistical-Inference Stone**

*Adrian Sampson (University of Washington)*

#### **Optimizing Out Overcomputation**

*Eric Schkufza and Alex Aiken (Stanford University)*

#### **Trading Functionality for Power within Applications**

*Melanie Kambadur and Martha A. Kim (Columbia University)*

#### **Uncertainty Quantification in High Performance Computing**

*Florian Augustin and Youssef Marzouk (MIT)*

Wrap-Up