Sara Achour

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EDUCATION

MIT
2013-Present | Cambridge,MA
COMPUTER SCIENCE PHD
Advised by Martin Rinard
Program Analysis and Compilation Group
CSAIL/EECS
GPA:3.85

UCLA
2008-2013 | Los Angeles
BS IN COMPUTER SCIENCE
Henry Samueli Engineering School (HSSEAS)
Dean's List all Quarters
Summa Cum Laude (top 5%)
BS IN COMPUTATIONAL BIOLOGY
Computational Systems Conc.
College of Letters and Science
Valedictorian
Major GPA: 3.97/4.00
Cumulative GPA:3.87/4.00

COURSEWORK

GRADUATE
Computer Architecture, Program Analysis, Machine Learning, Theory Of Computation (In Progress)

UNDERGRADUATE
Computer Science: Parallel Computing, Databases, Numerical Computing, Computer Architecture, Logic Design of Digital Systems / Digital Design Laboratory, Software Engineering, Networking, Programming Languages, Algorithms and Complexity, Operating Systems, Formal Languages and Automata, Computer Graphics
Math/EE: Digital and Analog Signal Processing and Feedback Control, Statistics, Probability Differential Equations, Linear Algebra, Discrete Math, Single/Multivariable Calculus
Biology: Biomedical Engineering, Modelling and Simulation of Biological Systems, Organic and Inorganic Chemistry, Molecular Biology, Physiology, Cells Tissues and Organs, Genetics, Evolution Ecology and Biodiversity

PUBLICATIONS

Energy Efficient Approximate Computation in Topaz
Sara Achour and Martin Rinard
Aug 19, 2014, Technical Report, MIT-CSAIL-TR-2014

Chisel: Reliability- and Accuracy-Aware Optimization of Approximate Computational Kernels
Sasa Misailovic, Michael Carbin, Sara Achour, Zichao Qi and Martin Rinard
29th ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages and Applications (OOPSLA/SPLASH 2014), Portland, OR, USA, October 2014.

Reliability-Aware Optimization of Approximate Computational Kernels with Rely
Sasa Misailovic, Michael Carbin, Sara Achour, Zichao Qi and Martin Rinard
Jan 1, 2014, Technical Report, MIT-CSAIL-TR-2014-001

RESEARCH

TOPAZ
Martin Rinard | 2014
Topaz is a task-based language and runtime for developing programs to run on approximate computing platforms that may occasionally produce arbitrarily inaccurate results. Topaz deploys a novel outlier detection and reliable reexecution mechanism to prevent unacceptably inaccurate task results from corrupting the overall computation.

- designed and implemented Topaz runtime, control systems for output outlier detection (in MPI,C++).
- designed compute-combine extension to C, implemented cross compilier into pure C.
- designed and implemented approximate hardware extension for Pin.
- implemented five benchmarks from various domains for experiments (in C++).

CHISEL
Sasa Misailovic, Michael Carbin, Martin Rinard|Fall-Summer 2013-2014
Chisel is a system for reliability- and accuracy-aware optimization of approximate computational kernels that run on approximate hardware platforms. Given a combined reliability and accuracy specification, Chisel automatically selects approximate kernel operations to synthesize an approximate computation that minimizes energy consumption while satisfying its reliability and accuracy specification.

- designed and implemented reliability search algorithm, given final output quality (in Python).
- implemented kernel output checkers.
- implemented five benchmarks from various domains for experiments (in C/Rely).

MAGPIE
Michael Gordon, MIT | Spring 2014
Magpie is a code reuse detection tool that, given a Java project, scans online repositories for similar snippets of code. Magpie then communicates the results to the user through the code reuse summarizer and browser. Magpie is implemented as an Eclipse plugin.

- implemented distinct code feature extraction from Java source file.
- implemented code feature search using ohloh code aggregator as backend.
- implemented tree-based similarity summarizer for project, with side-by-side structural comparator.

SKILLS

Programming/Scripting Languages: C, C++, Java, Javascript, Python, OCaml, Haskell, Bash, Prolog, VB .NET, Coq
Markup Languages: Latex, HTML, Markdown, CSS, Makefile
Libraries: C++ STL, Java Standard Libraries, Sproutcore, JQuery, Various Javascript [JQuery, PeerJS, 3js, etc], Parser/Generator Libraries, Android Libraries, Chrome APIs

Operating Systems: Debian-based, Archlinux, OSX Mavericks, Windows 7

AWARDS

2015	NSF GRFP Fellowship
2014	Merill Lynch Fellowship
2013	Summa Cum Laude in Computer Science (top 5%)
2013	Valedictorian in Computational Biology (1st)
2012	Roberto Padovani Fellowship (8 awarded)
2011	CDSC Fellowship
2010-2013	Dean's List (HSSEAS)

SOCIETIES

2012	Upsilon Pi Epsilon (Computer Science Honor Society)
2011	Tau Beta Pi (Engineering Honor Society)

LINKS

MIT:
people.csail.mit.edu/sachour
GitHub:
github.com/sarachour
Linkedin:
linkedin.com/pub/sara-achour/9/b09/76a

PERSONAL

8Tracks Virtuoso: Chrome extension for power users of 8tracks. Supports synchronization with Spotify, LastFM as well as mix search, notifications and hotkey mapping.
Debauchery: Collaborative drawing game for android with support for playing online with friends. *In progress.*
Scramble: In-browser collaborative retro game player with scalable peer-to-peer infrastructure. *In progress.*

MATLAB TO HABENERO C COMPILER
Jens Palsberg, Center for Domain Specific Computing (CDSC), UCLA, CA
June-Sept 2011
The Matlab to Habanero C compiler cross-compiles a subset of the Matlab language to Habanero C.

- implemented Typed Matlab AST to Habanero source cross compiler (in Java).
- implemented subset of matlab library functions using Blas, LaPack, C.
- implemented loop optimization for cross cutting matrix operations.
- presented results at CDSC poster session.

THYROID SIMULATOR
I wrote a partial differential equation simulator for the pediatric thyroid hormone model. This project was part of my Computational Biology thesis.

- implemented differential equation simulator for stiff systems (in Python).
- implemented pediatric thyroid hormone model (60 differential equations).
- implemented support for (dis)continuous inputs and time-delayed state variables.
- implemented web interface for specifying inputs and displaying outputs.

INDUSTRY

QUALCOMM | SOFTWARE RESEARCH INTERN
June-Sept 2012,2013 | Qualcomm Research Division, San Diego, CA
For my project, I developed high throughput realtime neurological visualizations to facilitate in-browser monitoring of simulations.

- designed and implemented neurological visualizations - including (hardware accelerated) heatmap, basic graphs, raster plot with histograms, fan-in/fan-out diagram, and connectivity diagram (javascript+webgl/canvas).
- implemented unit testing framework for Sproutcore library which supports relaxed compare for canvas and deep structural compare for complex data structures. Unit test results are stored using an expressive internal structure which may be exported to a variety of formats.
- presented findings in company poster session, one of eight interns awarded Roberti Padovani scholarship.

GERARD MANNING (PI), RAZAVI-NEWMAN LAB, SALK INSTITUTE OF BIOLOGICAL SCIENCES | RESEARCH INTERN
Summer 2007, 2008, 2009 | San Diego, CA
For my research, I studied the effects of whole genome duplications on kinase evolution in ciliates. Kinases are enzymes that phosphorylate substrates.

- annotated the *Paramecium Tetraurelia* kinome. A kinome is the set of kinases in a particular organism.
- constructed the kinome of the common ancestor between *Paramecium Tetraurelia* (3 whole genome duplications) and *Tetrahymena Thermophila* (0 whole genome duplications)
- compared each respective kinome to the constructed common ancestor kinome and draw conclusions about the evolution of kinase families following whole genome duplications.
- presented findings in final presentation, poster session.