Juspreet Singh Sandhu

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Research Interests

Theoretical Computer Science, High-Dimensional Probability, Theoretical Machine Learning, Information Theory, Optimization, Combinatorics, Spectral Graph Theory, Discrete Geometry

Education

***PhD**, Computer Science, Harvard University* *2018 – Present*

***BS**, Physics, University of Illinois at Urbana Champaign* *2011 – 2015*

Minors: *Computer Science, Mathematics*

Publications

Hiding functions of the Plain-Text. Flavio P. Calmon, Juspreet Singh Sandhu. **In progress**

Higher-Order MACS are not secure. Boaz Barak, Ugo Dal Lago, Juspreet Singh Sandhu. **In Progress**

Teaching

- *Teaching Fellow, Information Theory (AM 250).* Fall-2019, Harvard University
- *Teaching Fellow, Applied Complex Analysis (AM 104).* Fall-2019, Harvard University
- *Grader, Information Retrieval (CS 410).* Spring-2015, University of Illinois at Urbana Champaign

Technical Reports

Unitary t-designs & Quantum Circuits, Fall-2018, Harvard University

Duality between Brascamp-Lieb Inequality & Subadditivity of Entropy, Spring-2019, Harvard University

Research Experience

October 2017 – March 2018: Researcher, Programming Systems Lab, UCSD

Worked under the guidance of Shravan Narayan at UCSD to add a Fixpoint algorithm to the Refinement Types framework for the LLVM compiler.

October 2014 – March 2015: SPIN Researcher, National Center for Supercomputing Applications

Worked under the guidance of Prof. Poole to investigate the use of NLP algorithms in extracting meaningful data from recordings of conversations between firemen.

August 2014 – January 2015: Independent Study, TIMAN Lab, University of Illinois at Urbana Champaign

Worked under the guidance of Prof. Zhai to investigate the effect of coreference resolution on search engine performance using the stanford-core-nlp package and a dataset collected from IMDB.

May 2014 – August 2014: Summer Research, Astronomy Lab, University of Illinois at Urbana Champaign

Worked under the guidance of Prof. Foley to write python code that efficiently implements the bayesian method of predicting supernovae types as exposed in the GALSNID paper.

Talks & Presentations

September 23, 2019: *The FEI conjecture: Motivations, Applications & Special Cases*, Theory student seminar, Harvard University

August 12, 2019: *Brascamp-Lieb, Subbaditivity of Entropy & Log-Sobolev Inequalities*, Theory student seminar, Harvard University

July 15, 2019: *Entropic Inequalities*, Theory student seminar, Harvard University

May 17, 2019: *Entropy, Isoperimetry & Concentration of Measure*, Local Algorithms Group meeting, MIT.

March 4, 2019: *Random Circuit Sampling & Quantum Supremacy*, Theory student seminar, Harvard University

Coursework

Graduate Coursework: Information Theory in Computer Science, Matrix Analysis, Physics & Computation, Geometric Complexity Theory, Randomized Algorithms & Probabilistic Analysis*, Autonomous Machines*

Undergraduate Coursework: Discrete Mathematics, Algorithms & Models of Computation, Data Structures, Machine Learning, Abstract Linear Algebra, Complex Analysis, Differential Geometry, Differential Equations, Statistical Physics, Quantum Mechanics I & II, Electromagnetism I & II, Classical Mechanics I & II, Physics Lab I & II, Compilers, Computer Architecture

* - *Currently enrolled*

Work Experience

August 2017 – July 2018: Software Engineer, Graph Infrastructure Team, Kensho Inc.

Worked under the guidance of Predrag Gruevski and Caleb Howe to write threading semantics for distributed data-ingestion, implement automatic graph-database syncs, and prototype additions to the GraphQL compiler.

December 2015 – June 2017: Software Engineer, Search Team, Tumblr Inc.

Worked under the guidance of Benjamin Ullian to design and implement a recursive tree data-structure to parallelize search queries across Tumblr and wrote benchmarks to evaluate performance.

Awards

May 2012: *Dean's List, University of Illinois at Urbana Champaign*

November 2008: *Rank 52, National Mathematics Olympiad, India*

Languages

Fluent: English, Hindi, Sanskrit, Punjabi

Basic: Korean

References

Prof. Flavio Du Pin Calmon: fcalmon@g.harvard.edu

Prof. ChengXiang Zhai: czhai@illinois.edu