Shivam Handa

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RESEARCH INTERESTS Programming Languages, Semantics, Formal Methods, Distributed Systems, Probabilistic Programming

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA, USA
Ph.D. in Computer Science and Engineering **Sept 2016 - Current**

Indian Institute of Technology, Delhi, India
B.Tech in Computer Science and Engineering **June 2010 - May 2014**

- Cumulative Grade Point Average: 9.183/10, ranked 4th in a class of 60.

SCHOLASTIC ACHIEVEMENTS

- Won Silver Medal for India at **International Physics Olympiad (IPhO)** 2010, held at Zagreb, Croatia. Honoured by **Ministry of Science and Technology** and **Tata Institute of Fundamental Research** for the same.
- Awarded **Aditya Birla Scholarship** for 4 consecutive years. **1 among 11** scholars from Engineering students all over India.
- Secured **All India Rank 37** in IIT-JEE entrance examination, among 500,000 students.
- Awarded **AIEEE Merit Scholarship** for securing **All India Rank 9** in **AIEEE** entrance examination among 1,000,000 students.
- **Teaching Assistant** for Programming Languages course under Prof. Sanjiva Prasad.

WORK EXPERIENCE AND INTERNSHIPS

Microsoft Research India, Bangalore, India
Research Fellow, Programming Languages and Tools Group **June 2014- June 2016**

Adobe Advanced Technology Labs, Delhi, India
Research Intern, Social team **May 2013 - July 2013**

HBCSE, Tata Institute of Fundamental Research, Mumbai, India
NIUS Researcher under Dr. Vijay Singh **May 2012 - July 2012**

RESEARCH WORK

Compositional Inference Metaprogramming
Dr. Martin Rinard, Dr. Vikash Manasinghka *CSAIL, MIT*
We introduce language constructs which allow us to compose rigid black-box inference algorithm using the notion of inference metaprograms. Inference metaprograms allow developers to dynamically decompose inference problems into subproblems and run inference algorithms over these subproblems. We provide formalize inference metaprogramming and prove convergence guarantees for a large class of inference metaprograms.
https://dl.acm.org/citation.cfm?id=3192409
https://arxiv.org/abs/1907.05451

CScale: Distributed Steam Processing Engine
Dr. Ganesan Ramalingam, Dr. Kapil Vaswani, Dr. Kaushik Rajan *Microsoft Research*
Current stream processing engines try to keep the state size low and their histories bounded to make current fault tolerant schemes viable. The aim of this project is to remove this restriction. Our tool

- Maintains redundant secondaries, as recovery transmitting large state is not possible in sub second time.

- It currently uses replicated pipelines and uses re-computation to improve performance of replication and provide no-data-loss guarantees.

We are successful in gaining throughput equal to line rate, while improving recovery times, even in case of large states with infinite histories.

Remote Desktop using VM Record and Replay
Dr. Sorav Bansal *Undergraduate Thesis*
The project aimed to optimize remote desktop tools to consume less network bandwidth

- The tool utilizes VM record replay technique to record server's interrupts and streams then to client for replay. The size of interrupt log is extremely small as compared to the compresed video streams current tools use.
- Record replay requires a coherent VM image to be present on server and client when the technique starts. The tool sends parts of the VM image On-Demand.
- Workloads which are disk read heavy, bloats the network traffic. The tool uses an adaptive technique to switch between Record Replay mode and traditional remote desktop mode, based on disk loads and network traffic.

Content Ideation
Mohit Garg, Dr. Sriram Revankar *Adobe Advanced Technology Labs*
Created a tool to help companies create engaging content for their social media followers, which

- Clusters fan base into demographic groups, creating interest and preference profiles.
- Analyzes groups previous activity calculating Optimum Time when the group is receptive.
- Predicts performance of Posts and provides suggestions on mode of content delivery.
- Provides popular trends online, which maybe interesting to a company's audience.

We created an interest comparison measure, and successfully filed a **patent** for it.
Hierarchy Similarity Measure*, Shukla, S.; Agarawal, V. ;Bhargava, R.; Handa, S.*
https://www.google.co.in/patents/US20150149468

Effective Mass theory for a 2-D Quantum Dot
Dr. Praveen Pathak, Dr. Vijay Singh *HBCSE, Tata Institute of Fundamental Research*
The hypothesis we started on was that Ben Daniel-Duke (BDD) condition, which states that electron changes its effective mass in different potentials, would have much more effect on the energy levels rather that the magnitude of the magnetic field. I helped in deriving an approximate model for Quantum Dots in Magnetic Fields; considering BenDaniel-Duke (BDD) condition. Analyzed Results to state the importance of BDD effects over magnetic field effects.

References

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