

SHIVAM HANDA

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ACADEMIC DETAILS

- Ph.D., Computer Science, Minor in Business, MIT Center for Deployable Machine Learning, EECS, MIT (2019-Ongoing)
Areas: Program Synthesis, Application of Formal Methods in Machine Learning and System Design. GPA: 4.8
- M.S., Computer Science, EECS, MIT (2016-2019)
Thesis: Composable Inference Metaprogramming using Subproblems.
- B.Tech, Computer Science and Engineering, Indian Institute of Technology, Delhi (2010-2014)
Thesis: Remote Desktop using Virtual Machine (VM) Record and Replay. GPA: 9.183/10

WORK EXPERIENCE

- Research Fellow, Programming Languages and Tools Group, Microsoft Research India, Bangalore, India June 2014-June 2016
Project: CScale: Distributed Stream Processing Engine.
Designed data processing systems which can handle data at line rate (10Gbps). Advised product team to integrate these ideas.
- Research Intern, Social Team, Adobe Advanced Technology Labs, Delhi, India May 2013-July 2013
Project: Content Ideation. **Patent** on a part of this work: **Hierarchy Similarity Measure**, Shukla et.al.
Constructed a ML based model which helps companies create engaging content for their social media followers, allowing them to predict performance of their posts and provides suggestions on mode of content delivery and optimum time to post.
- NIUS Researcher in Physics, HBCSE, Tata Institute of Fundamental Research, Mumbai, India May 2012-July 2012
Landau quantization of a circular Quantum Dot using the Ben-Daniel Duke boundary condition, Superlattices and Microstructures.
- Advisor to the Dean of Engineering, GradSAGE, MIT Feb 2021-Current

SELECTED RESEARCH WORK

- **Inductive Program Synthesis over Noisy Data**
 - Synthesis of programs over noisy input-output examples. These programs in general are more **interpretable than ML models**.
 - Inductive Program Synthesis over Noisy Data, FSE 2020
 - Formalized the conditions under which the synthesis algorithm is **optimal** and will **converge** to the correct underlying program.
 - Program Synthesis Over Noisy Data with Guarantees under review PLDI 2022
 - Inductive Program Synthesis over Noisy Datasets using Abstraction Refinement arxiv 2022
- **A Dataflow Model for Extracting Shell Script Parallelism** ICFP 2021
 - Transforms shell scripts into their **parallel** and **distributed versions**, with **guarantees**, using light weight annotations.
 - This project has now joined the Linux Foundation.
- **Compositional Inference Metaprogramming**
 - Inference Metaprogramming allows developers to dynamically decompose **general bayesian inference problems** into smaller subproblems to solve. Our work formalizes inference metaprogramming and provides **convergence guarantees**.
 - Probabilistic programming with programmable inference PLDI 2018.
 - Compositional Inference Metaprogramming with Convergence Guarantees arxiv 2019.
- **Supply-Chain Vulnerability Elimination via Active Learning and Regeneration** CCS 2021
- **CScale: Distributed Stream Processing Engine**
 - Designed stream processing engine which allows computations with **large state** with **unbounded histories**.
 - It improves performance of **replicated pipelines** and uses **re-computation**, while providing no-data-loss grantees.
- **Remote Desktop using VM Record and Replay**
 - Optimization of Remote Desktop tools to **consume less Bandwidth** and **Virtual Remote Server's CPU**.
- **Content Ideation**
 - Constructed a ML based model which helps companies create engaging content for their social media followers, allowing them to predict performance of their posts and provides suggestions on mode of content delivery and optimum time to post.
 - **Patent** on a part of this work: **Hierarchy Similarity Measure**, Shukla et.al.
- **Influence of the Ben-Daniel Duke boundary condition on the levels of a circular Quantum Dot in a magnetic field**
 - Derived a theoretical model of effects of Ben Daniel Duke condition in case of circular Quantum Dots in magnetic fields.
 - To appear in **Superlattices and Microstructures**.

SCHOLASTIC ACHIEVEMENTS

- Awarded **Aditya Birla Scholarship** for **4 consecutive years**; **1 among 11** scholars from all over India.
- Won **Silver Medal** for India at **International Physics Olympiad (IPhO)** 2010, held at Zagreb, Croatia.
Honored by **Ministry of Science and Technology** and Tata Institute of Fundamental Research for the same.
- Secured **All India Rank 37** in IIT-JEE entrance examination, among more than 500,000 students.
- Awarded **AIEEE Merit Scholarship** for securing **All India Rank 9** in AIEEE qualifying exams.
- Won the **Adam Smith Case Competition**, 2021.

RELEVANT COURSE WORK

Managerial Finance, Intro to Operations Management, New Enterprises, Corporate Financial Accounting, Machine Learning, Statistical Learning Theory, Topics in Deployable Machine Learning, Quantum Mechanics, Relativistic Quantum Mechanics.