MEGHAMALA SINHA

Ph.D. candidate at Oregon State University, specializing in Machine Learning, Data Science & Computational Biology

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EXPERIENCE

Graduate Research Assistant, Oregon State University — Mar 2020 – Ongoing

- Proposed method to improve causal structure learning by using Knowledge Graphs as expert prior information.
- Working with NCATS-Translator team to enhance the development of the Integrated Clinical and Environmental Exposures Service (ICEES).

Graduate Teaching Assistant, Oregon State University — Sep 2016 – Mar 2020

- Teaching Assistant for courses CS-331 (Introduction to Artificial Intelligence), CS-325 (Analysis of Algorithms), CS-340 (Introduction to Databases), CS-290 (Web Development), CS-444 (Operating Systems II), CS-546 (Networks in Computation Biology), CS-434 (Machine learning and Data mining)

Research Intern, TCS Innovation Labs — Jun 2015 – Dec 2015

- Published and Patented research work on the "Biosensing for cognitive load: EEG-based cognitive load detection" project with the Human systems group

Lab Assistant, National Institute of Technology, Durgapur — Aug 2014 – Aug 2015

- Lab assistant for courses IT- 651 (Object Oriented Technology), IT- 451 (Operating System)

EDUCATION

MS/Ph.D., Oregon State University — Sep 2016 – Ongoing

Major: Computer Science Minor: Biological Data Science GPA: 3.52/4 MS Thesis: Causal Structure Learning from Experiments and Observations

Master of Technology, National Institute of Technology, Durgapur — Jun 2013 – Aug 2015

Major: Information Technology GPA: 9.15/10 Thesis: Student evaluation model using bayesian network in e-learning system

Bachelor of Technology, West Bengal University of Technology — Jul 2008 – Jun 2012

Major: Information Technology GPA: 8.6/10 Project: Web-based central recruitment system

SELECTED PUBLICATIONS

Patent

- Chatterjee, D., Sinha, A., **Sinha, M.** and Saha, S. K. "Method and system for detection and analysis of cognitive flow" WO2017221082A1, filed 22.03.2017, published 28.12.2017 [link]

Papers

- **Sinha, M.** and Ramsey, S. "Using a General Prior Knowledge Graph to Improve Data-Driven Causal Network Learning" AAAI-MAKE. 2021 [link]
- **Sinha, M.**, Tadepalli, P. and Ramsey, S. "Voting-based integration algorithm improves causal network learning from interventional and observational data: an application to cell signaling network inference". Plos one. 2021 Feb 8;16(2):e0245776.[link]
- **Sinha, M.**, Tadepalli, P. and Ramsey, S. "Pooling vs Voting: An Empirical Study of Learning Causal Structures" WHY@AAAI. 2019 [link]
- Chakraborty, B. and **Sinha, M**. "Student evaluation model using bayesian network in an intelligent e-learning system" IIOABJ. vol. 7.2. 2016 [link]
- Chatterjee, D., Sinha, A., **Sinha, M.** and Saha, S. K. "A Probabilistic Approach for Detection and Analysis of Cognitive Flow" BMA@ UAI. 2016 [link]

SELECTED PROJECTS

Learning Causal Network under Uncertain Interventions

- Proposed a novel Bayesian method *"Learn and Vote"* to learn causal networks under uncertain interventions, demonstrating significance on a popular cell signaling, mixed dataset
- Improved causal structure-learning accuracy of baseline method by 14% by reducing false positive rate
- Conducted large scale benchmark study of prominent causal inference methods for handling uncertain interventions and compared our method.

Identifying features of sequence locations in a Genome

- Identified features of sequence locations to distinguish different type of genomic entities, using SVM classification
- Achieved accuracy of 82-85 %. Utilized SGE parallel processing to reduce execution time from 2 mins to 42 secs

Reinforcement Learning methods to solve MDPs like Game of Life

- Defined problem domains for small MDPs in Relational Dynamic Influence Diagram Language
- Implemented UCT and Value-Iteration solver for solving such domains

Event extraction via deep semantic LSTM

- Implemented event prediction method using word, document embedding with LSTM by extracting events from ACE 2005 corpus
- Implemented multiple word representation, multiple CNN layer, RNN over multiple CNN

Email Spam detection

- Conducted a comparative study to understand effectiveness of decision tree, random forest and SVM with K-means for feature selection to detect spam
- Proposed method using K-means clustering with Neural Network with improved accuracy (76%) and reduced computational cost

Analysis of Learner's Mental State using Probabilistic Graphical Model

- Designed a Bayesian Network Framework to determine cognitive state of users
- Measured Cognitive states while users (with various IQ) performed tasks of different complexities using physiological sensors

Student Evaluation Model in e-learning system

- Developed a probabilistic e-learning system having student, tutor, domain and student evaluation module to correctly detect knowledge level based on response to questions
- An element of uncertainty was introduced in student evaluation module and handled by Bayesian Network

SKILLS

Fundamentals

Artificial Intelligence | Causal Inference | Machine Learning | Deep Learning | Algorithms | Reinforcement learning | Statistics | Data Analysis | Software Engineering | Cancer Systems Biology | Graphical Models | Genome Biology

Programming Languages & Tools

Python *(proficient)* | Java/ J2EE *(proficient)* | R *(proficient)* | Matlab *(proficient)* | C++ *(familiar)* | C *(proficient)* | JSP *(proficient)* | PL/SQL *(proficient)* | MySQL *(proficient)* | JDBC/ODBC *(proficient)* | TeX *(proficient)* | Tensorflow *(familiar)* | Keras *(familiar)* | Node.js *(familiar)* | Tableau *(familiar)* | Neo4j *(familiar)* | Cipher *(familiar)* | Pandas *(familiar)* | sklearn *(familiar)* | JDBC/ODBC*(proficient)*

OTHERS

- Invited speaker at the "Women in Data Science Puget Sound 2021 Conference" to talk on "Usefulness of Knowledge Graphs for Improving Data-Driven Causal Network Learning".
- Invited speaker at the "Women in Data Science Puget Sound 2020 Conference" to talk on "Causal Inference from Experiments and Observations".
- Volunteer in the Fall Career Expo'18 at Oregon State University
- Volunteer at SafeHaven Humane Society, a private, nonprofit animal shelter located in Tangent, Oregon.