theaksaini.github.io

Anil Kumar Saini

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Research Interests

- Automated Machine Learning (AutoML), Fairness in AI, Evolutionary Computation

Education

University of Massachusetts Amherst, MA 2016–2022

- PhD in the College of Information and Computer Sciences, GPA: **3.9/4**
- Advisor: Prof. Lee Spector

University of Massachusetts Amherst, MA 2016–2019

- MS in the College of Information and Computer Sciences, GPA: **3.9/4**

Indian Institute of Technology Roorkee, India 2012–2016

- BTech in the Department of Computer Science and Engineering, GPA: **8.9/10**

Professional Experience

- **Cedars-Sinai Medical Center | Research Data Scientist** Dec 2024–Present
  Working as a research data scientist in the Department of Computational Biomedicine, contributing to biomedical research projects with a particular focus on automated machine learning and fairness issues in machine learning. Duties include deploying models into production and leading the dissemination of scientific findings through peer-reviewed publications.
- **Cedars-Sinai Medical Center | Postdoctoral Scientist** Aug 2022–Nov 2024
  Worked as a postdoctoral scientist in the Department of Computational Biomedicine under the guidance of Dr. Jason Moore. Focused on addressing fairness issues in machine learning models. These issues are especially critical in medical settings, where predictive models trained on biased datasets can perpetuate inequalities against historically disadvantaged groups.
- **UMass Amherst | Graduate Research Assistant** May 2017– Aug 2021
  Served as a Research Assistant in the College of Information and Computer Sciences, University of Massachusetts Amherst.
- **Adobe Research Bangalore | Intern** May 2015–Jul 2015
  Developed a tool that helps users write articles with numerical information on a given topic. For a given set of datasets and the topic query, it quantifies relevancy, sufficiency, and source quality for each dataset and comes up with a set of useful datasets.

Publications

1. **Hernandez, J. G., Saini, A. K., Ghosh, A., & Moore, J. H.** (2025). The tree-based pipeline optimization tool: Tackling biomedical research problems with genetic programming and automated machine learning. *Patterns*, 6(7).
2. **Hernandez, J. G., Saini, A. K., & Moore, J. H.** (2025). Lexicase Selection Parameter Analysis: Varying Population Size and Test Case Redundancy with Diagnostic Metrics. In *Genetic Programming Theory and Practice XXI* (pp. 375-393). Singapore: Springer Nature Singapore.
3. **Wong, E. F., Saini, A. K., Accortt, E. E., Wong, M. S., Moore, J. H., & Bright, T. J.** (2024). Evaluating Bias-Mitigated Predictive Models of Perinatal Mood and Anxiety Disorders. *JAMA Network Open*, 7(12), e2438152-e2438152.
4. **Hernandez, J. G., Saini, A. K., & Moore, J. H.** (2024, July). Lexidate: Model Evaluation and Selection with Lexicase. In *Proceedings of the Genetic and Evolutionary Computation Conference Companion* (pp. 279-282).
5. **Ribeiro, P., Saini, A., Moran, J., Matsumoto, N., Choi, H., Hernandez, M., & Moore, J. H.** (2024). TPOT2: A New Graph-Based Implementation of the Tree-Based Pipeline Optimization Tool for Automated Machine Learning. In *Genetic programming theory and practice XX* (pp. 1-17). Singapore: Springer Nature Singapore.
6. **Moore, J. H., Ribeiro, P. H., Matsumoto, N., & Saini, A. K.** (2023). Machine Learning—Automated Machine Learning (AutoML) for Disease Prediction. *Clinical Applications of Artificial Intelligence in Real-World Data*, 161-173.

7. **Moore, J. H., Ribeiro, P. H., Matsumoto, N., & Saini, A. K.** (2023). Genetic programming as an innovation engine for automated machine learning: The tree-based pipeline optimization tool (TPOT). In *Handbook of Evolutionary Machine Learning* (pp. 439-455). Singapore: Springer Nature Singapore.

8. **Matsumoto, N., Saini, A. K., Ribeiro, P., Choi, H., Orlenko, A., Lyytikäinen, L. P., Laurikka, J.O., Lehtimäki, T., Batista, S., & Moore, J. H.** (2023, March). Faster Convergence with Lexicase Selection in Tree-Based Automated Machine Learning. In *European Conference on Genetic Programming (Part of EvoStar) (pp. 165-181)*. Cham: Springer Nature Switzerland.

9. **Saini, A. K., Spector, L., & Helmuth, T.** (2022, July). Environments with local scopes for modules in genetic programming. In *Proceedings of the Genetic and Evolutionary Computation Conference Companion* (pp. 598-601).

10. **Saini, A. K., & Spector, L.** (2022). Evolving and analyzing modularity with gleam (genetic learning by extraction and absorption of modules). In *Genetic Programming Theory and Practice XVIII* (pp. 181-195). Singapore: Springer Nature Singapore.

11. **Saini, A. K., & Spector, L.** (2021). Relationships between parent selection methods, looping constructs, and success rate in genetic programming. *Genetic Programming and Evolvable Machines,* 22(4), 495-509.

12. **Saini, A. K., & Spector, L.** (2021, July). GLEAM: genetic learning by extraction and absorption of modules. In *Proceedings of the Genetic and Evolutionary Computation Conference Companion* (pp. 263-264).

13. **Saini, A. K., & Spector, L.** (2020, July). Why and when are loops useful in genetic programming?. In Proceedings of the *2020 Genetic and Evolutionary Computation Conference Companion* (pp. 247-248).

14. **Saini, A. K., & Spector, L.** (2020). Using modularity metrics as design features to guide evolution in genetic programming. In *Genetic Programming Theory and Practice XVII* (pp. 165-180). Cham: Springer International Publishing.

15. **Saini, A. K., & Spector, L.** (2020, April). Effect of parent selection methods on modularity. In *European Conference on Genetic Programming (Part of EvoStar)* (pp. 184-194). Cham: Springer International Publishing. **Winner, Best Paper Award.**

16. **Saini, A. K., & Spector, L.** (2019, July). Modularity metrics for genetic programming. In *Proceedings of the Genetic and Evolutionary Computation Conference Companion* (pp. 2056-2059).

17. **Metevier, B., Saini, A. K., & Spector, L.** (2019). Lexicase selection beyond genetic programming. In *Genetic programming theory and practice XVI* (pp. 123-136). Cham: Springer International Publishing.

Teaching Experience

- **Instructor** for CS 0184 (Beginning Coding for Science) at Hampshire College in Spring 2019
- **Teaching Assistant** for COMPSCI 121 (Introduction to Problem Solving with Computers) at UMass Amherst in Fall 2016
- **Teaching Assistant** for COMPSCI 348 (Introduction to Knowledge Discovery) at UMass Amherst in Spring 2017
- **Teaching Assistant** for COMPSCI 590T (Algorithmic Fairness and Strategic Behavior) at UMass Amherst in Fall 2021

Honors and Awards

- Received IIT Roorkee Merit-cum-Means (MCM) Scholarship consecutively for 8 semesters.
- Awarded Central Board of Secondary Education (CBSE) Certificates of Merit in 2 out of 5 subjects for being among the top 0.1% nationwide in Senior Secondary Year.

Services

- **Professional:**
  - Reviewer for Genetic Programming Theory and Practice XVI and XXII, and IEEE Transactions on Evolutionary Computation.
  - Member of the organizing committee of CBM Science Cafe at Cedars-Sinai, an avenue for the members of the department to present on scientific research topics.
- **University:**
  - Student Senator of Graduate Student Senate (2020-21)
  - Member of New Student Committee - CICS (Spring 2021)
  - President and Treasurer of the Indian Student Association, a GSO (Graduate Student Organization) at UMass during 2017-18 and 2018-19, respectively
  - Member of the executive board of Hindu YUVA, an RSO (Registered Student Organization) at UMass from Fall 2016 - Spring 2021

Relevant Coursework

- **Artificial Intelligence**
  Artificial Intelligence, Advanced Natural Language Processing, Neural Networks, Probabilistic Graphical Models
- **Theory**
  Advanced Algorithms, Design and Analysis of Algorithms, Data Structures, Theory of Computation (Seminar)
- **Systems**
  Performance Evaluation, Advanced Information Assurance, Computer Architecture
- **Others**
  Research Methods in Empirical Computer Science, Ethical Considerations in Computing