Sanyam Jain

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OVERVIEW

I am currently a Master's student (2022-24) at Østfold University College and a Research Assistant (2023) at OsloMet University, Norway. My research focus belongs to ALife, Evolution, Complexity and Artificial General Intelligence. I enjoy working with Prof Stefano Nichele (also supervisor) where we together study complexity and emergent behaviour in discrete Cellular Automata, continuous CA (Lenia) and Neural CA. Some of my previous work and projects also determine my interest in Deep Learning for Computer Vision and Explainable AI. I finished my Junior Research Fellowship (and did not continue PhD) at Indian Institute of Technology (IIT) Jodhpur (2020-2022) where I studied Deep Learning, Classical ML, and Dependable AI taught by Dr. Mayank Vatsa and Dr. Richa Singh. Conversely, I was also part of VANETs lab supervised by Prof Debasis Das, where my focus was to provide Machine Learning edge for the team. Moreover, I was part of QIC group at the IIT as well. I finished my early Computer Science Engineering (Bachelor's 2015-2019) degree from UPES, Dehradun at the foothills of Himalayas. Most of my guidance during bachelor's for which I am thankful, always to Dr Ravi Tomar. I belong to the central part of India, from a town called Banswara which lies in south Rajasthan.

EDUCATION

08.2022 – present	**Master of Applied Computer Science** Scientific Computing, Machine Learning, Adv. Machine Learning, Cyber Physical Systems, Applied CS project (Evolutionary Algorithms and Cellular Automata) (expected graduation 06.24). Tentative end in June 2024.	**Østfold University College** ("Currently 4.4/5"), Halden Norway
06.2015 – 05.2019	**Bachelor of Technology, CSE** Data Structures, Algorithms, JAVA, Operating Systems, Databases, Computer Networks, Theory of Computation, Discrete Mathematics, Digital logic and design, Artificial Intelligence	**University of Petroleum and Energy Studies (UPES)**, Dehradun ("77.50%"), Uttarakhand
05.2013 – 04.2015	**Senior School** Physics, Chemistry, Mathematics, English, Physical Education	**Samrat Public School, Ajmer** ("77.50%"), Rajasthan
Till 2013	**Previous Schooling** Lower KG, Upper KG, Class 1st to 10th	**St. Paul's Senior Secondary** School, Banswara, Rajasthan

RELEVANT EXPERIENCE

(Relevant References from respective institutions can be provided on request.)*

09.2023 - current	**Research Assistant (20%)** Performing coarse grained analysis on gene regulatory networks. Analysing evolved Random Boolean Networks.	**Oslo Metropolitan University**
06.2023 - 08.2023	**Summer Intern (Full Time)** The research internship included simulating discrete CA, Neural CA, and Lenia with Evo-Devo. The end result finally published as a 88 page article in Nordic Machine Intelligence Journal.	**Oslo Metropolitan University**
09.2022 – 06.2023	**Research Assistant (Part Time)** For Prof. Stefano Nichele at the Faculty of Computer Science and Communication. Studying behaviour of complex systems such as Multi Neighbourhood Cellular Automata using genetic algorithm and ML models.	**Østfold University College**
09.2020 – 08.2022	**Research Assistant (Full Time)** Part of VANETs Lab under supervision of Dept of Computer Science. Projects and Coursework in Deep Learning, Computer Vision, XAI, ML for Economics, Cryptography. Also been **Teaching Asst. for ML class** for Executive batch.	**Indian Institute of Technology, Jodhpur ("7.9 CGPA"), selection through GATE 2020 (All India rank 5692 out of 97481 candidates)**

OTHER EXPERIENCE

06.2019 - 08.2020	**Amazon AWS and Alexa** Have built custom Alexa skills for Indian Alexa Store using EC2, S3, Lambda, DynamoDB and optimised production cost for https://keyringcorp.in (owned)	KeyringCorp, Mumbai
06.2019 – 08.2020	**RPA Consultant** Guided and trained 100+ customers for UiPath RPA, Automation Anywhere and Blue Prism to automate Microsoft Excel, Tableau and Power BI.	Self Employed
08.2019 – 09.2019	**Graduate Trainee – Data Analyst**	FISERV INDIA LTD
05.2018 – 08.2018	**Software Engineering Intern** Developed custom REST APIs and OAuth protocol for SugarCRM, ZohoCRM, and FreshSales using Django	YelloAnt Inc

LANGUAGE SKILLS

- **English:** Excellent skills, both written and spoken (IELTS 7). Medium of Instruction as English throughout my Education.
- **Norwegian:** Been taking classes and basic understanding. "jeg snakker litt norsk"
- **Hindi:** Mother Tongue

ONGOING RESEARCH PAPERS AND PROJECTS

- **List of Publications -** https://scholar.google.com/citations?user=R9XAK2IAAAAJ&hl=en
- **NORA-AI**: Capturing Emergent Complexity in Evolved Multi-Neighbourhood Cellular Automata https://s4nyam.github.io/mncaportal Submitted at Nordic Machine Intelligence.
- **WIVACE 2023 Italy:** Capturing emerging complexity in Lenia available at https://s4nyam.github.io/evolenia
- **Project DeepSeaNet (preprint):** https://arxiv.org/pdf/2306.06075.pdf (Part of Adv ML course)
- **Adversarial Attack on YOLOv5:** https://arxiv.org/pdf/2306.06071.pdf (NORDIC AI MEET Poster)
- **CCGRID23** (Core A): CacheIn: A Secure Distributed Multi-layer Mobility-Assisted Edge Intelligence based Caching for Internet of Vehicles
- **ICAPAI:** SVM at Edge: Low Cost Caching Prediction for Connected Edge Intelligence in Federated Machine Learning https://github.com/s4nyam/EdgeSVM

CONFERENCE REPORTS

- WIVACE 2023, Conference Report - https://s4nyam.github.io/evolenia/wivace.html (Funding by HiØ)
- Keynotes and Talks Summary: NORA AI Annual Conference 2023, Tromsø, Norway, https://www.linkedin.com/pulse/keynotes-talks-summary-nora-ai-annual-conference-2023-sanyam-jain/
- NEURO AI Workshop, Tromsø, June 4, 2023 - https://www.linkedin.com/pulse/neuro-ai-workshop-troms%C3%B8-june-4-2023-sanyam-jain/
- NORA-AI Meet 2022, Short Summary of Day 1 Keynote - https://www.linkedin.com/pulse/nora-ai-meet-2022-short-summary-day-1-keynote-sanyam-jain/

GLIMPSE OF MSc. THESIS

Title: AI Generating Algorithms using Self-Organizing Neural Cellular Automata
Supervisor: Prof Stefano Nichele (https://www.nichele.eu/)
Abstract: Cellular Automata are sophisticated and complex systems that evolve interesting behaviour over generations of update rule sets. Game of Life, a popular behaviour of criticality in the such 2D CA are well studied. Continuous CA like, Lenia are successful in making life over a continuous space to compete wetware dynamics. Neural CA are much complex architectures that allows flexibility for more complex dynamics. The concept of endless variation becomes pivotal, implying that without complexification, any fixed level of complexity would inevitably exhaust existing interestingness or variation. Evolvability, facilitated by heritable genetic traits and selectable phenotypes with variation, is fundamental; without it, the discovery of new behaviours would be stifled. The dynamical task landscape, whether auto-telic or co-evolving, involves adaptive mutations, epigenetic autonomy, and adaptations. To study such complex and dynamical behaviours, researchers have been utilizing various tools to perform experiments In vitro, In vivo and In silico for different use cases. Our focus in this research work is In silico. Moreover, we also measure emerging diversity in terms of quality and quantity using entropy measures and gene-sequencing methods for phenotypic and genotypic diversities observed over time along with G-P, P-G relationships, and plasticity. There are few more results related speciation, gene sequencing and respective trajectories, gene clustering for Genetic Diversity. For phenotypic diversity we use entropy-based measures, (μ and σ) based measures and few other tools which I would like to share over the virtual conferencing if sounds interesting. There are a few more projects that me and my supervisor from MSc has done as part of the research asst. related to gene regulatory networks (and random Boolean networks), and some project related Classical Cellular automata.

REFERENCES

1. Stefano Nichele (stefano.nichele@hiof.no), Professor at HiØ and Professor II at OsloMet, Norway
2. Ankur Nahar (nahar.1@iitj.ac.in), Senior Research Fellow at IIT Jodhpur, India
3. Ravi Tomar (ravitomar7@gmail.com), previously Associate Professor at UPES Dehradun, India