SHUBHAM PATERIA

@ shubham.pateria@gmail.com   📞 +65-83570653, +91-9770947141   🌐 spateria.github.io
🌐 dblp.org/pid/186/7303   ⚙ spateria   in shubham-pateria-2091

EXPERIENCE

Research Scientist
Singapore Management University

📅 April 2022 – Ongoing   📍 Singapore

- Co-developed a hierarchical multi-agent reinforcement learning system combining self-organizing and deep neural networks, for simulated defense research technology licensed to DSO National Laboratories.
- Co-lead of the Trustworthy Federated Ubiquitous Learning project under SMU and AISG. Developing a novel self-organizing federated learning system for distributed data clustering, classification, and vertical federated learning. The system outperforms baselines by 25% in sparse data clustering and 3-4% in biomedical classification.

Co-founder
Maargo Technologies (discontinued startup)

📅 October 2021 – March 2022   📍 Singapore

- Developed mental health recommendation service for university students. I implemented the front-end and back-end for user verification, profiling, and Question-Answer dialogue handling. We did pilot tests with two Singaporean universities but decided not to continue due to insufficient traction.

Founder-in-Residence (EFSG10)
Entrepreneur First

📅 July 2021 – January 2022   📍 Singapore

Research Scholar
Nanyang Technological University (NTU)

📅 July 2017 – August 2021   📍 Singapore

- Conducted original research on **methods and algorithms for Hierarchical Reinforcement Learning and Planning**, with publications in high-impact venues such as IEEE TNNLS, ACM CSUR, and AAMAS.
- Developed a novel approach for simulated multi-robot hierarchical reinforcement learning for Search and Rescue applications, leading to 50-70% better task-completion performance compared to baselines. This work was funded by ST Engineering. Published in IEEE SSCI.
- Developed a novel end-to-end hierarchical reinforcement learning approach for goal-based navigation and simulated robot control, leading to 30-40% increase in goal achievement rate over baseline. Published in IEEE TNNLS and AAMAS.
- Developed a novel hierarchical planning method for goal-based navigation and simulated robot control, leading to 39-46% improvement in reward-based performance and data efficiency compared to baselines. Published in IEEE TNNLS.

EDUCATION

Ph.D. in Computer Science
Nanyang Technological University (NTU), Singapore

📅 July 2017 – Aug 2021

B.Tech. in Electronics & Communication Engineering
National Institute of Technology, Durgapur, India

📅 July 2009 – June 2013

SKILLS

Analysis and Problem Solving
Research Writing   LaTex
Python   Pytorch   Tensorflow   Keras
scikit-learn   Pandas   NLTK
Machine Learning   Reinforcement Learning
Deep Learning, CNN, LSTM, RNN
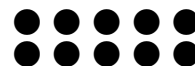SQL   Data Analysis   C,C++
React   FastAPI   Django

LANGUAGES

English   ●●●●●
Hindi   ●●●●●

PATENTS

- K. K. JHA, A. K. SINGH, D. RAVI, **S. PATERIA**, V. P. C. SUDHEESH BABU, and M. R. MANIYAR, *Method and system for an eye sensation prediction based display enhancement*, India Patent 201741008468, 2019.
- A. K. SINGH, **S. PATERIA**, K. KATRAGADDA, K. K. JHA, and V. P. C. S. BABU, *Method and system for optimizing power consumption in a display device*, India Patent 201741038214, 2019.

EXPERIENCE

Senior Software Engineer
Samsung R&D Institute India - Bangalore Pvt. Ltd.

📅 July 2016 – July 2017   📍 Bengaluru, India

- R&D Contribution: Novel methods for optimizing power consumption and visual quality of the Samsung smartphone display modules. The work led to two issued patents.

Software Engineer
Samsung R&D Institute India - Bangalore Pvt. Ltd.

📅 June 2014 – June 2016   📍 Bengaluru, India

- Worked with Display technology teams in SRI-B and Samsung HQ responsible for board bring-up and device driver upgrades critical for the successful commercial launch of Samsung smartphones in the worldwide market (Galaxy S4-variants, A7, Tab4, and other mid-tier smartphone variants).
- R&D Contribution: Machine learning for power-efficient and fault-tolerant sensor management system for Smart Home IoT sensors with minimal error (average 0.24°C) in temperature prediction. Published in IEEE IACC.

Trainee-Technology
Sapient Global Markets

📅 Oct Oct 2013 – Feb 2014   📍 Bengaluru, India

OTHER PROJECTS

- **Character-level Sign Language Interpretation from Hand-gestures using Recurrent Neural Networks.** Project Link
  A Convolutional LSTM model was developed to translate sequences of character-level hand gestures into corresponding words, achieving a word prediction accuracy of 96.8%. In comparison, a character prediction CNN without hidden state recurrence achieved only 64.5% accuracy. Additionally, a Sequence-to-Sequence LSTM was created, trained on pairs of incorrectly and correctly spelled words, serving as a postprocessor for the Conv LSTM's output. This further improved the test accuracy to 99.1%.
- **Aspect-based sentiment analysis using sentiment flow with local and non-local neighbor information.**
  A novel natural language sentiment prediction approach based on multilevel classification using Support Vector Machines (SVMs), achieving 83-88% sentiment classification accuracy. Published in COLING 2016.

PUBLICATIONS

- **S. Pateria**, B. Subagdja, A.-H. Tan, and C. Quek, "Value-based subgoal discovery and path planning for reaching long-horizon goals," *IEEE Transactions on Neural Networks and Learning Systems (TNNLS)*, 2023.
- K. P. Wai, M. Geng, B. Subagdja, **S. Pateria**, and A.-H. Tan, "Towards explaining sequences of actions in multi-agent deep reinforcement learning models," in *Proceedings of the 2023 International Conference on Autonomous Agents and Multiagent Systems, AAMAS*, 2023.
- **S. Pateria**, B. Subagdja, A.-H. Tan, and C. Quek, "End-to-end hierarchical reinforcement learning with integrated subgoal discovery," *IEEE Transactions on Neural Networks and Learning Systems (TNNLS)*, vol. 33, no. 12, 2021.
- **S. Pateria**, B. Subagdja, A.-h. Tan, and C. Quek, "Hierarchical reinforcement learning: A comprehensive survey," *ACM Computing Surveys (CSUR)*, vol. 54, no. 5, 2021.
- **S. Pateria**, B. Subagdja, and A. H. Tan, "Hierarchical reinforcement learning with integrated discovery of salient subgoals," in *Proceedings of the 19th International Conference on Autonomous Agents and MultiAgent Systems*, ser. AAMAS20, 2020.
- **S. Pateria**, B. Subagdja, and A.-H. Tan, "Multi-agent reinforcement learning in spatial domain tasks using inter subtask empowerment rewards," in *2019 IEEE Symposium Series on Computational Intelligence (SSCI)*, IEEE, 2019.
- **S. Pateria**, "Aspect based sentiment analysis using sentiment flow with local and non-local neighbor information," in *Proceedings of COLING 2016, the 26th International Conference on Computational Linguistics: Technical Papers*, 2016.
- P. K. Choubey, **S. Pateria**, A. Saxena, V. P. C. SB, K. K. Jha, and S. B. PM, "Power efficient, bandwidth optimized and fault tolerant sensor management for iot in smart home," in *2015 IEEE International Advance Computing Conference (IACC)*, IEEE, 2015.