Shantanu Jaiswal

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Education

Nanyang Technological University (NTU Singapore) Singapore
Bachelor of Engineering in Computer Engineering, Specialization in Intelligent Systems *Aug 2014 – Jun 2018*

- **GPA**: 4.64/5.00 (Honours highest distinction)
- **Selected Courses**: CE4041 (Machine Learning, A+); CE4034 (Information Retrieval, A+); CE4042 (Neural Networks, A); EE8087 (Living with Mathematics, A+); CE1008 (Engineering Mathematics, A+); MH1812 (Discrete Mathematics, A); MH8300 (Math in Real World Applications, A); CE1007 (Data Structures; A+)

Research Interests

Scene Understanding and Reasoning; Multimodal and Embodied AI; Self-supervised Learning; Cognitive Science

Publications

Conference papers

[1] **Shantanu Jaiswal**, Debaditya Roy, Basura Fernando, and Cheston Tan. "Learning to Reason Iteratively and Parallelly for Complex Visual Scenarios". In: ***Under review*** *at Conference on Computer Vision and Pattern Recognition (CVPR)*. 2024. [Paper] [State-of-art on STAR-VideoQA, CLEVRER-Humans, CLEVR-Humans, NLVRv1, CLEVR-CoGenT].

[2] Ishaan Rawal, **Shantanu Jaiswal**, Basura Fernando, and Cheston Tan. "Revealing the Illusion of Joint Multimodal Understanding in VideoQA Models". In: ***Under review*** *at International Conference on Learning Representations (ICLR)*. 2024. [Paper] [Short version at NeurIPS 2023 XAI in Action Workshop].

[3] **Shantanu Jaiswal**, Basura Fernando, and Cheston Tan. "TDAM: Top-Down Attention Module for Contextually-Guided Feature Selection in CNNs". In: *European Conference on Computer Vision (ECCV)*. 2022. [Paper] [Suppl.] [Code].

[4] **Shantanu Jaiswal**, Dongkyu Choi, and Basura Fernando. "What do CNNs gain by imitating the visual development of primate infants?" In: *31st British Machine Vision Conference (BMVC)*. 2020. [Paper] [Suppl.(zip)] [Code] [Abstract (Cogsci 2020)].

Other workshop/symposium/tiny-track papers and technical reports

[5] Aishik Nagar, **Shantanu Jaiswal**, and Cheston Tan. "Dissecting Zero-Shot Visual Reasoning Capabilities in Vision and Language Models". In: ***Under review*** *at International Conference on Learning Representations (ICLR) Tiny-Papers Track*. 2024. [Paper].

[6] Cheston Tan* and **Shantanu Jaiswal*** (equal contribution). "The Path to AGI Goes through Embodiment". In: *Proceedings of the AAAI Symposium Series. Vol. 1. No. 1.* 2023. [Paper].

[7] **Shantanu Jaiswal**, Liu Yan, Dongkyu Choi, and Kenneth Kwok. "A Probabilistic-Logic based Commonsense Representation Framework for Modelling Inferences with Multiple Antecedents and Varying Likelihoods". In: *arXiv*. 2022. [Tech. Report].

[8] Annamalai Narayanan, Mahinthan Chandramohan, Rajasekar Venkatesan, Lihui Chen, Yang Liu, and **Shantanu Jaiswal**. "graph2vec: Learning Distributed Representations of Graphs". In: *Proceedings of the 13th International Workshop on Mining and Learning with Graphs (MLG)*. 2017. [Paper] [Code].

Research Experience

Senior Research Engineer I – A*STAR Center for Frontier AI Research Jan 2019 – Present
Advisors: Dr. Cheston Tan and Dr. Basura Fernando; Topic: Cognitively-inspired computer vision *Singapore*

- Investigating design of more effective architectural components and training approaches for scene understanding and reasoning tasks by taking inspiration from relevant cognitive phenomena (related papers: [1], [3], [4]).

- Contributed to design of probing techniques and benchmarking studies for vision-language models to systematically examine their reasoning capabilities and analyze potential multimodal biases (related papers: [2], [5]).

Undergraduate Research Assistant – NTU School of EEE Sep 2016 – Aug 2017

Advisor: Dr. Lihui Chen; Topic: Deep learning for graph representation learning *Singapore*

- Implemented deep learning approaches for graph representation learning and aspect-based sentiment analysis.
- Contributed to development of the *graph2vec* framework and evaluation of other graph learning approaches (incl. node2vec, deep graph kernels and Weisfeiler-Lehman graph kernels) on relevant benchmarks (related paper: [8]).

Scholarships, awards and honours

President's Research Scholar, Nanyang Technological University **2017**

Ideasinc Collab4Good Seed Fund (declined), Nanyang Technopreneurship Center **2016**

Most Innovative Prize, NTU Hackathon on Digital Economy and Services **2016**

Ministry of Education (MOE) Tuition Grant (merit-based; international student category), Govt. of Singapore **2014**

Scholarship for Higher Education (SHE-INSPIRE) for meritorious academic performance (top 1%ile; perfect score in Math and Computer Science, Indian School Certificate Board Exams), Govt. of India **2014**

Industrial Experience

A*STAR Social and Cognitive Computing Department Aug 2018 – Dec 2022

Lead Engineer in "Commonsense Knowledge" group of K-EMERGE Programmatic Grant *Singapore*

- Developed a commonsense knowledge representation framework and hierarchical conceptual ontology (using ProbLog) to encode probabilistic facts and inferential rules (related paper/technical report: [7]).
- Co-designed a crowd-sourcing pipeline for knowledge collection and applied the framework for rule-based semantic parsing of aerospace documents within a larger industrial machine reading and question-answering system.

Government of Singapore Investment Corporation (GIC Private Ltd.) Jun 2017 – Aug 2017

Graduate Internship Program – Data and Analytics *Singapore*

- Implemented forecasting models and bias-reduction strategies for real-estate investment trust (REIT) predictions.

SAP Innovation Center Network (Leonardo Machine Learning) Jan 2017 – May 2017

Developer Intern – Sales and Service Ticket Intelligence *Singapore*

- Developed model deployment and evaluation framework for clients to analyze models in real-time.

References

Cheston Tan: cheston-tan@i2r.a-star.edu.sg *(Senior Principal Scientist II, A*STAR Center for Frontier AI Research)*

Basura Fernando: fernando_basura@cfar.a-star.edu.sg *(Principal Scientist II, A*STAR Center for Frontier AI Research)*

Lihui Chen: elhchen@ntu.edu.sg *(Associate Professor, NTU School of Electrical and Electronic Engineering)*

Kenneth Kwok: kenkwok@ihpc.a-star.edu.sg *(Department Director, A*STAR Social and Cognitive Computing)*

Skills and Standardized Tests

Programming languages: Python, Java, Matlab, Prolog, C
Select frameworks: PyTorch, ProbLog, TensorFlow, Scikit-learn, CoreNLP, Networkx, Pandas, Git, MTurk
Languages: English (native), Hindi
GRE (General): 169Q, 165V, 4.5AW

Organizations and Activities

Reviewer for NeurIPS 2023, ICLR 2024 and CVPR 2024

Hall Soccer Team Member (trained towards professional soccer in 2nd university year), NTU Aug 2015 – Dec 2017

Press and Publicity Director, NTU Astronomical Society Aug 2015 – May 2016

Head of Media, NTU Model United Nations Organizing Committee Aug 2014 – May 2015

High-school Computer Science Teacher, Shri Ram School Aravali June 2014 - July 2014

Varsity Soccer (U-17 ASISC North West Regional 2011 winning team), Shri Ram School Aug 2009 – July 2013

Volunteer Secondary School Math teacher, Mewat Rural Education Program Jan 2013 – Nov 2013

Indian team (3 members) at Pacific Astronomy Summit, Hawaii Space Grant Consortium Jan 2013 – July 2013

Volunteer Programming Instructor, Navjyoti Institute for Intellectual Disabilities May 2012 – July 2012