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)
- **Select Courses**: CE4041 (Machine Learning); CE4042 (Neural Networks); CE4034 (Information Retrieval); EE8087 (Living with Mathematics); CE1007 (Data Structures); CE2001 (Algorithms)

Research Interests

Scene Understanding and Reasoning; Cognitively-Inspired AI; Visual attention and memory; Semantic Development

Publications

Papers

[1] **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) (Poster)*. 2022. [Paper] [Suppl.] [Code].

[2] **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)].

Pre-prints and workshop papers

[3] **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. [Preprint] [Code & data release pending agency approval].

[4] 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

Research Engineer – A*STAR Center for Frontier AI Research Jan 2019 – Present

Advisors: Dr. Basura Fernando and Dr. Cheston Tan; Topic: Cognitively-inspired computer vision *Singapore*

- Identifying relevant cognitive phenomena (and their functions) for scene understanding tasks, and accordingly proposing new computational blocks/operations and variations in training approaches.
- Past work: (i) Integration of top-down computation in CNN blocks for more contextually-guided feature selection across the model hierarchy; (ii) A developmentally-inspired training approach for faster training of CNNs wherein visual inputs are refined (in resolution and color) and base model is grown in parameters over discrete stages.
- Ongoing work: (i) Using logic-representations for questions along with a recurrent visual attention method for more interpretable visual question answering (VQA) and description-based object counting; (ii) Adaptive feedback computation methods to make video QA models more efficient.

Research Engineer – Social and Cognitive Computing, A*STAR IHPC Aug 2018 – Dec 2022

Advisors: Dr. Kenneth Kwok and Dr. Erik Cambria; Topic: Commonsense knowledge for NLU *Singapore*

- Designed a knowledge representation framework that – (i) utilizes a probabilistic logic representation scheme to model inferential knowledge with multiple antecedents and represent conceptual beliefs with varying likelihoods, and (ii) incorporates a hierarchical conceptual ontology to identify concept relevant relations and organize beliefs at different conceptual levels (thereby promoting re-use of knowledge through inheritance where applicable).
- Developed crowd-sourcing pipeline for knowledge collection, extended an existing knowledge-base with above stated representation framework (using ProbLog), and applied knowledge-base for rule-based semantic parsing and question answering on aerospace documents (this system is being utilized as part of a larger industrial project).

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

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

- Studied and implemented deep learning and traditional machine learning approaches for problems of graph representation learning and aspect-based sentiment analysis.
- Contributed to the development of the graph2vec framework and the evaluation of existing graph representation learning approaches (incl. node2vec, deep graph kernels and Weisfeiler-Lehman graph kernels) on benchmark graph classification and clustering tasks.

Awards and honours

President's Research Scholar, Nanyang Technological University	**2017**
Ideasinc Collab4Good Seed Fund (worth 10,000 SGD; 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, Govt. of India	**2014**

References

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

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

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

Erik Cambria: cambria@ntu.edu.sg *(Associate Professor, NTU School of Computer Science and Engineering)*

Industry experience

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

Graduate Internship Program – Data and Analytics *Singapore*

- Adapted an expert-system time-series forecasting model to allow domain-experts to adjust relevant factors for real-estate investment trust (REIT) valuation predictions and reduce biases in REIT forecasting.
- Studied usage of "Deepdive" framework for extracting structured knowledge from stock analyst reports.
- Applied density-based anomaly detection techniques for quality checking of manually recorded stock metrics.

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

Developer Intern – Sales and Service Ticket Intelligence *Singapore*

- Developed a model evaluation framework to allow clients to evaluate performance of deployed models on custom datasets and provide feedback to data scientists.
- Utilized OpenFace framework and implemented Siamese Neural Network models for face clustering.

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

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
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