CURRICULUM VITAE

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RESEARCH STATEMENT

My research focuses on pioneering advancements in deep learning, reinforcement learning, and artificial memory to develop *robust, generalizable and human-like AI solutions* for long-term sequence modeling and decision-making. I have made significant contributions in the following areas:

1. Deep Neural Network Models with Artificial Neural Memory:

- Created novel architectures that incorporate artificial neural memory, leading to breakthroughs in multi-modal and generative AI (e.g., KDD18, NeurIPS18, and ICLR22).
- Developed foundational theories for memory operations, enabling more effective learning and reasoning in neural networks (e.g., ICLR19, ICML20, and ICLR23).

2. General-Purpose Neural Computers:

- Investigated the design and implementation of neural computers akin to Universal Turing Machines, capable of handling diverse tasks such as continual learning, machine reasoning and reinforcement learning (e.g., ICLR20, ICML22).
- Devised a general memory module that enhances the generalization and reasoning capabilities of various deep learning models from small RNNs to giant LLMs (e.g., Preprint24).

3. Memory-Based Reinforcement Learning Agents:

- Designed agents that leverage memory to improve decision-making in dynamic environments (e.g., NeurIPS21, AAAI22, and AAMAS24).
- Developed memory-based optimization approaches to improve online reinforcement learning (e.g., NeurIPS22)

I have applied these techniques to time-series, dialogue systems, healthcare, material science, robotics and gaming applications, demonstrating a commitment to advancing AI capabilities across various domains through innovative research and practical applications.

In my short research career spanning six years, including two as a Ph.D. candidate, my research has significantly influenced the ML/AI domain with **36 papers** published in peer-reviewed journals and conferences. Among these, **11 papers are the first-authored**, over 90% of which are in top-tier conferences including NeurIPS, ICLR and ICML.

Starting from August 2018, my scholarly contributions have garnered **497 citations**, reflecting in an author **h-index of 13**. This accomplishment has led to an **m-index of 2.2**, calculated as the h-

index divided by the number of years active since my initial publication. Such a metric is indicative of "exceptional scientists typically found at leading universities and major research labs" (J. E. Hirsch, PNAS, 2015). My research has diverse applications, including **time-series prediction** (6 papers), **healthcare** (3 papers), **reinforcement learning** (12 papers), **natural language processing** (10 papers), and **computer vision** (5 papers).

Beyond publications, I've delivered **4 tutorials and 4 invited talks** at international venues such as AAMAS, KDD, ad IJCAI, sharing my methodologies and insights. As a senior committee member for **6 AI/ML conferences**, including NeurIPS and ICLR, I contribute to the rigorous selection process, shaping the future of AI/ML research. My commitment to open-source is demonstrated by **9 code repositories**, which have collectively received over 100 forks and stars, reflecting my dedication to knowledge sharing and community collaboration.

I was offered a prestigious tenure position as a Research Fellow at the Applied AI Institute at Deakin University in September 2019, a rare honor given as I completed my PhD in just two years. In 2022, I was promoted to **tenure-track Research Lecturer**, equivalent to Assistant Professor in the US.

EMPLOYMENT

Spring, 2022 - now **Research Lecturer**, *Deakin University, Australia*

- Designed, supervised and implemented research projects in deep learning, reinforcement learning, and large language models. Published 21 papers, with 80% appearing in top-tier venues such as NeurIPS, ICLR, and ICML.
- Mentored 6 Ph.D. students, 2 of whom have successfully completed their degrees. Their collective work resulted in 9 published papers with outstanding outcomes.
- Collaborated with interdisciplinary research teams. Successfully secured 1 research grant valued at $254,200 AUD.

Fall, 2019 - spring, 2022 **Associate Research Fellow**, *Deakin University, Australia*

- Led and implemented research projects in reinforcement learning, and memory-augmented neural networks. Published 9 papers, including 4 as the primary author, published in prestigious venues such as NeurIPS, ICLR, and ICML. One paper is top 1% in ICLR 2019.
- Received the prestigious Alfred Deakin Medal for Doctoral Thesis, one of only four awarded across the entire university.

Spring, 2018 - summer, 2018 **Graduate Teaching Assistant**, Deakin University, Australia

- Led practical sessions for Data Science undergraduates (SIT-112) at Deakin University.
- Delivered teaching materials and graded final exams for the course.

Fall, 2017 - fall, 2019 **Graduate Researcher**, *Deakin University, Australia*

- Led and implemented research projects in memory-augmented neural networks, leading to publication of 6 papers (5 as first author) in top venues like NeurIPS, ICLR and KDD.
- Secured a competitive annual PhD research grant of $10,000 AUD.

Spring, 2017 - summer, 2017 **AI Researcher**, *Cinnamon AI LAB, Vietnam*

- Led research projects on automatic document reading and understanding using Convolutional Recurrent Neural Networks (CRNNs).
- Secured two lucrative contracts (>$100,000 USD) with major Japanese clients.

Fall 2015 - winter, 2017 **ML Researcher**, *Viettel Research and Development Institute, Vietnam*

- Implemented advanced tracking systems using extended Kalman filters
- Delivered autonomous interception using Polynomial Regression, a solution that generated $7,000 USD in monthly labor cost savings.
- Recognized with the Innovation Award of the Year by Viettel Group.

EDUCATION

2017 - 2020 **Deakin University, Australia**

Doctor of Philosophy, Information Technology
Thesis: *Memory and Attention in Deep Learning*.
Supervisor: Prof. Truyen Tran and Prof. Svetha Venkatesh
Score: 3/3 Clear Passes

2010 - 2015 **Hanoi University of Science and Technology (HUST), Vietnam**

Bachelor of Engineering, Information Technology. Honors Program (Centre for the Gifted).
Thesis: *Fuzzy Clustering Using Linguistic-Valued Exponent*.
Supervisor: A. Prof Khang D. Tran
Score: 10/10

HONORS & AWARDS

2021 **Best Paper of KDD'21 Workshop: Document Intelligence**
HYCEDIS: HYbrid Confidence Engine for Deep Document Intelligence System.

2021 **Global Talent Program**
Awarded Distinguished Talent Visa (permanent residency) in Australia.

2020 **Alfred Deakin Medal for Doctoral Thesis**
Memory and attention in deep learning

2016 **Viettel RD Innovation Award of the Year**
Polynomial regression in digitizing scanned military graphs
Optimal interceptor trajectory under constraints

2015 **Honors Distinction**
Thesis: "Fuzzy clustering using linguistic-value exponent"

2013 **Research Contest Award**

Awarded by HUST for student research project: "Vietnamese license plate recognition using tree-based multi-labels SVM algorithms"

2010 **Mathematics Prizes**
Second Prize at American Regions Mathematics League - ARML

INVITED TALKS & TUTORIALS

2024 **AAMAS, Aukland, New Zealand**
Tutorial: Unlocking Exploration: Self-Motivated Agents Thrive on Memory-Driven Curiosity

2022 **AJCAI, Perth, Australia**
Tutorial: Memory-Based Reinforcement Learning

2022 **FPT Software AI Center, Vietnam (virtual seminar)**
Talk: Memory for Lean Reinforcement Learning

2021 **KDD, Singapore (virtual seminar)**
Tutorial: From deep learning to deep reasoning

2021 **IJCAI, Canada (virtual seminar)**
Tutorial: Neural machine reasoning

2018 **Cinnamon AI Marathon, Vietnam**
Talk: Generalization for Good: A story on OCR evolution

2017 **Topdev Vietnam Mobile Day, Vietnam**
Talk: Theory behind conversational agents

2017 **Codecamp, Vietnam**
Talk: AI Bot landscape

SUPERVISION

2024 **Associate Supervisor**
PhD. Candidate Giang Do. *Improving Foundation Models by addressing the binding problem*. 2023-2026

2023 **Principle Supervisor**
PhD. Candidate Dai Do. *Efficient and Safe Large Language Models with Reinforcement Learning*. 2023-2026

2023 **Principle Supervisor**
PhD. Candidate Hoang Nguyen. *Causal Reinforcement Learning*. 2023-2026

2022 **Associate Supervisor**
PhD. Candidate Ragja Palakkadavath. *Domain Generalization for Algorithmic Robustness and Fairness*. 2022-2025

2021 **Associate Supervisor** (completed)

PhD. Candidate Kha Pham. *Memory for Fast Adaptation in Neural Networks*. 2021-2024

2021 **Associate supervisor** (completed)
PhD. Candidate Bao Duong Nguyen. *Advanced Machine Learning for Causal Discovery*. 2021-2024

PROFESSIONAL SERVICES

Journals

Machine Learning, Knowledge and Information Systems (KAIS), Transactions on Knowledge and Data Engineering (TKDE), Nature Scientific Reports, ACL Rolling Review (ARR).

Conferences

Senior Program Committee: AAAI 2023-2025
Program Committee: ACML 2018-2020, NeurIPS 2020-2024, ICLR 2021-2024, ICML21-2024

GRANTS

1. Kerri Morgan, Frank Jiang, Julien Ugon, Sergiy Shelyag, **Hung Le**, Nicholas Parsons, Govinda Poudel, Alex Hocking, "Elucidating Human Brain Connectivity Through Deep Learning and Network Analysis.", Mini ARC Analog Programme- MAAP, $25,000 AUD + 1 PhD scholarship (tuition fee + stipend for 3 years), which is equivalent to $254,200 AUD, 2021-2023.
2. Annual PhD Research Grant, Applied AI Institute, $10,000 AUD, 2019.

PATENTS

1. Character Recognition Apparatus, Character Recognition Method, and Program. JP-2021022291-A. Filing Date: 30-Jul-2019.

PUBLICATIONS

Research Statistics

- Total number of papers: 36.
- Total number of A* papers: 23 (63%)
- Number of first-author papers: 11 (30%):
  + Top-1 AI/ML A* **NeurIPS**: 3 papers (27%)
  + Top-2 AI/ML A* **ICLR**: 2 papers (18%)
  + Top-3 AI/ML A* **ICML**: 2 papers (18%)
  + Other AI/ML A*: 3 papers (27%)
- Oral/Spotlight: 5 papers (45%)

Peer-reviewed journals and conferences

1. Large Language Model Prompting With Episodic Memory. Van Dai Do, Quan Tran, Svetha Venkatesh and **Hung Le**. Accepted at ECAI, 2024.

2. Revisiting the Dataset Bias Problem from a Statistical Perspective. Kien Do, Dung Nguyen, **Hung Le**, Thao Le, Dang Nguyen, Haripriya Harikumar, Truyen Tran, Santu Rana and Svetha Venkatesh. Accepted at ECAI, 2024
3. *VRDSynth: Synthesizing Programs for Multilingual Visually Rich Document Information Extraction*. Thanh-Dat Nguyen, Tung Do-Viet, Hung Nguyen-Duy, Tuan-Hai Luu, **Hung Le**, Bach Le, Patanamon (Pick) Thongtanunam. Accepted at ISSTA, 2024.
4. *Variable-Agnostic Causal Exploration for Reinforcement Learning*. Minh Hoang Nguyen, **Hung Le**, Svetha Venkatesh. Accepted at ECML-PKDD, 2024.
5. *Diversifying Training Pool Predictability for Zero-shot Coordination: A Theory of Mind Approach*. Dung Nguyen, **Hung Le**, Kien Do, Sunil Gupta, Svetha Venkatesh and Truyen Tran. Published in IJCAI, 2024.
6. *Beyond Surprise: Improving Exploration through Surprise Novelty*. **Hung Le,** Kien Do, Dung Nguyen and Svetha Venkatesh. Published in AAMAS (Oral), 2024.
7. *Universal Graph Continual Learning*. Thanh Duc Hoang, Do Viet Tung, Duy-Hung Nguyen, Bao-Sinh Nguyen, Huy Hoang Nguyen, and **Hung Le**. Published in Transactions on Machine Learning Research (TMLR), 2023.
8. *Balanced Q-learning: Combining the Influence of Optimistic and Pessimistic Targets*. Thommen George Karimpanal, **Hung Le**, Majid Abdolshah, Santu Rana, Sunil Gupta, Truyen Tran, Svetha Venkatesh. Published in Artificial Intelligence, 2023
9. *Improving Domain Generalization with Interpolation Robustness*. Ragja Palakkadavath, Thanh Nguyen-Tang, **Hung Le**, Svetha Venkatesh, Sunil Gupta. Accepted in ACML, 2023.
10. *Social Motivation for Modelling Other Agents under Partial Observability in Decentralised Training*. Dung Nguyen, **Hung Le**, Kien Do, Svetha Venkatesh, Truyen Tran. Accepted at IJCAI, 2023.
11. *Improving Out-of-distribution Generalization with Indirection Representations*. Kha Pham, **Hung Le**, Man Ngo, Truyen Tran. Published in ICLR, 2023.
12. *Memory-Augmented Theory of Mind Network*. Dung Nguyen, Phuoc Nguyen, **Hung Le**, Kien Do, Svetha Venkatesh, Truyen Tran. Published in AAAI, 2023.
13. *The Application of Machine Learning in Micrometeoroid and Orbital Debris Impact Protection and Risk Assessment for Spacecraft*. Shannon Ryan, Neeraj Mohan Sushma, **Hung Le**, Arun Kumar A V, Santu Rana, Sevvandi Kandanaarachchi, Svetha Venkatesh. Published in HVIS'22.
14. *Learning to Constrain Policy Optimization with Virtual Trust Region*. **Hung Le**, Thommen Karimpanal George, Majid Abdolshah, Dung Nguyen, Kien Do, Sunil Gupta, Svetha Venkatesh. Published in NeurIPS, 2022 (Spotlight).
15. *Functional Indirection Neural Estimator for Better Out-of-distribution Generalization*. Kha Pham, **Hung Le**, Man Ngo, Truyen Tran. Published in NeurIPS, 2022.
16. *Momentum Adversarial Distillation: Handling Large Distribution Shifts in Data-Free Knowledge Distillation*. Kien Do, **Hung Le**, Dung Nguyen, Dang Nguyen, HARIPRIYA HARIKUMAR, Truyen Tran, Santu Rana, Svetha Venkatesh. Published in NeurIPS, 2022.
17. *HYCEDIS: HYbrid Confidence Engine for Deep Document Intelligence System*. Bao-Sinh Nguyen, Quang-Bach Tran, Tuan-Anh Nguyen Dang, Duc Nguyen, **Hung Le**. Published in ICONIP, 2022.
18. *Improving Document Image Understanding with Reinforcement Finetuning*. Bao-Sinh Nguyen, Dung Tien Le, Hieu M. Vu, Tuan-Anh D. Nguyen, Minh-Tien Nguyen**, Hung Le**. Published in ICONIP, 2022.

19. *Towards Effective and Robust Neural Trojan Defenses via Input Filtering.* Kien Do, Haripriya Harikumar, **Hung Le**, Dung Nguyen, Truyen Tran, Santu Rana, Dang Nguyen, Willy Susilo, Svetha Venkatesh. Published in ECCV, 2022.
20. *Neurocoder: General-Purpose Computation Using Stored Neural Programs*. **Hung Le**, Svetha Venkatesh. Published in ICML, 2022 (Spotlight).
21. *Make The Most of Prior Data: A Solution for Interactive Text Summarization with Preference Feedback*. Duy-Hung Nguyen, Nguyen Viet Dung Nghiem, Bao-Sinh Nguyen, Tien Dung Le, Minh-Tien Nguyen, Shahab Sabahi, **Hung Le**. Published in NAACL-Findings, 2022.
22. *Generative Pseudo-Inverse Memory*. Kha Pham, **Hung Le**, Man Ngo, Truyen Tran, Bao Ho, Svetha Venkatesh. Published in ICLR, 2022.
23. *Learning Theory of Mind via Dynamic Traits Attribution*. Dung Nguyen, Phuoc Nguyen, **Hung Le**, Kien Do, Truyen Tran, Svetha Venkatesh. Published in AAMAS, 2022.
24. *Episodic Policy Gradient Training*. **Hung Le**, Thommen Karimpanal George, Majid Abdolshah, Kien Do, Dung Nguyen, Svetha Venkatesh. Published in AAAI, 2022 (Oral).
25. *Model-Based Episodic Memory Induces Dynamic Hybrid Controls*. **Hung Le**, Thommen Karimpanal George, Majid Abdolshah, Truyen Tran, Svetha Venkatesh. Published in NeurIPS, 2021.
26. *DeepProcess: Supporting Business Process Execution Using a MANN-based Recommender System*. Asjad Khan, Aditya Ghose, Hoa Dam, **Hung Le**, Truyen Tran, Kien Do. Published in ICSOC, 2021.
27. *Robust Deep Reinforcement Learning for Extractive Legal Summarization*. Duy-Hung Nguyen, Bao-Sinh Nguyen, Nguyen Viet Dung Nghiem, Dung Tien Le, Mim Amina Khatun, Minh-Tien Nguyen, **Hung Le**. Published in ICONIP, 2021.
28. *From Deep Learning to Deep Reasoning (Tutorial)*. Truyen Tran, Vuong Le, Hung Le, Thao M Le. Published in KDD, 2021.
29. *A New Representation of Successor Features for Transfer across Dissimilar Environments.* Majid Abdolshah**, Hung Le**, Thommen George Karimpanal, Sunil Gupta, Santu Rana, Svetha Venkatesh. Published in ICML, 2021 (Spotlight).
30. *Self-attentive Associative Memory.* **Hung Le**, Truyen Tran, Svetha Venkatesh. Published in ICML, 2020.
31. *LODENet: A Holistic Approach to Offline Handwritten Chinese and Japanese Text Line Recognition.* Huu Tin Hoang, Chun-Jen Peng, Hung Tran, **Hung Le**, Huy Hoang Nguyen Published in ICPR, 2020.
32. *Neural Stored-program Memory.* **Hung Le**, Truyen Tran, Svetha Venkatesh. Published in ICLR, 2020.
33. *Learning to Remember More with Less Memorization.* **Hung Le**, Truyen Tran, Svetha Venkatesh. Published in ICLR, 2019 (Oral).
34. *Variational Memory Encoder-Decoder.* **Hung Le**, Truyen Tran, Thin Nguyen, Svetha Venkatesh. Published in NeurIPS, 2018.
35. *Dual Memory Neural Computer for Asynchronous Two-view Sequential Learning.* **Hung Le**, Truyen Tran, Svetha Venkatesh. Published in KDD, 2018.
36. *Dual Control Memory Augmented Neural Networks for Treatment Recommendations.* **Hung Le**, Truyen Tran, Svetha Venkatesh. Published in PAKDD, 2018.