Tenindra **Abeywickrama**

Research Scientist, RIKEN

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My research applies AI heuristic search and graph algorithms to problems on spatially embedded data, including brain networks, transportation, 3D pathfinding, and spatial omics. I develop efficient, scalable, and theoretically grounded algorithms, while extending into ML methods like graph neural networks. Having successfully translated my past work into deployed industry systems, I am driven to bridge the gap between research and practice to deliver tangible real-world social impact.

Education

Jul 2019 – Oct 2014 | **Monash University, Faculty of Information Technology** — **Melbourne, Australia**
Doctor of Philosophy in Computer Science | *Advisor: Prof. Aamir Cheema*

Dec 2010 – Mar 2006 | **University of New South Wales** — **Sydney, Australia**
Bachelor of Engineering in Electrical Engineering (*First Class Honours*)
Bachelor of Science in Computer Science (*Double Degree*)

Selected Experience

Present – Feb 2025 | **RIKEN | AI for Science Division, Center for Computational Science** — **Tokyo, Japan**
Research Scientist (equivalent to Assistant Professor) | Director: Prof. Satoshi Matsuoka
› Developing algorithms (incl. GPU-based) for neuroscience, 3D pathfinding, omics, and optimizing GNNs

Jan 2025 – Jul 2024 | **Urban Computing Lab, Faculty of IT, Monash University** — **Melbourne, Australia**
Research Affiliate | Lab Director: Prof. Aamir Cheema

Aug 2023 – Jul 2020 | **Grab Inc. | Geo Data Science** — **Singapore**
Lead Data Scientist (Senior Data Scientist Jul 2020 - Apr 2022) | Manager: Dr. Hannes Kruppa
› Led organization-wide R&D projects and building research culture (e.g., patent writing workshops).
› Collaborated with engineers to deploy my research in production (e.g., [C.1] in allocation).
› Solved production problems, directly generating IP (e.g., [P.1,P.2]).

Jul 2020 – Mar 2019 | **Grab-NUS AI Laboratory, National University of Singapore** — **Singapore**
Postdoctoral Research Fellow | Advisor: Prof. Kian-Lee Tan

Selected Honours and Awards

ICDE 2026 Distinguished PC Award	2026
DAAD AINeT Fellow for AI in Neuroscience	2026
Invited Alumnus for the 12th Heidelberg Laureate Forum	2025
ACM SIGMOD Research Highlight Award	2022
Young Researcher for the 9th Heidelberg Laureate Forum	2022
Best Scalable Data Science Paper Award at VLDB 2021	2021
Best Paper Award at ICAPS 2020	2020

Selected Publications & Preprints

[#] Indicates primary project mentor to a student/postdoc lead author

[S.1] **COL-Trees: Efficient Hierarchical Object Search in Road Networks**
Tenindra Abeywickrama, Muhammad Aamir Cheema, and Sabine Storandt
Submitted to Artificial Intelligence (AIJ) [arXiv] [Code] **Invited**

[C.6] **Identifying Multi-Hit Cancer Drivers Without Massive Parallelization: A CP, MIP, and Column Generation Framework**
Rick S. H. Willemsen, Tenindra Abeywickrama[#], and Ramu Anandakrishnan
Int. Conf. on Principles and Practice of Constraint Programming (to appear) [arXiv] [Code] [CORE A]
Impact: Identified that supercomputers using 10,000s+ cores were unnecessary for this cancer genomics problem. Guided a postdoc to complete the project, ultimately solving the problem on a single CPU **[CP'26]**

[J.2] **Bipartite Matching: What to do in the Real World When Computing Assignment Costs Dominates Finding the Optimal Assignment**
Tenindra Abeywickrama, Victor Liang, and Kian-Lee Tan
SIGMOD Rec., 51(1):51–58, Jun 2022 **ACM SIGMOD Research Highlight Award** **[SIGMOD Record 2022]**

[C.4] **Optimizing Bipartite Matching in Real-World Applications by Incremental Cost Computation**
Tenindra Abeywickrama, Victor Liang, and Kian-Lee Tan
Int. Conf. on Very Large Data Bases, 2021 [PDF] [1st/112] [CORE A]* **Best Scalable Data Science Paper Award** [**VLDB'21**]

[E.3] **Hierarchical Graph Traversal for Aggregate k Nearest Neighbors Search in Road Networks (Extended Abstract)**
Tenindra Abeywickrama, Muhammad Aamir Cheema, and Sabine Storandt
Int. Joint Conf. on Artificial Intelligence, 2021 [CORE A]* **Invited (Sister Conference Best Paper Track)** [**IJCAI'21**]

[C.3] **Hierarchical Graph Traversal for Aggregate k Nearest Neighbors Search in Road Networks**
Tenindra Abeywickrama, Muhammad Aamir Cheema, and Sabine Storandt
Int. Conf. on Automated Planning and Scheduling, 2020 [PDF] [1st/216] [CORE A]* **Best Paper Award**
Impact: This work enabled a new approach to real-time driver-passenger matching in ride-hailing systems [C.4], a breakthrough that resulted in a US Patent for Grab [P.2] and was highlighted in their engineering blog. We have since extended it to other problems [S.1] and released a highly optimized open-source implementation. [**ICAPS'20**]

[J.1] **K-SPIN: Efficiently Processing Spatial Keyword Queries on Road Networks**
Tenindra Abeywickrama, Muhammad Aamir Cheema, and Arijit Khan
IEEE Transactions on Knowledge and Data Engineering, Jan 2019 [PDF] [SJR:Q1,IF:8.9]
This work was presented at ICDE 2020 as part of the TKDE Poster Track [**TKDE'19**]

[C.2] **Efficient Landmark-Based Candidate Generation for kNN Queries on Road Networks**
Tenindra Abeywickrama and Muhammad Aamir Cheema
Int. Conf. on Database Systems for Advanced Applications, 2017 [PDF] [AR: 24.3% (73/300)] [CORE A] [**DASFAA'17**]

[C.1] **k-Nearest Neighbors on Road Networks: A Journey in Experimentation and In-Memory Implementation**
Tenindra Abeywickrama, Muhammad Aamir Cheema, and David Taniar
Int. Conf. on Very Large Data Bases, 2016 [PDF] [Extended Version] [Code] [AR: 16% (115/719)] [CORE A]*
Impact: Our work was utilized by Grab to design their driver retrieval system as documented in their engineering blog. The paper has 250+ citations, and the GitHub repository is widely used in road network studies. [**VLDB'16**]

Patents

[P.2] **System and method for bipartite matching**
Tenindra Nadeeshan Abeywickrama, Chen Liang
US Patent No. US12260357B2, Granted Mar. 2025 [**US Patent**]

[P.1] **Method of annotating map data for navigation of vehicles**
Chunda Ding, Xiaocheng Huang, Minbo Qiu, Tenindra Nadeeshan Abeywickrama, Chen Liang
US Patent App. 18/561,112, Pending (Published Nov. 2024) [**US Patent**]

Selected Grants and Funding

JSPS Kakenhi Research Activity Start-up JPY 2,730,000 2025-27

Endeavour Australia Cheung Kong Fellowship AUD 23,000 (1 of 5 awarded to Australian graduate students) 2018

Monash Faculty of IT Ph.D. Research Scholarship AUD 76,000 2014-17

Selected Invited Talks

Invited to present [C.4] at INFORMS'23 (Public Sector OR Track) Declined due to corporate IP policy 2023

Incremental Kuhn-Munkres in the Real World Microsoft Research (Virtual) Oct 2020

Decoupled Heuristics for POI Search in Road Networks Grab Inc., Singapore Apr 2019

Innovation Showcase 2016 Monash University, Melbourne, Australia Oct 2016

Supervision

Yuta Inoue (PhD Student at U-Tokyo) RIKEN R-CCS HPC Internship Dec 2025

Jingying Li (MSc Student at NUS) Grab Data Science Internship (Next: PhD Student at NUS) Jan-Jun 2023

Keru Chen (MSc Student at NUS) Final Year Project (Paper in MDM [C.5], Next: Data Scientist at Grab) 2020

Selected Service

Program Committee ICDE ('27, '26, '25, '23 TKDE Poster Track), VLDB ('26)
Journal Reviewer VLDBJ, IEEE TKDE, IEEE TOSC, DPDB, WWWJ