Dr. Artur Grigorev

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Biography

I'm a Postdoctoral Research Associate at the University of Technology Sydney (UTS), specializing in the application of Generative AI and advanced data science techniques to transportation and incident management. I earned my Ph.D. in Information Technology from UTS, where my research focused on many aspects of traffic incident analysis including duration and impact prediction, severity classification, incident detection, and risk forecasting. I hold a Bachelor's degree in Computer Science and a Master's degree in Applied Mathematics with a specialization in Urban Supercomputing.
My expertise includes deep learning, machine learning, and computer vision applications, with a particular emphasis on traffic safety and urban mobility, such as vehicle detection, tracking and speed estimation. I have authored multiple publications in high-impact journals (such as TRC: part C) and has presented at leading international conferences, such as the IEEE ITSC.
Language & Working Rights: I have unlimited working rights (granted visa 485 until 2030) with an IELTS Academic score of 8.0 (out of 9.0). I've been living in Sydney, Australia for over 4 years, speaking English fluently and capable of effective scientific and technical communication.
Skills: Professionally, I have extensive experience in programming with Python for data analysis and data visualisation, utilising various machine learning and deep learning techniques for predictive modelling. Thoughout my previous degrees I've been solving problems using various geo-analysis software (QGis) including programming modules (geopy, networkx, geopandas) and simulation software (Aimsun, SUMO). Also, I have a strong knowledge of Linux and parallel programming in C (OpenMP, MPI, CUDA). My academic contributions include publications at various international conferences and papers in high-impact journals.
Research Interests:

- Sustainable Urban Transportation
- Traffic simulation and optimisation
- Geo-spatial and Spatial-temporal data analysis
- Traffic incident analysis
- Accident duration, impact, and risk prediction
- Deep learning and computer vision for traffic applications (vehicle detection, tracking, counting, and speed estimation)

Experience

2023 – Present (21st August 2023-2024)

Full-time Postdoctoral Reseach Associate (UTS, Faculty of Engineering and IT) with a research focus on enhancing the Traffic Incident Analysis and Predictive Modelling using Large Language models and Generative AI.

2020 – 2023 (3.5 years)

Full-time PhD student (UTS, Faculty of Engineering and IT) with a research focus on Traffic Incident Analysis, Traffic Incident Duration prediction, Traffic accident risk prediction, and other accident-related topics. *Link to thesis (includes research performed during the degree):* http://hdl.handle.net/10453/177936 .

Education

2020 – 2023

Ph.D. in Information Technology, University of Technology Sydney (UTS)
Research focus: Traffic Incident Analysis and Predictive Modelling.
Thesis title: *Thesis topic: "Advanced AI techniques for comprehensive traffic incident analysis: enhancing incident duration prediction and accident risk forecasting".*

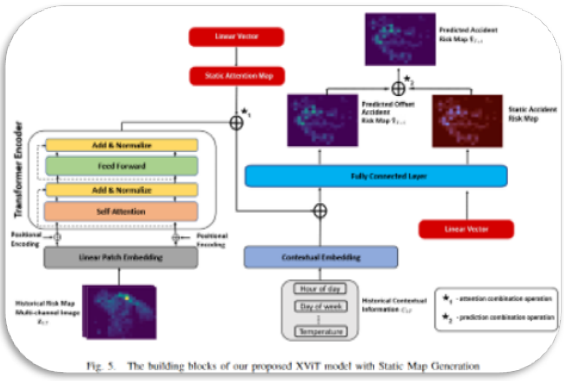
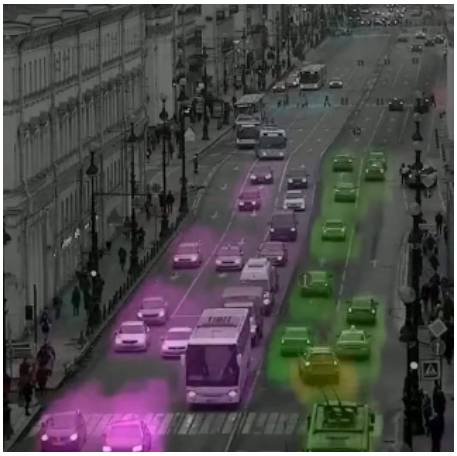


Fig. 5. The building blocks of our proposed XViT model with Static Map Generation

2017 – 2019

Master of Applied Math & Computer Science (with Excellence), ITMO University in Urban Supercomputing.
Thesis title: *Analysis of emergency transport behaviour using computer vision methods and deep learning techniques*.
The program was dedicated to GPU and parallel systems programming, machine learning, and urban science. The research included computer vision analysis of video from CCTV cameras to estimate the traffic speed, flow, occupancy, vehicle count for each lane of the road with detection of counter-lane movement using various Deep Learning methods.

2013 – 2017

Bachelor of Information Technology and Computer Machinery, Systems and Networks. ITMO University
Thesis title: *Developing and Testing the Performance of the Advertisements Web-Site Based on a Document-Oriented Database*.
The program focus was on computer programming (mainly, C++ and Python) and system administration. The thesis included the development and performance testing of an advertisement website using a document-oriented (NoSQL) database.

Research Publications

Research Papers

1. A. Grigorev, A.-S. Mihăiță, and F. Chen, "Traffic incident duration prediction: A systematic review of techniques **(under review, Journal of Advanced Transportation)**,"
2. A. Grigorev, K. Saleh, and Y. Ou, "Incident response gpt: Generating traffic incident response plans with generative artificial intelligence," 2024. arXiv: `2404.18550 [cs.LG]`.
3. A. Grigorev, K. Saleh, Y. Ou, and A.-S. Mihaita, "Enhancing traffic incident management with large language models: A hybrid machine learning approach for severity classification *(under review in International Journal of Intelligent Transportation Systems Research)*," 2024. arXiv: `2403.13547 [cs.LG]`.

4. A. Grigorev, S. Shafiei, A.-S. Mihaita, Q. Zhu, and H. Grzybowska, "Predicting the duration of traffic incidents for sydney greater metropolitan area using machine learning methods (*under review in International Journal of Intelligent Transportation Systems Research)*," 2024. arXiv: 2406.18861.
5. A. Grigorev, A.-S. Mihăiță, K. Saleh, and F. Chen, "Automatic accident detection, segmentation and duration prediction using machine learning," *IEEE Transactions on Intelligent Transportation Systems*, 2023.
6. A. Grigorev, K. Saleh, and A.-S. Mihaita, "Traffic accident risk forecasting using contextual vision transformers with static map generation and coarse-fine-coarse transformers," in *2023 IEEE 26th International Conference on Intelligent Transportation Systems (ITSC)*, IEEE, 2023, pp. 4762–4769.
7. A. Grigorev, A.-S. Mihaita, S. Lee, and F. Chen, "Incident duration prediction using a bi-level machine learning framework with outlier removal and intra–extra joint optimisation," *Transportation research part C: emerging technologies*, vol. 141, p. 103 721, 2022.
8. A. Grigorev, A.-S. Mihăiță, K. Saleh, and M. Piccardi, "Traffic incident duration prediction via a deep learning framework for text description encoding," in *2022 IEEE 25th International Conference on Intelligent Transportation Systems (ITSC)*, IEEE, 2022, pp. 1770–1777.
9. K. Saleh, A. Grigorev, and A.-S. Mihaita, "Traffic accident risk forecasting using contextual vision transformers," in *2022 IEEE 25th International Conference on Intelligent Transportation Systems (ITSC)*, IEEE, 2022, pp. 2086–2092.
10. A. Grigorev, T. Mao, A. Berry, J. Tan, L. Purushothaman, and A.-S. Mihaita, "How will electric vehicles affect traffic congestion and energy consumption: An integrated modelling approach," in *2021 IEEE International Intelligent Transportation Systems Conference (ITSC)*, IEEE, 2021, pp. 1635–1642.
11. A. Grigorev, O. Severiukhina, and I. Derevitskii, "Anomaly detection using adaptive suppression," *Procedia Computer Science*, vol. 156, pp. 274–282, 2019.
12. A. Grigorev, I. Derevitskii, and K. Bochenina, "Analysis of special transport behavior using computer vision analysis of video from traffic cameras," in *Digital Transformation and Global Society: Third International Conference, DTGS 2018, St. Petersburg, Russia, May 30–June 2, 2018, Revised Selected Papers, Part I 3*, Springer, 2018, pp. 289–301.

Skills

Languages	English: IELTS Academic 8.0 (Scientific and technical reading/writing, conversational English) Russian: Native Speaker
Programming	Python (Pandas, Numpy, Scikit-Learn, OpenCV, Keras, PyTorch) C (OpenMP, MPI, CUDA) Linux (Debian/Ubuntu) - advanced user
Databases	Experience with SQL and document-oriented (NoSQL) databases
Machine Learning	Deep Learning methods for Computer Vision tasks such as: vehicle detection, tracking, counting, speed estimation, etc.
Traffic Simulation Software & GIS Tools	Aimsun, SUMO, QGIS

Awards & Achievements

Awards

2021	iMove Top-Up Award, Project 5-013 "Modelling traffic disruption impact: Deep Learning & simulation"
	FEIT HDR Research Showcase 2021 Runner-Up.
2020	UTS FEIT Higher Degree by Research Scholarship
	UTS International Research Scholarship

Awards & Achievements (continued)

2019
- 7th place in "ID R&D Voice Antispoofing Challenge" - An audio signal processing competition.
- Top 3% (silver) in "APTOS 2019 Blindness Detection Competition" - An image classification competition on Kaggle.

Certifications

2020
- Fundamentals of Reinforcement Learning by Coursera (Issued Oct 2020)
- Neural Networks and Deep Learning by Coursera (Issued Oct 2020)

2023
- IELTS (Academic) 8.0

Presentations

- "Beyond Machine Learning: The Power of Large Language Models in Traffic Accident Management" - Transport Research Association for NSW Annual Symposium 2023.
- "Traffic Accident Risk Forecasting using Contextual Vision Transformers with Static Map Generation and Coarse-Fine-Coarse Transformers" - 26th IEEE International Conference on Intelligent Transportation Systems 2023, Bilbao, Spain.
- "The Integrated Analysis of Accident Reports and Traffic Flow Data Sets With Early Traffic Disruption Detection and Segmentation" - Transportation Research Board: Annual Meeting 2023.

2022
- "Automated Traffic Accident Detection, Segmentation and Duration Prediction" - TRANSW 2022 symposium.
- "Modelling the impact of traffic disruptions using machine learning methods" - iMove NextGens FireChat event.
- "Traffic Accident Duration and Impact Prediction" - IEEE NSW UNITE 2022.

2021
- "Traffic incident duration modelling using Machine Learning and Deep Learning" - UTS FEIT HDR Showcase 2021.

2020
- "Modelling the impact of traffic disruptions using machine learning methods" - TRANSW 2020 symposium.

References

Dr. Adriana-Simona Mihaita

adriana-simona.mihaita@uts.edu.au

Dr. Simona Mihaita is an Associate Professor at the University of Technology Sydney, where she leads the Future Mobility Research lab. Her research focuses on traffic simulation and optimization using AI and machine learning, particularly for predicting traffic accidents and their urban impact, as well as smart analytics for connected and autonomous vehicles in a smart city environment.

Dr. Khaled Saleh

khaled.saleh@ieee.org

Dr. Khaled is an experienced AI and Machine Learning researcher, lecturer (assistant professor) at the University of Newcastle, with over 7 years of experience in both academia and industry. He earned his PhD in computer science from Deakin University in 2019 and previously worked there as an AI research fellow, developing socially aware AI models for the intent understanding of vulnerable road users.