



HDR Seminar 11

Program

25 August 2021

4:00pm - 4:10pm	Briefing Topic: Policy update and announcements A/Prof Dongmo Zhang
4:10pm - 4:40pm	Invited speech Topic: Future Transit Solutions - from Planning to Operation Speaker: Dr. Bo (Bobby) Du, Lecturer and Leader of Future Transport & Mobility, SMART Infrastructure Facility, University of Wollongong
4:40pm - 4:55pm	IT services talk Topic: What and how we can access remotely from home or from overseas to IT services. Speaker: Mr Guang Hui Deng, Acting Campus Support Manager
4:55pm - 5:10pm	Conference presentation Topic: My observations on ICML 2021 Speaker: Lakmini Wijesekara (PhD Candidate - 18570263) Supervisory panel: Dr. Liwan Liyanage and Dr. Michael O' Connor
5:10pm - 5:30pm	Conference presentation Topic: DRUG RESISTANCE EVOLUTION OF MYCOBACTERIUM TUBERCULOSIS Speaker: Tanzila Chowdhury (PhD Candidate -17268703) Supervisory panel: Prof Andrew Francis, A/Prof Laurence Park, Prof Mark Tanaka (UNSW) and Prof Glenn Stone
5:30pm	Closing

Venue: Online Zoom

Zoom ID: 886 7872 4041

Next Event: HDR Seminar – 22nd September 2021

Future Transit Solutions - from Planning to Operation

Dr. Bo (Bobby) Du, University of Wollongong

Abstract:

With emerging technologies, such as connected and autonomous vehicle (CAV), big data sharing and processing at real-time, vehicle-to-vehicle (V2V) and vehicle-to-everything (V2X) communication, Intelligent Transport System (ITS) is playing a more important role in building a smart city in the digital era. Public Transit is facing transformation towards a more flexible, efficient, sustainable, integrated and passenger-centric mobility service. From planning to operation, a series of questions and challenges needs to be answered and overcome. This presentation will introduce a new concept of public transit service with corresponding solutions at both planning and operational levels.

Biography:

Dr. Bo Du was awarded Ph.D. in Transportation Engineering in 2015 at Nanyang Technological University, Singapore. He is currently a Lecturer and Leader of Future Transport & Mobility Group and the Coordinator of SMART Short Courses in the SMART Infrastructure Facility, University of Wollongong. His research activities focus on better understanding people's travel behaviour and practically improving transport system in the electric, autonomous, connected and shared era using modelling, optimization, simulation and data analytics tools. He is a member of the IEEE Intelligent Transportation Systems Society (ITSS) and the Transport Research Association for NSW (TRANSW). He has published 30+ papers, and many of them appeared in top-tier journals and conferences in the fields of Transport & Logistics, such as Transportation Research Part B: Methodological, Transportation Research Part E: Logistics and Transportation Review, and IEEE Transactions on Intelligent Transportation Systems. He was a recipient of the Fred Burggraf Award from Transportation Research Board, USA, which recognized excellence in transportation research by researchers 35 years of age or younger. Dr. Du is a Young Professional Ambassador of the Australia China Business Council. This program aims to develop Australia's emerging young professional talent and build their leadership capabilities in the Australia-China business space.

My observations on ICML 2021

Speaker: Lakmini Wijesekara (PhD Candidate - 18570263)

Abstract: The International Conference on Machine Learning (ICML) is a prestigious conference (Rank A*) and it is the premier gathering of professionals dedicated to the advancement of machine learning. The 38th ICML conference was held from 18th to 25th July 2021 virtually. More than 1000 papers were presented with cutting-edge research on all aspects of Machine Learning including areas like Artificial Intelligence, Statistics and Data Science, as well as application areas such as Machine Vision, Computational Biology, Speech Recognition, and Robotics.

In this short talk, I will be presenting my observations, reflections, and some of the knowledge I gained through participation in this conference, particularly in relation to Data Science.

DRUG RESISTANCE EVOLUTION OF MYCOBACTERIUM TUBERCULOSIS

Speaker: Tanzila Chowdhury (PhD Candidate -17268703)

Abstract: Tuberculosis is a pathogenic bacterial disease caused by Mycobacterium tuberculosis (TB) which affects human lungs. Although, most of the infected bacteria can be eliminated with drugs, some of the bacteria acquire drug resistance and can be transmitted throughout the process. Therefore, the urgency arises to understand and prevent the growth of resistant TB. Tuberculosis bacteria acquires resistance in two different ways: transmission and treatment failure (resistance acquisition). If the most likely reason of acquiring resistance can be determined, the health care system can take necessary steps to minimise the problem.

Data from outbreaks of tuberculosis frequently include both genotypic information from a molecular marker, as well as information about the drug resistance status of each isolate. The purpose of the

research is to analyse different datasets, examine how different models can help determine the evolution of drug resistance TB and build appropriate model to calculate the proportion of TB resistance due to transmission and treatment failure.

We have collected published TB outbreak datasets that can be used to construct several clusters with different genotype (spoligotype) along with their drug resistance information. To study TB drug resistance evolution, we have introduced TB history graph which looks at all of the possible history paths of TB drug resistance for a cluster. We have designed two different models to look at different events of drug resistance. One of the models looks at the most probable path of the history graph. The second model accounts for all of the different paths and formulate general formula for the expected number of resistance transmission and resistance acquisition events. In our research, we make estimates of key parameters related to drug resistance in the sample, such as the proportion of drug resistant cases arising as a result of treatment failure.