



The VADA Program

Visual and Automated Disease Analytics
Graduate Training Program

NEWSLETTER

LETTER FROM THE VADA PROGRAM LEADERSHIP
DR. LISA LIX AND DR. POURANG IRANI

University of Manitoba Trainees



It is with both sadness and excitement that we share this final newsletter with you. Sadness is not unexpected, given the time, energy, and expertise that has been devoted to the VADA Program since NSERC announced the success of our funding application in 2017. It is bittersweet to see the VADA Program end. At the same time, there is excitement associated with reflecting on the achievements of the students, faculty, and Leadership Team members of the VADA Program. We have had the opportunity to meet so many talented and enthusiastic students. Getting to know students and faculty

at both the University of Manitoba and University of Victoria has been an enriching experience. Sharing all that we have learned about the VADA Program with other training teams that are interested in our approach has also been a highlight.

We would like to extend our sincere thanks to Dr. Aynsle Hinds, Allison Poppel, and Viktoriya Vasylykiv, who have expertly coordinated all aspects of the VADA Program. An enormous thanks is owed to Dr. Elizabeth Borycki and Dr. Andre Kushniruk, who have contributed so thoughtfully to the leadership of the VADA Program. We are grateful to all faculty who have led or served on committees, participated in Summer School events, and provided support, in whatever capacity, to the VADA Program.

Finally, we are most deeply indebted to the students who participated so wholeheartedly in all parts of the VADA Program. We are humbled by your skills, talent, and enthusiasm for learning. There is a bright future ahead for each of you.

The Fall 2023 Cohort

We welcomed 16 students this academic year to a condensed program curriculum, wherein trainees exclusively focused on completing the Foundations of Disease Analytics course (First year students) or seminar (Second year students). Five Master's students and five PhD students started the program, while 6 PhD students were welcomed back for Year 2. Read about our trainees below!

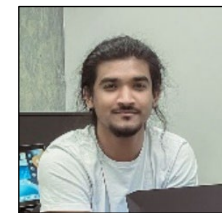
New Master's Students



Deanne Nixie Miao (Biochemistry and Medical Genetics)

Deanne Nixie Miao earned her BSc Honors in Genetics from the University of Manitoba in 2021, Deanne brings a foundation in genetics to her current pursuits. Her MSc research is dedicated to advancing our understanding of cisplatin-induced ototoxicity by employing state-of-the-art technologies, including single-nuclei RNA-seq and single-nuclei ATAC sequencing. With her enthusiasm for learning and exploring complex biological processes, Deanne is at the forefront of ground-breaking research in her field.

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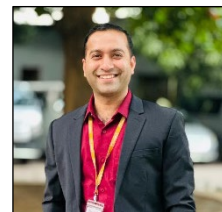
Md. Mehadi Hasan (Mathematics)

Md. Mehadi Hasan is a dedicated researcher with a background in Mathematical Epidemiology, Biomathematics, and Optimal Control Theory. He is currently pursuing his second Master of Science degree in which his research is about nosocomial infections.

comial infections.

Mehadi holds a master's degree in mathematics from Jagannath University in Dhaka, Bangladesh. Mehadi has conducted research on topics such as the solution approach of stiff systems and optimal control of the COVID-19 pandemic. His thesis emphasized Numerical Analysis and Optimal Control, analyzing the effectiveness of limited resources in controlling the pandemic and proposing an error-attenuating algorithm to enhance predictor-corrector methods.

New Doctoral Students



Md Moniruzzaman (Microbiology)

Monir completed his bachelor's and master's in microbiology at the University of Dhaka. After that, he worked in the International Center for Diarrheal Disease Research, Bangladesh as a research investigator. Monir is pursuing his Ph.D. and focusing on the microbiome and resistome in wastewater from an oxidation lagoon for a Manitoba First Nations community. His research involves using Nanopore sequencing technology to identify antibiotic-resistant genes in bacteria and phage particles, aiming to better understand environmental impacts on microbial resistance.



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Nasiba Ahmed (Community Health Sciences)

Nasiba's research focuses on developing and applying machine-learning methods for detecting multimorbidity disease clusters and trajectories from longitudinal observational data. Multimorbidity occurs when a person

has more than one chronic health condition. It is growing more common as the Canadian population ages, placing substantial burden on healthcare systems because of its association with greater service use and higher costs. In her research, the data features she will use to construct multimorbidity clusters include diagnoses, health problems and medication expenses. Visualization techniques will be implemented to describe the multimorbidity clusters.



Ghazale Farjam (Mathematics)

Ghazale is a passionate PhD student in the Department of Mathematics, specializing in mathematical biology and mathematical modelling. Her research lies at the intersection of applied mathematics and data science, with a primary focus on the development of mathematical models for infectious diseases. She aims to contribute valuable insights to the field, ultimately informing strategies for disease prevention and control.

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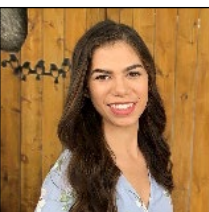
Returning Doctoral Students



Mohd Wasif Khan (Biochemistry and Medical Genetics)

Mohd Wasif Khan is a computational biology student investigating the role of genetics and microorganisms in early childhood caries (ECC). Another focus of his research is to identify the associations between taste

genetics and the oral microbiome in healthy individuals and ECC patients. For his research, he uses statistical techniques like meta-analysis, mediation analysis, and advanced machine learning methods. Through his research, he expects to get more insight into the pathogenesis of ECC and standardize the methods for such analyses along with appropriate visualization methods.



Katherine Li (Medical Microbiology and Infectious Disease)

Katherine's research focuses on the genetic diversity and antigenic variation amongst SARS-CoV-2 variants of concern (VOCs). She is analyzing the mutation patterns of high-

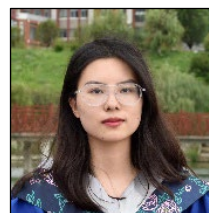
profile VOCs such as the Omicron and Delta lineages to better understand how these relate to the emergence of new VOC lineages and their impact on host immune recognition.



Hassan Maleki Golandouz (Community Health Sciences)

Hassan's research focuses on developing models that combine multiple sources of error-prone data, such as those found at the Manitoba Centre for Health Policy (MCHP), for accurately measuring chronic

health conditions and outcomes at the population level. The primary research question is: What factors affect the accuracy and precision of rule-based approaches, statistical model-based approaches, and machine-learning model-based approaches to develop algorithms for identifying individuals with chronic health conditions in electronic health data?



Shi Zhang (Community Health Sciences)

Shi's research focuses on developing mixed-effects modelling approaches to analyze health data with multilevel structures, like the hospital stay of COVID-19 patients in Manitoba, partially cross-classified by residential areas and hospitals.

University of Victoria Trainees

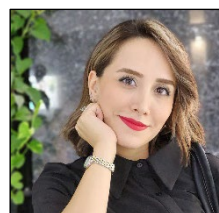
New Master's Students



Siying Ma (Mathematics and Statistics)

Siying's research focuses on the comparison of multi-list disease analytic models for estimating the hidden population of COVID-19.

The result is essential for the public health agencies to decide which type of data should be collected to analyze infectious diseases and will significantly reduce the costs of data collection.



Faeze Nezamabadi (Health Information Science)

Faeze is a dedicated scholar in Health Informatics, currently pursuing her second master's degree in health informatics. With a bachelor's degree in health information technology and a master's degree in medical informatics, she possesses a strong foundation in health data management. Faeze's research focuses on leveraging machine-



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learning algorithms to develop decision support systems for the treatment of chronic diseases. Her interdisciplinary collaborations and commitment to merging technology with healthcare underscores her vision for a data-driven future in medicine, aimed at enhancing patient care and outcomes.

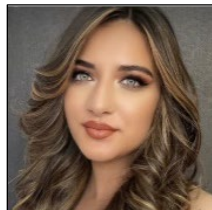
New Doctoral Students



Zhaoze Liu (Mathematics and Statistics)

Zhaoze's research focuses on genome-wide association studies and machine learning prediction for sablefish traits. For his research, he uses statistical techniques such as advanced machine learning methods, relatedness analysis and genetic imputation

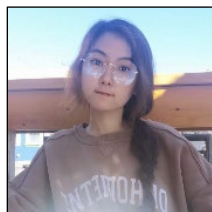
study. Through his research, he focuses on the relationship between the single-nucleotide polymorphism genotypes and weight of sablefish, and is exploring the differences in gene trait expression between siblings of different families.



Shera Potka (Computer Science)

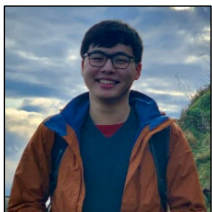
Shera is a PhD student specializing in artificial intelligence and machine learning. Her research focuses on Large Language Models (LLM), addressing bias in AI systems, and developing advanced recommender systems. Shera is passionate about enhancing AI technology to be more ethical, fair, and user centric. Her goal is to contribute to the field of AI by ensuring these technologies are developed responsibly and inclusively, shaping a future where AI positively impacts society.

Returning Doctoral Students



Kailun Bai (Mathematics and Statistics)

Kailun's research is focused on developing methods and tool for single-cell RNA sequencing data analysis, especially on cell type annotation, which is a crucial step in analyzing single-cell RNA sequencing data.



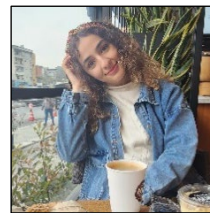
Yichun Zhao (Computer Science)

Yichun is a PhD student in Computer Science at the University of Victoria. His main research area is in Human-Computer Interaction (HCI) and Information Visualization (infoVis) with a focus on information accessibility and "visual" data analytics for people with visual impairments. Yichun is interested in designing and

evaluating novel data visualization tools that use multiple modalities to convey data and information in an accessible and effective way. He aims to enhance non-visual data analytics by conducting human-centered research with diverse participants to understand their needs, preferences, and challenges in accessing data. Yichun's goal is to empower people with visual impairments to participate more fully in various aspects of life where data literacy is increasingly important.

University of British Columbia Trainees

New Master's Students



Ghazaleh Shahin (Computer Science)

Ghazaleh is an ambitious MSc student at the University of British Columbia. Her academic journey began with a bachelor's degree in computer engineering from the prestigious University of Isfahan, Iran. Driven by her unwavering passion for technology and my

commitment to inclusivity, she is on a mission to explore the vast potential of data analysis in Augmented Reality (AR) and Virtual Reality (VR) technologies. Ghazaleh's focus is on harnessing the power of data to create more accessible and user-friendly experiences for individuals with disabilities.

She believes that by utilizing data-driven insights, we can revolutionize the way humans interact with computers. Ghazaleh envisions a future where technology seamlessly bridges gaps and empowers people from all walks of life. Through her academic pursuits and research endeavors, she is dedicated to contributing innovative solutions that shape a more inclusive digital landscape. molecular epidemiology of infectious diseases and public health.

2022-2023 VADA Committees

The 5 VADA committees for the 2022-2023 academic year included the Internship/Lab Exchange Committee, Summer School Committee, Recruitment and Selection Committee, Research Excellence Committee, and Sustainability Committee. The committees consisted of VADA faculty and second year Doctoral students. We thank all faculty members who chaired or served on a committee.





The VADA Program

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Internship/Lab Exchange Committee

Faculty:

Miguel Uyaguari (Chair)
Meaghan Jones
Meghan Azad
Laura Cowen
Natalie Knox

Second Year Doctoral Students:

Ruth Mwatelah
Md Ashiqul Haque

Summer School Committee

Faculty:

Lisa Lix (Chair)
Pingzhao Hu
Julien Arino
Xuekui Zhang
Hezhao Ji

Second Year Doctoral Students:

Lisa Shah
Muditha Lakmali Bodawatte Gedara

Recruitment and Selection Committee

Faculty:

Abdul Roudsari (Chair)
Jason Leboe-McGowan
Depeng Jiang
Alex Thomo
Britt Drogemoller
Pourang Irani

Second Year Doctoral Students:

Taylor Davedow
Yulia (Yushan) Hu

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Research Excellence Committee

Faculty:

Lyle Mckinnon (Chair)
Gary Van Domselaar
Elizabeth Borycki
Celine Nadon
Andre Kushniruk
George Tzanetakis

Second Year Doctoral Students:

Leann Lac

Sustainability Committee (Ad hoc)

Faculty:

Alex Kuo (Chair)
Andre Kushniruk
Britt Drogemoller
George Tzanetakis

Second Year Doctoral Students:

Amanda Joseph

Fall 2023 Foundations of Disease Analytics Course

The Foundations of Disease Analytics Course returned for an in-person delivery this Fall semester, with University of Victoria and British Columbia students joining in a hybrid delivery. This course was condensed to one semester this Fall in light of the program ending. We had 12 students taking the course this year, and 6 returning PhD students giving presentations throughout the semester about their VADA Program internships.

2022-2023 Summer School

Our last Summer School was held from June 20th – 24th, 2023 as an in-person event at St. John's College at the Fort Garry campus of the University of Manitoba. University of Victoria and British Columbia students travelled to Winnipeg, had the opportunity to live in the student dorm rooms of the college, and visit some of Winnipeg's most iconic locations such as the Forks, with a walking tour lead by Dr. Lisa Lix, and The Leaf at Assiniboine Park. Sessions included speakers and panelists from Ontario's Hospital for Sick Children, the Manitoba Centre for Health Policy, National





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Microbiology Laboratory, Manitoba Government, various universities, and industry! Check out the summer school's program [here](#). A noteworthy distinction of the summer school competitions was that each category was won by persons identifying as female. Congratulations to the Big Data Challenge winners, Katherine Li, Samah Ahmed, and Kailun Bai; Poster competition winners Katherine Li for the category *Scientific Merit*, and Jocelyn Ivette Zambrano Alvarado for the category *Effective Visualization*. Many thanks to Viktoriya Vasytkiv and Safia Soussi Gounni for their work in making a successful summer school!

Check out our many fun photos from Summer School:



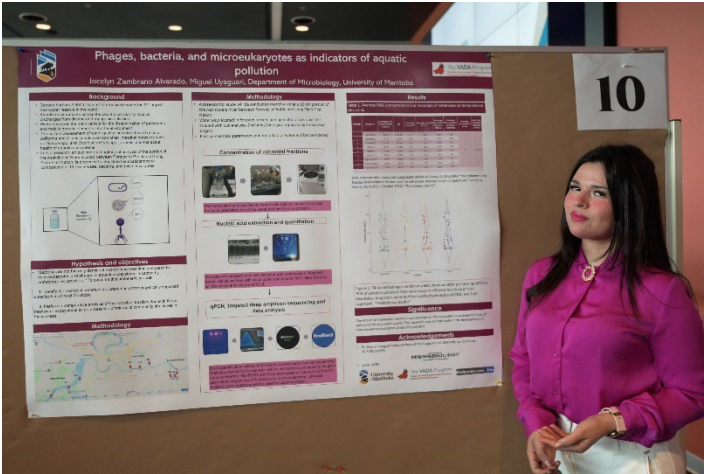
A group photo with trainees and faculty. Front row, Left to Right: Kailun Bai, Taylor Wells, Shi Zhang, Muditha Bodawatte Gedara, Maria Shenna Fauni, Dee Dee Wong, Ruth Mwatelah. Middle row, Left to Right: Viktoriya Vasytkiv, Yushan Hu, Katherine Li, Jocelyn Ivette Zambrano Alvarado, Saqib Islam, Dr. Pingzhao Hu, Dr. Lisa Lix, Dr. Pourang Irani, Safia Soussi Gounni, Mohd Wasif Khan, Thuppahiralalage Eranga De Saa, Samah Ahmed. Back row, Left to Right: Hassan Maleki Golandouz, Dr. Julien Arino, Md Ashiqul Haque, Henry Oluka. Hassan Maleki Golandouz, Dr. Julien Arino, Md Ashiqul Haque, Henry Oluka.



Md Ashiqul Haque and Hassan Maleki Golandouz with our visiting guest and speaker, Dr. Alistair Johnson.



VADA Program faculty, Dr. Jason Leboe-McGowan at the Summer School Research Poster Reception learning about Samah Ahmed's work.



Jocelyn Ivette Zambrano Alvarado with her winning research poster in the category of *Effective Visualization*.



Some of our trainees at the Leaf, Assiniboine Park. *Left to Right: Mohd Wasif Khan, Saqib Islam, Muditha Bodawatte Gedara, Md Ashiqul Haque, Thuppahiralalage Eranga De Saa, Hassan Maleki Golandouz.*



Dr. Pourang Irani and **Dr. Lisa Lix** with Big Data Challenge winners (left to right) **Katherine Li, Samah Ahmed, and Kailun Bai.**



The trainees enjoying dinner together after the Leaf. *Front Row: Thuppahiralalage Eranga De Saa; Second row, Left to Right: Jocelyn Ivette Zambrano Alvarado, Muditha Bodawatte Gedara, Saqib Islam, Hassan Maleki Golandouz, Mohd Wasif Khan; Third row, Left to Right: Shi Zhang, Kailun Bai, Yushan Hu, Md Ashiqul Haque; Fourth Row, Left to Right: Maria Shenna Fauni, Ruth Mwatelah, Henry Oluka, Dee Dee Wong; Fifth Row: Taylor Wells*

VADA Program Internships – Summer 2023

VADA Program students completed their internships in a variety of locations across Canada:

- Samah Ahmed, Saqib Islam, Mohd Wasif Khan – University of Manitoba
- Maria Shenna Fauni - National Microbiology Laboratory
- Jocelyn Ivette Zambrano Alvarado - McMaster University
- Henry Oluka - African Development Institute of Research Methodology
- Dee Dee Wong - University of Victoria
- Katherine Li, Kailun Bai - Public Health Agency of Canada
- Hassan Maleki Golandouz - National Collaborating Centre for Infectious Diseases
- Shi Zhang – Manitoba Health

Trainee Awards, Presentations and Accomplishments

Congratulations to Leann Lac, who received the Canada Graduate Scholarship - Doctoral (CGS-D)/NSERC.

Ruth Mwatelah attended the 2023 Canadian HIV Research Conference and presented a research poster:

- **Mwatelah R**, Knight J, Ma H, Olango K, Kuria S, Ongaro MK, Walimbwa J, Bhattacharjee P, Lorway R, Kaosa S, Kikoko J, Isac S, Yiu K, Mishra S, McKinnon L. Developing a screening tool to reach men who have sex with men living with undiagnosed HIV in Kenya.

Md Ashiqul Haque and Muditha Bodawatte Gedara attended the 2023 Canadian Society for Epidemiology and Biostatistics Conference, and both presented an oral presentation:

- **Haque MA**, Bodawatte Gedara M, Nickel NC, Turgeon M. The Validity of Electronic Health Data for Measuring Smoking Status: A systematic Review and Meta-analysis.
- **Bodawatte Gedara M**, Sanusi RA, Sajobi TT, Lix LM. Item-Focussed Trees to Detect Differential Item Functioning in Patient-Reported Outcome Measures.

Kailun Bai published the following:

- **Bai K**, Xing L, Shao X, Zhang X. PCLDA: A cell annotation tool using scRNA-seq data based on simple statistics methods.

Katherine Li published the following:

- **Li K**, Melnychuk S, Sandstrom P, Ji H. Tracking the evolution of the SARS-CoV-2 Delta variant of concern: analysis of genetic diversity and selection across the whole viral genome. *Frontiers in Microbiology*. 2023;14.

Yushan Hu published the following:

- **Hu Y**, Shao X, Xing L, Li X, Nonis GM, Koelwyn GJ, Zhang X, Sin DD. Single-Cell Sequencing of Lung Macrophages and Monocytes Reveals Novel Therapeutic Targets in COPD. *Cells*. 2023 Dec 5;12(24):2771.

Md Moniruzzaman published the following:

- **Moniruzzaman M**, Hussain MT, Ali S, Hossain M, Hossain MS, Alam MA, Galib FC, Islam MT, Paul P, Islam MS, Siddiquee MH. Multidrug-resistant *Escherichia coli* isolated from patients and surrounding hospital environments in Bangladesh: A molecular approach for the determination of pathogenicity and resistance. *Heliyon*. 2023 Nov 1;9(11).

Yichun Zhao published the following:

- **Zhao Y**, Nacenta MA, Sukhai MA, Somanath S. TADA: Making Node-link Diagrams Accessible to Blind and Low-Vision People. *arXiv preprint arXiv:2311.04502*. 2023 Nov 8.