CURRICULUM VITÆ OF

LISA Ying Wai TANG

lisat.wyw@gmail.com | BC, Canada

EDUCATION & INSTRUCTIONAL EXPERIENCES

PhD (and BSc) — Computing Science, Simon Fraser University, Canada; *Convocation Medalist* for outstanding performance

Postdoctoral training — University of British Columbia; Vancouver Coastal Health; Provenance Health

- Projects on use of **machine learning (ML), deep learning (DL), large language models (LLM)** with large-scale datasets
- Experienced in working with proprietary data formats and processing of (multimodal) data, videos, time-series

Lecturing — Have taught graduate and undergraduate courses at Simon Fraser University (4 classes), Columbia College (5 classes), University of British Columbia (5 classes), and Northeastern University (3 classes)

Languages — English, Cantonese, Mandarin

SKILLS

Management

- Demonstrated ability to collaborate with team members with diverse background and skill sets
- Enjoy independent problem-solving and implementation
- Skilled at multitasking on different levels (research and administration)
- Demonstrated record of productivity and tendency to over-deliver

Communication

- Passionate with data visualizations (Seaborn) and interactive explorations (Plotly), visual arts, and photography
- Experienced in website design & web app development (HTML, CSS, Flask, JavaScript), besides Markdown & LaTex
- Experienced preparing concise and effective project charters for inter-departmental and cross-institutional uses
- Sole or lead writer of various awarded grant applications
    - $90k by Canadian Cardiovascular Society for 2021-2022 (lead)
    - $155k by Huawei-Data Science Institute for 2020-2021 (sole)
    - NSERC MITACS postdoctoral fellowship 2019 (sole)
    - NSERC postdoctoral fellowship application 2015 (sole)

Machine learning/ programming

- Experiences in survival analysis (Sksurv) & machine learning (CatBoost, eXtreme Gradient Boosting, Optuna)
- Extended convolutional neural networks, recurrent networks with Pytorch, Keras, Tensorflow, Tensorflow-Lite
- Python, R, C++, Java, and MATLAB
- Computing using SLURM scheduling, shell-scripting, Amazon Web Services, Google Cloud & Kaggle platforms
- Operated on large datasets using Polars (Python), Statistical Analysis Software, and SQL
- Large language models: Unsloth, explainable natural language processing

Production/ Knowledge translation

- Implemented and delivered production-ready solution (Docker) that won the first place at the CVPR 2023 workshop on "Deep Learning in Ultrasound Image Analysis" coding competition https://github.com/lisatwyw/smrvis
- Implemented a working prototype in 3 days that garnered the fifth place at a 2023 ICASSP coding competition
- Prototyping of dashboards in R , e.g. bccdc.shinyapps.io/phido_dashboard/ and Streamlit, e.g. lisatwyw.github.io

Other experiences

- Web scraping data to collect social media tweets and analyze sentiments in the population
- Implemented data conversion pipeline to extract echocardiogram waveforms from non-standard formats, e.g. PDF
- Reduced office workload by implementing computer-assisted analysis pipelines to help code qualitative data
- Natural language processing & sentiment analysis on medical narratives

EMPLOYMENT

Nov 2023 - Present — **Senior scientist at BC Centre of Disease Control, Data Analytics & Services**

- Spearheading NLP research program for social listening using social media data for near-time
- Supervised and mentored 2 data scientists, 2 data analysts, 1 co-op student, and 1 biostatistician
- Collaborated with 3 directors of research and 1 family physician
- Led R/D to increase operational throughput of computational framework for drug discovery by 300% (toxicology department)
- Decreased time of dashboard production turnaround time by 4 months
- Increased workshop participation from 20% to 33%
- Prompt engineering for ethnicity prediction from names, event tagging, and sentiment analyses

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Fall 2022 - Nov 2023 **Part-time faculty in Masters of Data Analytics** | ***Data Visualization* (6070) & *R* (6000)** | Northeastern University, Van campus
- First faculty member to introduce the use of interactive Colab for in-class demos and off-campus assignments
- Delivered 3-hour weekly lectures and voluntarily offered off-campus group tutorials
- Completed fair and timely grading of courseworks for large classes without tutor marker
- Mentored motivated students with 100% success rate on their student-award nominations

Fall 2022 **Sessional faculty in Masters of Health Science** | ***Intermediate Methods for Epidemiology* (HSCI805)** | Simon Fraser University
- Designed new curriculum (without teaching assistant) with R Colab notebooks https://tinyurl.com/epi-gala
- Led 4 term-projects on topics such as women's health and patients in psychiatric hospitals during pandemic
- Facilitated comfortable discussions on ethical and responsible research conduct

Fall 2018 - Fall 2022 **Data Science Research Associate** | University of British Columbia, Canada
- Led co-author of proposal on development of AFib prognostic tools; awarded $90k
- First author of proposal on data analysis of large-scale population data using deep learning; awarded $155k
- Spearheaded all manuscripts from start to finish, including data collection, error analyses, rebuttals
- Team lead and manager of 3 different projects on the side; samples of project listed on pp. 2-3

Spring 2017 - Spring 2018 **Research Scientist** | Data Science Institute & St. Paul's Hospital, Canada
- Conceived, designed, implemented validation and software prototype using residual neural networks for ML-enabled diagnosis of a lung disease
- First author of grant proposal on using graph-based and ML methods for disease severity rating; awarded $50k/yr

EXAMPLE ROLES & PROJECTS

Apr 2024 - present Project supervisor for identification of illicit drugs using mass spectrometry (MS) data
- Apply preprocessing pipeline to analyze high resolution MS data
- Conceive and develop model development pipelines
- Provide support for data scientist and project owner
- **Highlights: recurrent neural network; toxicology**

Mar 2024 - present Project lead on natural language processing for public health use cases
- Implementing reproducible workflows on following projects
  - Identify and removing implicit biases in clinical notes
  - Topical modeling for understanding long COVID discourse
- **Highlights: interpretable natural language processing methods**

Nov 2023 - Jun 2024 **Project lead for disease surveillance dashboard**
- Supporting three team members (data analysts and biostatistician) on implementation
- Designed user questionnaires to effectively differentiate core vs nice-to-have features
- Provide emotional and technical support to team members on all fronts (deployment, credential management, algorithm validation, user interviews, etc)
- Promote optimization of operational workflows via adoption of GitLab version control, PowerAutomate

Dec 2021 - July 2023 Project lead of cardiology research sponsored by Huawei through Data Science Institute, UBC
- Core lead and project manager of clinical research using administrative databases of 80M-100M records per data lake from authorities such as Medical Services Plan and National Ambulatory Care Reporting System
- Conceived and implemented research plans to train and validate prognostic models for stroke and bleeding prevention in AFib patients using these administrative datasets
- Demonstrated ability to work under pressure with minimal supervision by principal investigators
- Learned part-time to use SAS and R within one month while conducting literature review full-time
- Research outputs used to support subsequent grant applications to NSERC Alliance and CIHR grant for 5-year strategic planning via manuscript submission to ***njp Nature Digital Medicine***

Highlights: interpretable AI; large-scale administrative data; survival analysis; clinical net benefit

Jan 2023- July 2022 Project manager of AI project sponsored by Canada's Digital Technology Supercluster; funding of $120k for 1 year
- Led writing of ethics application and study protocol
- Conceived technical research plans for the development of machine learning models for differential diagnosis of pneumonia using digital auscultation
- Supervised junior staff on data entry, coding data, and cleansing data fields
- Mentored co-op student in software development of machine learning algorithms
- Chaired regular committee meetings with respiratory experts & professors via effective slides
- Assisted admin/HR tasks (drafted job ads, interviewed candidates)
- Reviewed invoice and identified workarounds to lower budget expenses by 40%

Highlights: agile development; generative adversarial networks

Nov 2021 - July 2022

Project lead of qualitative research with formal ethics approval, supervised by emergency physician of Vancouver General Hospital (VGH)

- Worked alone part-time on drafting, refining, and submitting a lengthy ethics application, followed by two quick rounds of provisos within short span of 3 weeks
- Designed interview questions to be used for a focus group aimed at brainstorming solutions to (self-) management of heart failure diseases for patients and their caregivers
- Independently setup surveys via Qualtric (online survey with logic embedded), recruitment toolkits via REACHBC platform, designed print posters for circulation at a health clinic at VGH
- Coordinating all types of recruitment activities with clinical staff and nurse educators, as well as communication with focus group participants
- Conducted focus group sessions and administered thank you cards and email

Highlights: qualitative, patient-centric research

Jan 2020 - Jun 2021

Support for a visual analytic project sponsored by Data Science Institute, led by Professors at UBC for a province-wide initiative known as the "811 HealthLinkBC"

- Assisted the editing of a postdoctoral fellowship grant application that successfully acquired funds of $40k to support Dr. Jürgen Bernard, now assistant professor at University of Zurich
- Providing both technical and administrative support to multidisciplinary team of non-technical project members and world-renowned experts in information visualization in building a prototype for interactive data analyses of telehealth calls to 811 call center
- Co-authored field notes of usage sessions and interviews; provided feedback on features & manuscript

Highlights: interactive visualization; agile development

Oct 2019 - Sep 2020

Project lead of research in atrial fibrillation sponsored through Data Science Institute; funding of $110k for 1 year

- Core lead and project manager of data analysis on heart rhythm data acquired from a randomized clinical trial
- Conceived designs of studies; completed implementations of machine learning pipelines
- Cut project's budget expenses of $25k by ensuring product delivery without hiring additional staff
- First-author of 3 international conference abstracts, 2 journal articles (1 published and 1 under review), and 1 workshop article within 11 months; written all manuscripts with minimal supervision from start to finish
- Collaborated with clinical experts; prepared orals for presentations at top-tier clinical conference)
- Lead author of 3-page project proposal for a grant extension with success ($20ok)

Highlights: health monitoring; cardiac implant; time-series; prognosis; recurrent neural network

Oct 2019 - Aug 2020

Project lead of data analysis work on continuous monitoring data collected for a clinical trial known as TEC4Home (in partnership with Telus)

- Core developer of various analysis pipelines completed on part-time basis (average of 2 days per month)
- Visualized trends of biometrics collected from real patient data; explored sex and age differences in trends
- Examined correlations between daily blood pressure readings with weight, step count, etc.
- Outputs of my data analyses were presented to an internal committee meeting, where we successfully secured over $1M of research grants at conclusion of the meeting
- Conceived data analysis and publication plans for phase two data that will serve to solidify subsequent applications for national grant

Highlights: health monitoring; vital signs; TelusHealth

Mar 2020

Implemented 2 systems for product-evaluation of Amazon Web Services (volunteered)

- Worked alone on implementing two AWS-hosted systems during a tight window of one week: 1) A telephone management system hosted on AWS within 3 days 2) A chat bot deployed on Slack within 5 days
- Devised, implemented, deployed systems over test period of ~2 weeks to provide assessment to supervisor
- Prepared documentations for knowledge-sharing with peers: https://bit.ly/3lAZbgx | https://bit.ly/3f3AacC

May 2019 - Dec 2019 then Mar 2020 & Dec 2020

Project lead of lung research (postdoctoral)

- Conceived and implemented machine learning development protocols using a dataset of 9,300 medical images (from a multinational public dataset)
- Completed benchmark on over 10 popular networks such as ResNeXt within 2 months time
- First-authored a manuscript to machine learning workshop; withdrew accepted paper due to conflict of interest
- Independently developed software pipeline for automated detection of COPD from medical images (CT) First-authored article published in Lancet Digital Health 2020

Highlights: development and external validation; low-dose screening; fine-tuning residual networks; class activation mapping for clinical interpretation

May 2018 - Dec 2019

Project lead of machine learning projects on differential diagnosis using brain images (postdoctoral)

- Developed pipelines that extracted lesional patterns from lesion masks to capture the differences in the spatial distribution of lesions between patient groups
- Cross-validated classifier achieved 84±9% and 78±17% in sensitivity and specificity, respectively
- Integrated demographic information with water diffusion indices computed from diffusion tensor images to develop a cross-validated classifier that achieved 84±9% accuracy
- First-authored technical report: https://bit.ly/3scKG51
- First-authored abstract at **Canadian Association of Radiologists won "First Prize on Scientific Research"**

VOLUNTEERING

NeurIPS workshops mentorship (Summer 2023 - Spring 2024)
- Mentoring two female researchers Niti M. (PhD student) and Varsha G. (postdoctoral fellow)
- Acting as critical reviewer for Niti's first double-blind abstract submission to Women in ML workshop entitled "*Improving Temperature Related Mortality Predictions of a European Health Early Warning System by Improving Influenza Forecasts*"
- Weekly extended meetings (>90 minutes) to review technical plan and writing refinement strategies
- Supporting Niti on another proposal track submission being planned for ClimateChangeAI (CCAI) workshop
- Co-developing tutorial CCAI submission to be led by Varsha that focuses on API data pull and geospatial visualizations of air quality measurements

Long-term mentorship (Summer 2014 - Summer 2022)

Project-lead on 3 voluntary projects on "Analysis of facial cues in communication", conducted in collaboration with KUPPL (University of Kensas), LABlab (SFU), and MIAL (SFU);
- Co-supervised projects that led to various published articles
- Provided verbal and written feedback to project lead on experimental designs and results
- Co-led writing and refined manuscripts and conference abstracts
- Held bi-weekly Skype meetings to discuss project progress and propose new research directions

Steering committee (Winter 2022 - Spring 2023)

Member of UBC's "Geering Up" (free online half-day workshop for grade 11 teens)
- Spear-headed brainstorming sessions, content creation, recruitment; activities-planning
- Self-motivated research on STEM-driven activities
- Reviewed resources on strategies to promote inclusiveness in (virtual) classrooms

Scientific judging
- Faculty of Medicine Research Day 2022, Tri-Cluster Research Day 2021, Trainee Research Day 2021

Volunteer supervisor (2015, '16, '18)

Gift-wrap booths for 3 Christmases at a not-for-profit fundraising event, Metrotown Mall, Burnaby
- Performed gift-wrapping professionally and handled transactions efficiently
- Resolved complaints in efficient and effective manners via reminders on societal impact each donation meant

(NON-ACADEMIC) SUPERVISORY EXPERIENCES

Sep'24 - present	Raina C, data scientist
Apr'24 - present	Afraz K, data scientist
Nov'23 - present	Max X, biostatician and data linkage lead (co-supervision)
Mar'24 - Jun'24	Lizz P, Geospatial data analyst (co-supervision with Sunny M.)
Nov'23 - May'24	Joy D, data analyst (co-supervision with Max X.)
Nov'21 - Jun'22	Jessica L., work-learn student (supervision)
Sep'21 - Jun'22	Bill W., contracted research coordinator of Black Tusk Research Group (external; co-supervision)
May'20 - Jun'22	Lauren Z., work-learn student (supervision)
May'18 - Sep'18	William G., co-op student (co-supervision)
May'17 - Jun'17	Nicholas S., co-op student (co-supervision)
Jan'17 - May'17	Karen G. & Eugene X., co-op student (co-supervision)
May'16 - Sep'16	Hengde H., Co-op student (co-supervision)
Jun'14 - Sep'14	Elizabeth W. & Jason L., co-op student (co-supervision)

AWARDS & ACHIEVEMENTS (PARTIAL LIST)

Nov 2023 — Best null hypothesis, USD $2500, selected out of 86 submissions by DrivenData

Jul 2023 — 1st Place CVPR workshop R&D competition "Deep learning for ultrasound image analysis"
- Winning solution written in ~2 weeks; leveraged 5 variants of U-Net to extract isosurfaces of industrial pipes
- Third-party evaluation via docker image posted at https://github.com/lisatwyw/smrvis for public use

Mar 2023 — 5th Place ICASSP workshop R&D competition "Predicting ground-glass opacity severity from CT images"
- Third-party evaluation by challenge's host https://github.com/lisatwyw/cov19 for public use

April 2023 — First time participation at **Vancouver Sun Run 10km**
- Ran 10 km in 64 minutes; 2nd place in my team of 12; competition ranking in same age category: 273 / 1131 (top 24%)

Jun 2018 — 1st Prize Award on Scientific Research | Annual Scientific Meeting of the Canadian Society of Radiology
- First-author abstract & oral chosen as "best" by a committee of 3 anonymous radiologists; awarded $1k USD

- 2018 — Deep Learning Workshop in Denver: $500 USD travel grant
- 2013 — MLMI workshop in Japan: best paper award & oral presentation
- 2013 — MICCAI main conference in Nagoya: student award for oral presentation; $500 USD
- 2011 — MIBSOC in Brussels: on graph-based approach to tongue contour tracking; $1000 Euros travel grant
- 2008 — SIIM in Seattle: New Investigator's award $1K

SELECT PUBLICATIONS (Google Scholar profile https://tinyurl.com/lisatwyw)

Under review

- LYW Tang, et al. Interpretable survival models for risk stratification of stroke, bleeding, and mortality for patients with atrial fibrillation: development and validation using population data from a Canadian province.
- LYW Tang. "Racialized" medical narratives? Multimodal analysis and stylometry for equitable healthcare.

Peer-refereed journal articles

- LYW Tang & CW Tang Motivating Mature Learners to Adopt Reproducible Workflows in a 60-minute Hybrid Workshop: A Curriculum Design Challenge. Journal of Design Service and Social Innovation 2024 Accepted.
- LYW Tang, et al. Predicting Atrial Fibrillation Recurrence After Catheter Ablation: A Comparative Evaluation in the CIRCA-DOSE Trial. *Circulation: Arrhythmia and Electrophysiology* 2021.
- LYW Tang, et al. Autonomic Alterations After Pulmonary Vein Isolation in the CIRCA-DOSE Study. *Journal of the American Heart Association* 2021.
- LYW Tang, et al. Towards large-scale case-finding: training and validation of residual networks for detection of chronic obstructive pulmonary disease using low-dose CT The *Lancet Digital Health* 2020.
- M Le, LYW Tang, et al. FLAIR2 improves LesionTOADS automatic segmentation of multiple sclerosis lesions in non-homogenized, multi-center, 2D clinical magnetic resonance images. NeuroImage: Clinical 23, 2019
- Y Yoo, LYW Tang, et al. Deep learning of joint myelin and T1w MRI features in normal-appearing brain tissue to distinguish between multiple sclerosis patients and healthy controls. NeuroImage: Clinical 17, 2018
- LYW Tang, et al. Examining visible articulatory features in clear and plain speech. Speech Communication 75, 2015
- T Brosch, LYW Tang, et al. Deep 3D convolutional encoder networks with shortcuts for multiscale feature integration applied to multiple sclerosis lesion segmentation *IEEE Trans. on Medical Imaging* 35 (5) 2014
- LYW Tang, et al. Tongue contour tracking in dynamic ultrasound via higher-order MRFs and efficient fusion moves. *Journal of Medical Image Analysis* 2012.

Peer-refereed proceedings & abstracts

- LYW Tang, et al., "Baseline prediction of atrial fibrillation recurrence after catheter ablation: comparative analysis of prognostic models using data recorded by implanted cardiac monitors" *Circulation* 2020. (podium presentation)
- LYW Tang, et al. "Predicting Catheter Ablation Outcomes with Pre-ablation Heart Rhythm Data: Less Is More," *Machine Learning in Medical Imaging (MLMI)*, In conjunction with *MICCAI* 2020.
- LYW Tang, et al., "Machine learning of lesion patterns for NMO-MS differential diagnosis'", Annual Scientific Meeting for Canadian Association of Radiology 2018. (selected for oral; won the CAR 2018 First Prize of Scientific Research)
- LYW Tang and G Hamarneh. "Random walker image registration with inverse consistency", IEEE International Symposium on Biomedical Imaging April 2015. (podium presentation)
- LYW Tang and G Hamarneh. "Reducing computational complexity of random walker image registration via cost aggregation", IEEE International Symposium on Biomedical Imaging 2014. (podium presentation)
- T Mahyari, LYW Tang, et al. "Improving probabilistic image registration via reinforcement learning and uncertainty evaluation," In Machine Learning in Medical Imaging, In conjunction with MICCAI, pp. 188-195, Sep. 2013. (podium presentation + won the Best MLMI 2013 Paper Award)
- H Mirzaei, LYW Tang, et al., "Decision Forests with Spatio-temporal Features for Graph-based Tumor Segmentation in 4D Lung CT," In Machine Learning in Medical Imaging, pp. 179-186, 2013. (podium presentation)

Book Chapters

- T Brosch, Y Yoo, LYW Tang, et al. "Chapter 3 - Deep learning of brain images and its application to multiple sclerosis," in Guorong Wu, Dinggang Shen, Mert R. Sabuncu (Ed.), "Machine Learning and Medical Imaging", Academic Press, 2016.
- LYW Tang and G Hamarneh. "Medical Image Registration", in Krizysztof Iniewski (Ed.), "Medical Imaging: Principles, Detectors, and Electronics" (2nd ed), Wiley.

Articles acknowledging my support & mentorship

- S Garg, et al. Different facial cues for different speech styles in Mandarin tone articulation. Front. in Communication 2023.
- S Garg, et al. (2023). Mouth2Audio: intelligible audio synthesis from videos with distinctive vowel articulation. Internationa Journal of Speech Technology, 1-16.
- S Garg, et al. ADFAC: Automatic Detection of Facial Articulatory Features. MethodX, 2020.
- N Straton, et al. Computational modeling of stigmatized behaviour in pro-vaccination and anti-vaccination discussions on social media. IEEE Int Conf on Bioinformatics and Biomedicine (BIMI), 2019.
- N Straton, et al. Predictive modeling of stigmatized behaviour in vaccination discussions on Facebook. IEEE BIMI, 2019.

Work in progress

- LYW Tang. Advancing reconciliation with Indigenous Peoples in healthcare through decolonizing research methods: a narrative review.
- CW Tang & LYW Tang. AI-enabled anti-human trafficking: a narrative review.
- LYW Tang, CW Tang, Ben Cardoen, Sieun Lee, Refuge Watch: an Extensible Python Framework towards climate-resilient strategies for refugee support