CURRICULUM VITÆ OF

LISA *Ying Wai* TANG

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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, Data Analytics & Services, PHSA

- 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
- Provided consultations with 2 research directors 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
2013 - Deep Learning Workshop in Denver: $500 USD travel grant
2013 - MLMI workshop in Japan: best paper award & oral presentation
2011 - MICCAI main conference in Nagoya: student award for oral presentation; $500 USD
2008 - MIBSOC in Brussels: on graph-based approach to tongue contour tracking; $1000 Euros travel grant
- 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. Internation 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