Zhou (Joe) Lan

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Summary

I am a computational and statistical investigator at Brigham and Women's Hospital and Harvard Medical School with focuses on biomedical data, particularly neuroscience, genetics, oncology, and cardiovascular research. My work spans the **full spectrum** of biomedical/clinical investigation, including

- a) **Pre-Clinical Studies:** focusing on large-scale imaging, genetic, and omics biobank–based biological discovery through data science and digital health approaches;
- b) **Clinical Trials:** emphasizing treatment evaluation using robust statistical methodologies;
- c) **Epidemiological Real-world Studies and Outcomes Research:** leveraging electronic health records, insurance claims, medical charts, and large registries data to assess treatment effectiveness/safety through advanced causal inference techniques.

I have participated in a number of studies as a leading biostatistics investigator and a statistics collaborator. As a leading investigator, I have served as a lead author on more than 15 publications in leading journals such as *Imaging Neuroscience, NeuroImage: Clinical, Bioinformatics, Data Science in Science*, and *JAMIA Open* with open codes and software available at `https://github.com/lanzhouBWH`. As a statistics collaborator, I have co-authored over 50 collaborative papers in high-impact biomedical and clinical journals, including *The New England Journal of Medicine, Journal of the American Heart Association, Circulation*, *Human Brain Mapping, Neuro-Oncology* and *Radiology*. Currently, my work is expanding to incorporate artificial intelligence. I also actively engage with the FDA guidelines for the pharmaceutical industry.

Work Experience

Brigham and Women's Hospital, Harvard Medical School Oct 2022 – present
Computational and Biostatistical Investigator; Instructor in Medicine

Center for Outcomes Research and Evaluation, Yale Medical School Jul 2020 – Sep 2022
Statistician Consultant

Pennsylvania State University Aug 2019 – Jul 2020
Bruce Lindsay Visiting Assistant Professor

Eli Lilly & Company May 2018 – Aug 2018
Ph.D. Statistics Intern

Ventana Medical Systems (Roche) May 2016 – Jul 2016
Imaging Scientist Intern

Education

North Carolina State University, Raleigh, North Carolina

Ph.D. in Statistics, July 2019

Georgia Institute of Technology, Atlanta, Georgia

M.S., Statistics (Applied Mathematics), May 2015

Zhejiang University, Hangzhou, China

B.S., Biology, May 2012

Expertise

Programming	Python, R, C/C++, Bash, Slurm Workload Manager, SAS, SQL
Statistics & Machine Learning	Survival Analysis, Bayesian Modeling, Probabilistic Graphical Models, Quantile Regression, Spatial Statistics, Matrix-Variate Methods, High-Dimensional Data Analysis, Causal Inference
Computation	High-Performance Computing, Parallel Computing, Algorithm Development
Biomedical Applications	Neuroimaging, Radiology, Genetics, Diffusion MRI, Magnetic Resonance Spectroscopy, Oncology, Cardiology

Work Authorization

United States Permanent Resident (Green Card)

Main Projects

Pre-Clinical Studies

- **Project 1:** Fiber Microstructure Quantile (FMQ) Regression for Analyzing Brain White Matter Bundles using Large Biobank Data: Human Connectome Project-Young Adults Data (`https://www.humanconnectome.org/study/hcp-young-adult`) (Lauren J. O'Donnell at Brigham and Women's Hospital, Harvard Medical School)
  - Used the established imaging processing pipelines (*UKFTractography*: `https://github.com/pnlbwh/ukftractography` and *whitematteranalysis*: `https://github.com/SlicerDMRI/whitematteranalysis`) for Human Connectome Project-Young Adults to derive human tractography data.
  - Led development of statistical and computational methods for analyzing diffusion MRI tractography to address high dimensionality, spatial correlation, using the quintile regression method, allowing for the analysis of diffusion MRI tractography from the periphery to the core.
  - Developed the pipeline software (including fiber bundle visualization based on computer vision techniques) for the health analytic method
    (Github Code: `https://github.com/lanzhouBWH/Fiber-Microstructure-Quantile-FMQ-Regression`)
  - Representative Publications:
    - Zhou Lan, Yuqian Chen, Jarrett Rushmore, Leo Zekelman, Nikos Makris, Yogesh Rathi, Alexandra J. Golby, Fan Zhang, and Lauren J. O'Donnell, "Fiber Microstructure Quantile (FMQ) Regression: A Novel Statistical Approach for Analyzing White Matter Bundles from Periphery to Core", *Imaging Neuroscience* **3**, 11 (2025).(doi: 10.1162/imag_a_00569)
    - Legarreta, Jon Haitz, Zhou Lan, Yuqian Chen, Fan Zhang, Edward Yeterian, Nikos Makris, Jarrett Rushmore, Yogesh Rathi, and Lauren J. O'Donnell, "Towards an Informed Choice of Diffusion MRI Image Contrasts for Cerebellar Segmentation", *Human Brain Mapping* **46**, 11 (2025).(doi: doi.org/10.1002/hbm.70317)

- **Project 2:** Neurometabolic network (NMetNet) for functional neurological disorder in children and adolescents (Collaborator: Alexander P. Lin at the Center for Clinical Spectroscopy at Brigham and Women's Hospital, Harvard Medical School)
  - Led the invention of NMetNet, which is a novel network-based statistical approach (Bayesian graphical lasso) in analyzing the alteration of metabolites between functional neurological disorders (FND) and controls.
  - Representative Publications:
    - Zhou Lan, Sheryl Foster, Molly Charney, Max van Grinsven, Katherine Breedlove, Kasia Kozlowska, Alexander Lin, "Neurometabolic Network (NMetNet) for Functional Neurological Disorder in Children and Adolescents", *NeuroImage: Clinical* **46**, (2025).(doi.org/10.1016/j.nicl.2025.103767)

- **Project 3:** Novel automated pipeline development to assess MR spectroscopy data quality (Collaborator: Alexander P. Lin at the Center for Clinical Spectroscopy at Brigham and Women's Hospital, Harvard Medical School)
  - Mentored an intern to develop an automatic MRS data processing pipeline using signal processing approaches, avoiding manual data quality control.
  - Representative Publications: Beroukhim B, McComas S, Joyce JM, Schuhmacher LS, Koerte I, Lan Z, Lin A, "A novel automated pipeline to assess MR spectroscopy quality control: Comparing current standards and manual assessment.", *J Neuroimaging* **35**, 1 (2025). (DOI: doi.org/10.1080/26941899.2024.2412017)

- **Project 4:** Noninvasive MRI/PET-based radiological biomarkers for predicting tumor molecular characteristics obtained from biopsy(Collaborator: Radiologists at Department of Radiology)
  - Maintained a large database derived from medical records for studying performance of non-invasive radiological biomarkers
  - Used predictive modeling approaches including logistic regression, receiver operating characteristic, LASSO regression to investigate the predictive performance of noninvasive MRI/PET-based radiological biomarkers for predicting tumor molecular characteristics obtained from biopsy.
  - Representative Publications:
    - Allyson L Chesebro, Susan C Lester, Zhou Lan, Catherine S Giess, "Imaging, Patient, and Diagnostic Radiologist Factors Associated With Malignancy for Mammographic Asymmetries Undergoing Biopsy", *Journal of Breast Imaging* **7**, 4 (2025). (DOI: doi.org/10.1093/jbi/wbaf008)
    - Jirarat Jirarayapong, ..., Zhou Lan, ..., Eva C Gombos, "Intraoperative Supine Breast MRI for Residual Tumor Assessment after Breast-Conserving Therapy in Early-Stage Breast Cancer", *Radiology: Imaging Cancer* **7**, 2 (2025). (DOI: doi.org/10.1148/rycan.240158)
    - Jessie L Chai, ..., Zhou Lan, ..., Atul B Shinagare, "Performance of VI-RADS in predicting muscle-invasive bladder cancer after transurethral resection: a single center retrospective analysis", *Abdominal Radiology* **49**, 5 (2025). (DOI: doi.org/10.1007/s00261-024-04245-4)

Clinical Trials for Treatment Evaluation

- **Project 1:** Apixaban for Extended Treatment of Provoked Venous Thromboembolism (HI-PRO Trial) (Brigham and Women's Hospital Thrombosis Research Group `https://thrombosisresearch.bwh.harvard.edu`)
  - Led the drafting of the Statistical Analysis Plan (SAP)
  - Made key decision on end-points definition and corresponding statistical appraoches.
  - Carried out cohort/end-point derivation, and main analyses.
  - Contributed to statistical sections of the clinical manuscript.
  - Representative Publications:
    - Gregory Piazza, Behnood Bikdeli, Arvind K. Pandey, Darsiya Krishnathasan, Candrika D. Khairani, Antoine Bejjani, Ruth H. Morrison, Heather Hogan, Sina Rashedi, Mariana Pfeferman, Junyang Lou, John Fanikos, Nicole Porio, Lisa Rosenbaum, Piotr Sobieszczyk, Zhou Lan, Marie Gerhard-Herman, Umberto Campia, Samuel Z. Goldhaber, for the HI-PRO Trial Investigators, "Apixaban for Extended Treatment of Provoked Venous Thromboembolism (HI-PRO Trial)", *New England Journal of Medicine* **393**, (2025). (DOI: 10.1056/NEJMoa2509426)

Epidemiological Real-world Studies and Outcomes Research

- **Project 1:** Using survival analysis and causal inference to the impact of therapies on cardiovascular outcomes in patients with diabetes.
  - Constructed cohorts from the electronic health record (EHR) database.
  - Conducted analyses using propensity score weighting, mediation models, and competing-risks Cox regression.
  - Co-authored manuscripts and wrote statistical methods and results sections.
    - Shah, Nisarg, Zhou Lan, C. Justin Brown, Seth S. Martin, and Alexander Turchin, "Impact of Statin Nonacceptance on Cardiovascular Outcomes in Patients With Diabetes", *Journal of the American Heart Association* **14**, 11 (2025).(doi: https://doi.org/10.1161/JAHA.124.040464)
    - C. Justin Brown, PharmD; Lee-Shing Chang, MD; Naoshi Hosomura, DDS, DMSc, MBA; Shervin Malmasi, PhD; Fritha Morrison, PhD; Maria Shubina, ScD; Zhou Lan, PhD; Alexander Turchin, MD, MS , "Assessment of Sex Disparities in Nonacceptance of Statin Therapy and Low-Density Lipoprotein Cholesterol Levels Among Patients at High Cardiovascular Risk", *JAMA Network Open* **6**, 2 (2023). (doi:10.1001/jamanetworkopen.2023.1047)
- **Project 2:** Impact of possible errors in natural language processing-derived data on downstream epidemiological analysis
  - Conceived the idea to study possible errors in natural language processing-derived data on downstream epidemiological analysis
  - Using High-performance computing to carry out Monte Carlo experiments for evaluation. (Github Code: `https://github.com/lanzhouBWH/NLP-Downstream-Impact`)
  - Representative Publications:
    - Zhou Lan, Alexander Turchin, "Impact of Possible Errors in NLP-Derived Data on Downstream Epidemiologic Analysis", *JAMIA Open* **6**, 4 (2023). (DOI: 10.1093/jamiaopen/ooad111)
- **Project 3:** Clinical, molecular and radiological associated with overall survival (OS) and progression-free survival (PSF) for patients with brain tumor
  - Constructed cohorts from medical records database for clinical investigation
  - Used predictive modeling and survival analysis approaches to identify clinical, molecular, and radiological predictors associated with overall survival (OS) and progression-free survival (PFS) for patients with brain tumors.
  - Used weighted cox regression handling non-proportional hazard.
  - Used multiple imputation approaches for handling missing data.
  - Representative Publications:
    - Aleksandra B Lasica, Zhou Lan, ..., Raymond Y Huang, Patrick Y Wen, Gilbert Youssef, "Clinical, molecular and radiological predictors of prognosis in newly diagnosed astrocytoma, IDH-mutant, WHO grade 4", *Neuro-Oncology* **7**, 1 (2025).(doi: https://doi.org/10.1093/neuonc/noaf133)
    - Tyler A Lanman, ..., Zhou Lan, ..., Patrick Y Wen, L Nicolas Gonzalez Castro, "Ivosidenib for the Treatment of IDH1-mutant Glioma, Grades 2 to 4: Tolerability, Predictors of Response, and Outcomes", *Neuro-Oncology Advances* **7**, 1 (2025).(doi: https://doi.org/10.1093/noajnl/vdae227)
- **Project 4:** Large Registry Data Analysis for National Inpatient Sample (`https://hcup-us.ahrq.gov/db/nation/nis/nisdbdocumentation.jsp`)
  - Constructed a python toolbox software for the National Inpatient Sample (Github: `https://github.com/lanzhouBWH/Toolbox-for-National-Inpatient-Sample--NIS-`), including outcome definition based on ICD-9 and ICD-10 codes.

  - Provided epidemiological analysis for Aspirin for Venous Thromboembolism Prophylaxis in Hip Fracture, Total Knee, and Hip Arthroplasty
  - Representative Publications:
    * Leyva, H., Fanikos, J., Lan, Z., Scimeca, G., Bikdeli, B., Piazza, G. and Goldhaber, S.Z, "Aspirin for Venous Thromboembolism Prophylaxis in Hip Fracture, Total Knee, and Hip Arthroplasty", *The American journal of medicine* **138**, 9 (2025).(doi: https://doi.org/10.1016/j.amjmed.2025.03.020)

- **Project 5:** Multi-center Analysis of CORONA-VTE Network for COVID-19 Analysis
  - Constructed a harmonized database from 5 clinical centers: Ann Arundel, Beth Israel, Colorado, Mass General Brigham, Thomas Jefferson, University of Virginia.
  - Carry out cluster cox regression model accounting for site effect.
  - Longitudinal analysis for investigating the effect of vaccination on cardiovascular outcomes of inpatients and outpatients during COVID-19 pandemic
  - Representative Publications:
    * Giovanni Scimeca, ...,Zhou Lan,..., Behnood Bikdeli, Gregory Piazza, "Predictors of venous thromboembolic events in hospitalized patients with COVID-19", *Journal of Thrombosis and Thrombolysis* **58**, 4 (2025).(doi: https://doi.org/10.1007/s11239-025-03078-2)
    * B Bikdeli, D Krishnathasan, CD Khairani, ..., Z Lan, S Goldhaber, G Piazza, "Adjudicated cardiovascular events in a cotemporary multicenter cohort of patients with COVID-19: findings from the CORONA-VTE Registry", *European Heart Journal* **138**, 9 (2025).(doi: https://doi.org/10.1093/eurheartj/ehad655.1223)
    * Behnood Bikdeli, ..., Zhou Lan, Gregory Piazza, "Low absolute risk of thrombotic and cardiovascular events in outpatient pregnant women with COVID-19", *European Heart Journal* **138**, 9 (2025).(doi: https://doi.org/10.1016/j.thr

- **Project 6:** Excess Days in Acute Care (EDAC) after Hospitalization for U.S. Centers for Medicare and Medicaid Services (CMS)
  - Served as the **Lead Measure Analyst** for the CMS Quality Measure *Excess Days in Acute Care after Hospitalization* (EDAC), which evaluates hospital performance by quantifying post-discharge acute care utilization, including readmissions, observation stays, and emergency department visits.
  - Led the maintenance and continuous updating of SAS analytic codebases, including scripts for data preprocessing, risk adjustment, and model diagnostics, as well as integration of evolving ICD-10 diagnosis and procedure codes.
  - Contributed to the technical documentation and public reporting materials available through CMS's QualityNet website: `https://qualitynet.cms.gov/files/64501bdf9920e9001651f1f5?filename=2022_EDAC_MeasMethRpt.zip`.

Pharmaceutical, Biotech, and Healthcare analytics Partnership

- Eli Lilly And Company (Complications of Obesity),
- Pfizer Inc (Flutemetamol-ATTR),
- Janssen Research and Development (Covid-19 PREVENT-HD)
- Boston Scientific Corporation (OPTALYSE-PE Trial)

Publications

Complete List of Published Work and Preprints in google scholar https://scholar.google.com/citations?user=fB87fIgAAAAJ

Patents

Chukka Srinivas, Zhou Lan, "System and Method for Color Deconvolution of a Slide Image to Assist in the Analysis of Tissue", , US20200167965A1 (Priority Date: 2017/08/04; Publication Date: 5/28/2020).