

# Fei Jiang

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**CONTRIBUTIONS TO SCIENCE** Develop machine learning models and statistical tests to analyze and generate new scientific knowledge from the data with **missing/censoring, measurement error, unobservable causal relation, high dimensional features, spatial and temporal correlations, longitudinal repeated measurements, network structure.**

**HIGHLIGHTS** **Methodologies: dynamic functional connectivity, high dimensional data analysis, functional data analysis, longitudinal data analysis, survival analysis, measurement error models, adaptive randomization clinical trials.**  
**Application areas: neuroimaging, cardiovascular and cerebrovascular imaging, stroke, EMR data analysis, Huntington's disease, digital health, medical device signal processing.**

**ACADEMIC APPOINTMENTS** **University of California, San Francisco** California, USA  
Assistant Professor in the Department of Epidemiology and Biostatistics Since 2019  
**Stanford University** California, USA  
Visiting Scholar in the Department of Biomedical Data Science January 2019 – June 2019  
**The University of Hong Kong** Hong Kong  
Assistant Professor in the Department of Statistics and Actuarial Science 2016 – 2019

**ADMINISTRATION POSITIONS** **Associate Director**, BAsC Applied AI Program 2018 – 2019  
The University of Hong Kong Hong Kong  
**Associate Director**, Master of Data Science Program 2017 – 2018  
The University of Hong Kong Hong Kong

**INDUSTRY POSITION** Visiting Scientist June 2018 – August 2018  
Cardinal Operations Shanghai, China  
Independent Expert Advisor November 2018 – 2019  
Hong Kong Highway Department Hong Kong, China

**ACADEMIC AND PROFESSIONAL QUALIFICATIONS** **Harvard University** Boston, Massachusetts, USA  
*Postdoctoral Research Fellow* 2014 – 2016  
*Mentors:* Prof. Francesca Dominici, Prof. Lee-Jen Wei, and Dr. Sebastien Haneuse  
**Rice University and M. D. Anderson Cancer Center** Houston, Texas, USA  
Ph.D. in Statistics 2010 – 2013  
*Advisor:* Prof. J. Jack Lee  
**The University of Texas Health Science Center at Houston** Houston, Texas, USA  
M.S. in Biostatistics 2007 – 2010  
*Advisor:* Prof. Dejian Lai  
**Jiangxi University of Finance and Economics** Nanchang, Jiangxi, China  
B.S. in International Finance 2003 – 2007

**AWARDS** Stroke and Vascular Neurology High Impact Paper Award 2018  
ENAR Distinguished Student Paper Award 2013  
Rice Graduate Student Fellowship 2010-2012

**FUNDING** **National Institutes of Health, K25, PI** 9/1/2022–8/31/2027  
Dynamic Resting State Functional Connectivity Machine Learning Framework for Dementia.  
Total amount: \$145,301 per year for 5 years.

**COMPLETED FUNDINGS** **General Research Fund (\$456K HKD, 20% success rate), PI** 2018-2021  
The Response-aided Clustering, Multi-scale Bayesian Change Point Detection, and Error Contaminated Functional Quantile Regression with the Applications to the BOSS data

**General Research Fund (\$497K HKD, 20% success rate), PI** 2017-2019  
Investigations on the Censored Quantile Regression with Time Dependent Covariates, B-spline Measurement Error Estimation, and Reflected Non-local Priors

**Health and Medical Research Fund (\$761K HKD, 15% success rate), Co-I** 2017-2019  
Combined Electroacupuncture and Auricular Acupuncture for Postoperative Pain after Abdominal Surgery for Gynecological Diseases: A Randomized Sham-controlled Trial

**Health and Medical Research Fund (\$1.5M HKD, 15% success rate), Co-I** 2019-2022  
The effect of acupuncture for insomnia in breast cancer patients undergoing chemotherapy: a randomized, sham-controlled trial

**Seed Fund for Basic Research (\$150K HKD, internal funding), PI** 2017-2018  
The Independent Component Approach for Estimating Heritability

COLLABORATIONS M.D. Anderson Cancer Center  
Harvard T.H. Chan School of Public Health  
School of Medicine, Stanford University  
School of Public Health, Columbia University  
School of Medicine, The University of Hong Kong  
Beijing Tiantan Hospital, China

CURRENT  
INTERESTS

## Neuroimage

**Jiang, F.**, Jin, H., Gao, Y., Xie, X., Cummings, J., Raj, A., and Nagarajan, S. Time-varying Dynamic Network Model for Dynamic Resting State Functional Connectivity in fMRI and MEG Imaging. **NeuroImage**.

- *Novel machine learning method to extract dynamic functional connectivity, a potential biomarker for neurodegenerative disease, from neuroimage data.*

**Jiang, F.**, Zhou, Y., Liu, J., Ma, Y. On High Dimensional Poisson Models with Measurement Error: Hypothesis Testing for Nonlinear Nonconvex Optimization, under revision **Annals of Statistics**

- *Novel hypothesis testing procedure to evaluate which high dimensional neuroimage features significantly contribute to the cognitive function.*

**Jiang, F.**, Zhou, Y. Heterogeneous Functional Regression for Subgroup Analysis, submitted to **Biometrika**

- *Novel method to cluster the brain regions based on tau and amyloid information from PET and brain activation from MEG data.*

## Digital Health in Stroke

Xu, J., **Jiang, F.** et al., Ambulatory Blood Pressure Trajectory Is a More Powerful Predictor for Stroke Recurrence, **Stroke and Vascular Neurology**

- *The functional logistic regression studying how the continuous blood pressure measurements affect the stroke onsets*

**Jiang, F.**, Chen, Q. (student), Yin, G., Shen, H. (2019). Functional Censored Quantile Regression with Application to the BOSS data Analysis, in press, **Journal of American Statistical Association**.

- *A method using the blood pressure trajectory to predict the time to stroke recurrence*

## EMR Data: high dimensional measurement error model

**Jiang, F.** and Ma, Y., On Poisson Regression with High Dimensional Covariates Subject to Measurement Errors, **Statistica Sinica**

- *A Poisson model handling the high dimensional error corrupted covariates for COVID19 case prediction.*

## Medical Device Signal Processing

**Jiang, F.**, Yin, G., and Dominici, F. (2018). Bayesian Multiple Change Point Detection with Non-local Priors, **Neural Information Processing Systems**. Long version in **Transactions on Knowledge Discovery from Data**.

- *A Bayesian method handling the abnormalities in the Magnetic Resonance Guided Radiation Therapy*

RESEARCH  
EXPERIENCES

## Adaptive Clinical Trials

**Jiang, F.**, Lee, J., and Mueller, P. (2013). A Bayesian Decision-theoretic Sequential-Response Adaptive Randomization Design, **Statistics in Medicine**.

- *A phase II sequential stopping and adaptive randomization clinical trial minimizing the average sample sizes of the enrolled patients and maximizing the number of patients on the better treatment*

**Jiang, F.**, Ma, Y., and Yin, G. (2017). Kernel-Based Adaptive Randomization Toward Balance in Continuous and Discrete Covariates, **Statistica Sinica**.

- *A covariate adaptive randomization trial maximizing the power of the phase II study*

## Survival Analysis: semi-competing risk and quantile regression

**Jiang, F.**, Ma, Y., and Lee, J. (2016). A Semiparametric Method for Survival Analysis, with Application to an AIDS Clinical Trial Study. **Journal of the Royal Statistical Society: Series C**.

- *A second order model using longitudinal CD4 counts to predict AIDS overall survival*

**Jiang, F.** and Haneuse, S. (2017). A Semi-parametric Transformation Frailty Model for Semi-competing Risks Survival Data, **Scandinavian Journal of Statistics**.

- *A model handling the semi-competing risk data where the non-terminal event, readmission to emergency room, is unobservable if the terminal event, pancreatic cancer death, occurs*

**Jiang, F.**, Chen, Q. (student), Yin, G., Shen, H. (2019). Functional Censored Quantile Regression with

Application to the BOSS data Analysis, in press, **Journal of American Statistical Association**.

- *Using the blood pressure trajectory to predict the time to stroke recurrence*

## **Longitudinal Data and Functional Data Analysis**

**Jiang, F.**, Ma, Y., and Wang, Y. (2015). Fused Kernel-Spline Smoothing for Repeatedly Measured Outcomes in a Generalized Partially Linear Model with Functional Single Index, **Annals of Statistics**.

- *A functional model using longitudinal cognitive score to predict the Huntington's disease risk*

**Jiang, F.**, Ma, Y., and Lee, J. (2016). A Semiparametric Method for Survival Analysis, with Application to an AIDS Clinical Trial Study. **Journal of the Royal Statistical Society: Series C**.

- *A second order model using longitudinal CD4 counts to predict AIDS survival time*

**Jiang, F.**, Baek, S., Cao, J., Ma, Y. (2018). A Functional Single Index Model, **Statistica Sinica**.

- *A functional tool using daily collected pollutant levels to predict the cardiovascular disease death*

## **Causal inference**

**Jiang, F.**, Tian, L, Fu, H., Hasegawa, T, and Wei, L. J. (2018). Robust Alternatives to ANCOVA for Estimating the Treatment Effect via a Randomized Comparative Study, in press, **Journal of the American Statistical Association**.

- *A method estimating the combo versus mono therapy treatment effect on heart attack when the covariates from two study groups are imbalanced*

Tian, L., **Jiang, F.**, Hasegawa, T., Uno, H., and Wei, L. J. (2018). Moving Beyond the Conventional Stratified Analysis to Estimate an Overall Treatment Efficacy with the Data from a Comparative Randomized Clinical Study, in press, **Statistics in Medicine**.

- *A method studying the combo versus mono therapy treatment effect on heart attack in stratified data when the covariates are imbalanced*

## **Genetic study: high dimensional data analysis**

**Jiang, F.**, Ma, Y., and Wei, Y. (2018). Sufficient Direction Factor Model and its Application for eQTL Discovery, in press, **Biometrika**.

- *A method studying the effects of high dimensional SNPs on the gene-expression in lung tissue*

## PUBLICATIONS

### **Statistical Methodology and Application (\* corresponding author)**

Wang, J., Shen, H. and Jiang, F., (2023). Robust Recommendation Via Social Network Enhanced Matrix Completion. **Statistica Sinica**, 33, pp.1-23.

- *An machine learning approach for using high dimensional features in recommended system.*

Jin, H., Ma, Y. and **Jiang, F.\***, (2022). Matrix Completion with Covariate Information and Informative Missingness. **Journal of Machine Learning Research**, 23(180), pp.1-62.

- *A novel machine learning method address missing not at random in compressed sensing.*

**Jiang, F.\***, Jin, H., Gao, Y., Xie, X., Cummings, J., Raj, A.\*, and Nagarajan, S.\* (2022). Time-varying Dynamic Network Model for Dynamic Resting State Functional Connectivity in fMRI and MEG Imaging. **NeuroImage**, 254, 119131.

- *A novel machine learning method to extract dynamic functional connectivity, a potential biomarker for neurodegenerative disease, from neuroimage data.*

Jin, H. (student), Yin, G., Yuan, B., and **Jiang, F.\*** (2022). Bayesian Hierarchical Model for Change Point Detection in Multivariate Sequences. **Technometrics**, 64(2), 177-186.

- *An algorithm for anomaly detection on the wind power generation system.*

Valdes, G., Friedman, J.H., **Jiang, F.** and Gennatas, E.D., (2021). Representational Gradient Boosting: Backpropagation in the Space of Functions. **IEEE Transactions on Pattern Analysis and Machine Intelligence**, 44(12), pp.10186-10195.

- *An machine learning approach for estimating nested functional relations.*

**Jiang, F.\***, and Ma, Y. (2020). Poisson Regression with Error Corrupted High Dimensional Features. **Statistica Sinica**, 32(2022), 1-24

- *A Poisson regression model for COVID19 case prediction considering the error contaminated covariates.*

**Jiang, F.**, Cheng, Q. (student), Yin, G., and Shen, H. (2020). Functional Censored Quantile Regression. **Journal of the American Statistical Association**, 115(530), 931-944.

- *A method using the blood pressure trajectory to predict the time to stroke recurrence*

Ma, Y.\* and **Jiang, F.** (2020). Understanding and Utilizing the Linearity Condition in Dimension Reduction, **Statistica Sinica**, 30 (2020), 763-781

- *Addresses one paradox: why the sliced inverse regression method is less efficient than the semi-*

*parameter dimension reduction method even if the linearity condition was satisfied*

**Jiang, F.**, Baek, S., Cao, J., Ma, Y.\* (2018). A Functional Single Index Model, **Statistica Sinica**, 30(2020) 303-324

- *A functional tool using daily collected pollutant levels to predict the cardiovascular disease death*

**Jiang, F.**, Tian, L., Fu, H., Hasegawa, T., and Wei, L. J.\* (2019). Robust Alternatives to ANCOVA for Estimating the Treatment Effect via a Randomized Comparative Study. **Journal of the American Statistical Association**, 114(528), 1854-1864.

- *A method estimating the combo versus mono therapy treatment effect on heart attack when the covariates from two study groups are imbalanced*

**Jiang, F.\***, Ma, Y., and Wei, Y. (2019). Sufficient Direction Factor Model and its Application to Gene Expression Quantitative Trait Loci Discovery. **Biometrika**, 106(2), 417-432.

- *A method studying the effects of high dimensional SNPs on the gene-expression in lung tissue*

Tian, L., **Jiang, F.**, Hasegawa, T., Uno, H., Pfeffer, M., and Wei, L. J.\* (2019). Moving Beyond the Conventional Stratified Analysis to Estimate an Overall Treatment Efficacy with the Data from a Comparative Randomized Clinical Study. **Statistics in Medicine**, 38(6), 917-932.

- *A method studying the combo versus mono therapy treatment effect on heart attack in stratified data when the covariates are imbalanced*

**Jiang, F.**, Yin, G., and Dominici, F. (2019). Bayesian Model Selection Approach to Multiple Change-Points Detection with Non-Local Prior Distributions. **ACM Transactions on Knowledge Discovery from Data (TKDD)**, 13(5), 1-17.

- *A Bayesian method handling the abnormalities in the Magnetic Resonance Guided Radiation Therapy*

**Jiang, F.\***, Yin, G., and Dominici, F. (2018). Bayesian Multiple Change Point Detection with Non-local Priors, **Neural Information Processing Systems**.

- *A Bayesian method handling the abnormalities in the Magnetic Resonance Guided Radiation Therapy*

**Jiang, F.\***, Ma, Y., and Yin, G. (2018). Kernel-based Adaptive Randomization toward Balance in Continuous and Discrete Covariates. **Statistica Sinica**, 28(4), 2841-2856.

- *A covariate adaptive randomization trial maximizing the power of phase II study*

**Jiang, F.**, and Haneuse, S\*. (2017). A Semi-parametric Transformation Frailty Model for Semi-competing Risks Survival Data. **Scandinavian Journal of Statistics**, 44(1), 112-129.

- *A model handling the semi-competing risk data where the non-terminal event, readmission to emergency room, is unobservable if the terminal event, pancreatic cancer death, occurs*

**Jiang, F.\***, Ma, Y., and Jack Lee, J. (2017). A Second-order Semiparametric Method for Survival Analysis, with Application to an Acquired Immune Deficiency Syndrome Clinical Trial Study. **Journal of the Royal Statistical Society: Series C (Applied Statistics)**, 66(4), 833-846.

- *A second order model using the longitudinal CD4 count to predict AIDS overall survival*

**Jiang, F.**, Ma, Y., and Wang, Y. (2015). Fused Kernel-spline Smoothing for Repeatedly Measured Outcomes in a Generalized Partially Linear Model with Functional Single Index. **Annals of statistics**, 43(5), 1929.

- *A functional model using longitudinal cognitive scores to predict the Huntington's disease risk*

**Jiang, F.**, Jack Lee, J., and Müller, P. (2013). A Bayesian Decision-theoretic Sequential Response-adaptive Randomization Design. **Statistics in medicine**, 32(12), 1975-1994.

- *A phase II sequential stopping and adaptive randomization clinical trial minimizing the average sample sizes of the enrolled patients and maximizing the number of patients on the better treatments*

## **Medical**

Lam, W. C., Au, K. Y., Qin, Z., Wu, F. M., Chong, C. O., **Jiang, F.**, ... and Chen, H. (2021). Superficial Needling Acupuncture vs Sham Acupuncture for Knee Osteoarthritis: A Randomized Controlled Trial. **The American Journal of Medicine**, 134(10), 1286-1294.

with Chen, H., So, T. H., Cho, W. C. S., Qin, Z., Ma, C. H., Li, S. G., ... and Lao, L. (2021). The Adjunctive Effect of Acupuncture for Advanced Cancer Patients in a Collaborative Model of Palliative Care: Study Protocol for a 3-Arm Randomized Trial. **Integrative Cancer Therapies**, 20, 15347354211012749.

Kim, G. H. J., Melgoza, A., **Jiang, F.**, and Guo, S. (2021). The Effect of Renin-angiotensin-aldosterone System Inhibitors on Organ-specific ace2 Expression in Zebrafish and its Implications for COVID-19. **Scientific reports**, 11(1), 1-9.

with Jelliffe-Pawlowski, L. L., Oltman, S. P., Rand, L., Scott, K. A., Kuppermann, M., Baer, R., ... and Chambers, C. (2020). Examining the Impact of the 2019 Novel Coronavirus and Pandemic-related Hardship on Adverse Pregnancy and Infant Outcomes: Design and Launch of the HOPE COVID-19 Study. **Reproductive Medicine**, 1(2), 91-107.

Xu, J., **Jiang, F.** et al. (2021). Ambulatory Blood Pressure Profile and Stroke Recurrence. **Stroke and Vascular Neurology**, svn-2020-000526.

With Ho, T. C.\*, Teresi, G. I. et al. (2021). Higher Levels of Pro-inflammatory Cytokines Are Associated with Higher Levels of Glutamate in the Anterior Cingulate Cortex in Depressed Adolescents. **Frontiers in Psychiatry**, 12, 346.

Zack, M. **Jiang, F.**, and Wei, L. J.\* (2018). Interpreting the Treatment Effect of Trastuzumab for a Duration of 9-weeks vs 1-Year for HER2-Positive Breast Cancer, **Journal of the American Medical Association, Letter**.

With Skoulidis, F.\*, Goldberg, M.E., et al. (2018). STK11/LKB1 Mutations and PD-1 Inhibitor Resistance in KRAS-Mutant Lung Adenocarcinoma, **Cancer Discovery**, 8(7), 822-835.

With Au, K.Y., Chen, H., et al. (2018). Sinew Acupuncture for Knee Osteoarthritis: Study Protocol for a Randomized Sham-controlled Trial, **BMC Complementary and Alternative**, 18(1), 133.

**Jiang, F.**, Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., Wang, Y., Dong, Q., Shen, H.\*, and Wang, Y.\* (2017). Artificial Intelligence in Healthcare: Past, Present and Future, **Stroke and Vascular Neurology**, 2(4), 230-243.

#### INVITED TALKS

*Randomization Adapted to Continuous and Discrete Covariates in Clinical Trials*

**2014 Mathematics and Statistics Department, The University of Nevada, Reno**

*Bayesian Multiple Change Point Detection with Non-local Prior*

*Functional Single Index Model and Sufficient Direction Factor Model*

**2016 Department of Statistics and Applied Probability, NUS**

*Sufficient Direction Factor Model and its Application for eQTL Discovery*

**2016 The Institute of Statistics and Big Data, Renmin University of China**

*Sufficient Direction Factor Model and its Application for eQTL Discovery*

**2016 ICSA International Conference**

*A Semi-parametric Method for Survival Analysis, with Application to an AIDS Clinical Trial Study*

**2017 LIDA International Conference**

*Bayesian Multiple Change Point Detection with Non-local Priors*

**2017 M. D. Anderson Cancer Center**

*Bayesian Non-local Prior for Boundary Detection*

**2017 ICSA International Conference**

*Bayesian Non-local Prior for Boundary Detection*

**2018 IMS Singapore**

*AI Powered Clinical Trial Design*

**2018 AI Health Summit in Hong Kong**

*Functional Censored Quantile Regression*

**2018 Joint Statistical Meeting**

*AI Powered Clinical Trial Design*

**2018 Hong Kong College of Radiologists Annual Scientific Meeting**

*Dynamic resting state functional connectivity A time-varying dynamic network model*

**2020 CMStatistics Conference**

*Dynamic resting state functional connectivity A time-varying dynamic network model*

**2021 The Pennsylvania State University**

*Dynamic resting state functional connectivity A time-varying dynamic network model*

**2021 CNS workshop**

#### CONTRIBUTED TALKS

*A Bayesian Decision-theoretic Phase II Clinical Trial Design*

**2010 Bayesian Biostatistics Conference**

*A Bayesian Decision-theoretic Sequential-response Adaptive Randomization Design*

**2012 Eastern North American Region Conference**

*Designing Seamless Phase II/III Studies with Time-to-event Endpoints*

**2013 Eastern North American Region Conference**

#### TEACHING EXPERIENCES

##### Course Lecturer:

- *Mathematical foundations for epidemiologist (Ph.D. course)*, 2019-present, UCSF
- *Linear statistical analysis (80 students)*, 2016-present, The University of Hong Kong
- *Biostatistics (master level course for industry students)*, 2016-present, The University of Hong Kong

##### Mentoring:

- Huaqing Jin, Ph.D. student, 2018-present, UCSF and The University of Hong Kong
- Jingxuan Wang, Ph.D. student, 2018-present, UCSF and The University of Hong Kong
- Qing Chen, Ph.D. research assistant, 2017-2018, The University of Hong Kong
- Yeqing Zhou, Ph.D research assistant, 2018-present, The University of Hong Kong

### **Teaching Assistant:**

- Probability and statistics, Spring 2011, Rice University
- Mathematic statistics, Fall 2011, Rice University
- Mathematic probability, Fall 2010, Rice University

### **Summer Program Mentoring:**

- Biostatistics summer project, Summer Project Mentor, Summer 2014, Harvard University
- RUSIS summer program, Project Leader, Summer 2012, Rice University

REFeree SERVICES      NeuroImage, Elife, Journal of American Statistical Association, Management Science, Statistica Sinica, Journal of Business and Economic Statistics, Annals of Applied Statistics, Electronic Journal of Statistics, Lifetime Data Analysis, Computational Statistics & Data Analysis, Statistics in Medicine

MEMBERSHIPS      American Statistical Association  
International Chinese Statistical Association