Yi-Chen Zhang

Contact Information

Address: 27877 Gettysburg St, Farmington Hills, MI 48331
Phone: 517-775-9919
E-mail: chris7462@gmail.com
Website: https://chris7462.github.io

Education

Ph.D., Department of Statistics and Probability Aug 2013 – Jun 2018
Michigan State University, East Lansing, MI
Advisor: Dr. Lyudmila Sakhanenko
Dissertation: Functional Data Analysis with Application to Traffic Flow Data

M.S., Graduate Institute of Statistics Sep 2007 – Jun 2009
National Central University, Taiwan
Advisor: Dr. Tsai-Hung Fan
Thesis: Bayesian Model Selection in Linear Mixed Effects Models with AR(1) Errors

B.S., Department of Mathematics Sep 2003 – Jun 2007
National Central University, Taiwan

Work Experience

Isuzu – Technical Center of America, Inc. (ITCA) Jan 2021 – Present

Lead Engineer, Autonomous and Artificial Intelligence – Advanced Engineering Jun 2024 – Present
- Lead the development of the Autonomous Driving Kit workstream.
- Conduct research on state-of-art Perception component for autonomous system.
- Develop and enhance the Localization component, focusing on Invariant Extended Kalman Filters (IEKF) for robust state estimation and sensor fusion.

Sr. Engineer, Autonomous and Artificial Intelligence – Advanced Engineering Jan 2022 – May 2024
- Lead the development of perception component including: object detection, object tracking, and visualization:
  Implementation ROS visualization for MVXNet using Kitti dataset: MVXNet demo.
  Develop structure aware single-stage 3D objection detection.
  Develop LiDAR object detection and tracking: 3D-LiDAR multi-object tracking.
  Develop multi-object tracking: Multi-object-tracking.
- Develop localization component including: wheel odometry, GNSS/IMU processing, and Fast-LOAM. These outputs are later fused in the Robot Localization package.
  Develop visual SLAM: Visual SLAM.
- Acting scrum master of the autonomous driving team.
- Make key contributions to the software architecture design and software stack integration.
- Provide technical support and career growth direction for team members and supervise interns.

Autonomous Driving Engineer – PVRD Team Jan 2021 – Jan 2022
- Develop core sensor component for centralized sensor fusion for both cameras and LiDARs.
- Curb detection using 3D LiDAR point clouds: Moriyama dataset demo.
- Object detection using 3D LiDAR point clouds: Moriyama dataset demo.
- Point clouds 3D map construction using Fast LOAM and OctoMap: Moriyama dataset demo.
- Software stack management with release tags and version control by git submodules.
- Component integration and testing in both simulation and on the truck.

Aptiv – Global Technology Company Jul 2018 – Jan 2021

Algorithm Engineer – Scene Perception Algorithm Team Oct 2020 – Jan 2021
- Mainly develop unit test cases in vectorCAST for different components.

Algorithm Engineer - Fused Road Model (FRM) Team Sep 2018 – Sep 2020

- Develop fusion algorithms for object trail processing:
  NGSIM dataset demo for road shape estimation and lane centerline prediction.
- Design FRM state machine and mode manager.
- Error handling for vision, object fusion, and vehicle state inputs.
- Maintain input Rosbag pipeline.
- Develop FRM analysis pipeline and dashboard.
- Coverity Static Analysis including AUTOSAR and MISRA C++.
- Develop unit test cases in Google Test and component test for FRM component.
- Sporadically acted as the scrum master for FRM.

Algorithm Engineer - Autonomous Driving Behavior Team — Jul 2018 – Aug 2018

- Develop a prediction and cost function based algorithm to perform cooperative social behavior.
- Work in Ottomatika code migration from urban pilot to highway pilot.
- Sporadically give numerical methods of statistical lectures.

Michigan State University — Aug 2013 – May 2018

Teaching Assistant – Department of Statistics and Probability — Jan 2017 – May 2018

- One semester of a graduate-level of Statistics class.
- One semester of senior-level of Probability and Statistics for Business classes.
- Two semesters of entry-level of Statistics classes.

Research Assistant – Computational Mathematics Science and Engineering — Jan 2016 – Dec 2016

Supervisor: Dr. Yuying Xie and Dr. Mark Reimers.

- Research in neuroimaging data for brain activity.
- Movement correction, denosing, and registration for images.
- Analyze the amplitude and phase for images by Fourier analysis.

Teaching Assistant – Department of Statistics and Probability — Aug 2013 – Dec 2015

- Summer instructor of an entry-level Statistics class.
- One semester of graduate-level of Statistics classes.
- Three semesters of senior-level of Probability and Statistics classes.

Academia Sinica — Aug 2010 – Jul 2013

Research Assistant – Institute of Statistical Science

Supervisor: Dr. Jeng-Min Chiou.

- Mainly research in functional data.
- Functional clustering and classification.
- Functional linear model and its prediction and applications.
- Missing value imputation and outlier detection for functional data.
- Programming assistant (Chiou, J.-M., Annals of Applied Statistics, 2012).

Military Service, Taiwan — Aug 2009 – Aug 2010

Corporal – Beigan Township, Lienchiang County

- The duties include training, safety, and communications.

National Central University — Feb 2004 – Jun 2009

Network Administrator – Graduate Institute of Statistics — Jul 2007 – Jun 2009

- Manage and maintain the e-mail server based on FreeBSD operating system.
- Design an alumni website for graduate alumnus.
- Maintenance and elimination of common breakdown of the PCs in computer laboratory.

Network Administrator – Mathematics Computation Laboratory — Feb 2005 – Jun 2007

- Manage the e-mail server and design some rules to block spam mails.
- Design a network sync upgrade system of more than 80 computers over 2 classrooms.
- Devise a web-based roll call and sign-in system.

Network Assistant – Mathematics Computation Laboratory — Feb 2004 – Jan 2005

- Provide software supports and computer consulting for freshmen.
- Supervise the networking, system analysis, and trouble shooting.

Teaching Experience

Year	Semester	Role	Course number with title
2018	Spring	TA	STT 231 Statistics for Scientists
2017	Fall	TA	STT 200 Statistical Methods
		GA	STT 873 Statistical Learning and Data Mining
	Spring	TA	STT 315 Introduction to Probability and Statistics for Business
2016	Fall	RA*	STT 442 Probability and Statistics II: Statistics
			STT 861 Theory of Probability and Statistics I
2015	Fall	TA	STT 200 Statistical Methods
	Summer	Instructor	STT 200 Statistical Methods
	Spring	TA	STT 224 Introduction to Probability and Statistics for Ecologists
2014	Fall	GA	STT 863 Statistical Methods I
			STT 886 Stochastic Processes and Applications
	Summer	GA	STT 421 Statistics I
			STT 430 Introduction to Probability and Statistics
	Spring	GA	STT 351 Probability and Statistics for Engineering
			STT 430 Introduction to Probability and Statistics
2013	Fall	GA	STT 441 Probability and Statistics I: Probability

∗: Sporadically acted as teaching substitute.

Publications

1. Zhang, W., Yu, W., Jia, Q., and **Zhang, Y.-C.** (2022) *Exploration and Sweeping for Autonomous Sweeper Truck*. Isuzu Technical Journal **134**, 42-51.
2. **Zhang, Y.-C.** (2021) *Road Geometry Estimation Using Vehicle Trails: A Linear Mixed Model Approach*. Journal of Intelligent Transportation Systems **27**, 127-144.
3. **Zhang, Y.-C.** and Sakhanenko, L. (2019) *The Naive Bayes Classifier for Functional Data*. Statistics & Probability Letter **152**, 137-146.
4. Chiou, J.-M., **Zhang, Y.-C.**, Chen, W.-H., and Chang, C.-W. (2014) *A Functional Data Approach to Missing Value Imputation and Outlier Detection for Traffic Flow Rate Data*. Transportmetrica B: Transport Dynamics **2**, 106-129.
5. Fan, T.-H., Wang, Y.-F., and **Zhang, Y.-C.** (2014) *Bayesian Model Selection in Linear Mixed Effects Models with AR(1) Errors Using Mixture Priors*. Journal of Applied Statistics **41**, 1814-1829.

Referee Service

- Biometrics.

Honors/Awards

- College of Natural Science Dissertation Continuation Fellowship Summer 2017, Michigan State University.
- College of Natural Science Dissertation Completion Fellowship Summer 2018, Michigan State University.

Computer Skills

- Advanced knowledge in C++.
- Experienced in using mathematics and statistics software including MATLAB and R.
- Ability to use C++ under R and MATLAB to carry out secondary development.
- Extensive experience of using Linux system with a focus on Ubuntu.
- Strong knowledge of Linux/Unix environment and commends.
- Understanding and experience to work with parallel computing API such as openMP and MPI.
- Experience with high performance cluster computer (HPCC) such as Torque and SLURM.
- Proficient in LaTeX for document preparation and Ti*k*Z for producing vector graphics.
- Fluent with version control tools such as git (gitlab and gerrit), Subversion (SVN), and Plastic SCM.
- Working knowledge of Robot Operating System (ROS).
- Having experience on static analysis including AUTOSAR, MISRA, and CERT C++ coding standard.
- Experienced in unit test including google test and vectorCAST.
- Working knowledge of OpenCV and PCL.

Software Packages

- **Autologistic-Models**: An R package implemented in C++. The objective of this program is to reduce the estimating bias of parameters when fitting autologistic models.
- **Modified-Rainbow**: A modified version of rainbow package in R that uses the functional principal component instead of the robust principal component.
- **Parallel-Kernel**: The kernel density estimation implemented in C++ and paralleled via OpenMP.
- **MCEM**: An R function with Mwanza example that realizes the method proposed by Richard A. Levine and George Casella (2001).

Documents

- **Ti*k*Z**: A tutorial document about how to use basic Ti*k*Z commends. See TikZ basic and Doraemon.