

TONGAN CAI

College of Information Sciences and Technology
Pennsylvania State University
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EDUCATION

- **Pennsylvania State University** State College, PA
Ph.D. in Informatics. Advised by Prof. Wang, James Z. Aug. 2019 – Present
- **University of Michigan** GPA:3.66/4.00 Ann Arbor, MI
Bachelor of Science and Engineering in Data Science Sept. 2017 – May 2019
- **Shanghai Jiao Tong University** GPA:3.55/4.00 Shanghai, China
Bachelor of Science and Engineering in Electrical & Computer Engineering Sept. 2015 – Aug. 2019

PUBLICATIONS

- Mingli Yu, Tongan Cai, Xiaolei Huang, Kelvin Wong, John Volpi, James Z. Wang, Stephen T.C. Wong. A Computational Framework of Intelligent Augmented Stroke Screening and Assessment (ISSA) Using Facial Video Data (Submitted *ISBI 2020*)
- Golbus, J. R.*, **Cai, T.***, Najarian, D., Trumpower, B., Kao, T., Waljee, A. K., Nallamotheu, B. K.. Determinants of Compensation for U.S. Academic Physicians: Does Gender Matter? *2019 AHA QCOR*
- **Cai, T.**, He, H., Zhang, W. (2018). Breast Cancer Diagnosis Using Imbalanced Learning and Ensemble Method. *Applied and Computational Mathematics*. Vol. 7, No. 3, pp. 146-154. doi: 10.11648/j.acm.20180703.20

RESEARCH INTEREST

- Computer Vision & Data Mining methods on various forms of data and their application in health care & transportation. Broadly interested in other methods & techniques for data to “talk” for themselves.

RESEARCH EXPERIENCE

Pennsylvania State University – College of Information Sciences & Technology University Park, PA
Graduate Research Assistant – Ph.D. in Informatics Aug. 2019 – Present

- Collaborating with Houston Methodist Hospital, we proposed a screening and assessment framework for facial paralysis caused by stroke with unconstrained real-world patient videos in the ER settings. We are leveraging optical flow, micro-expression analysis, 3D reconstruction for the task and trying to tackle frontalization of faces and illumination correction “in-the-wild”.
- An asymmetry-based approach was adopted for limited amount of clinical data and the framework is able to precisely distinguish facial asymmetry over time at pixel scale, with asymmetry-highlighted frames also provided for the reference of clinicians. Conference paper as co-first author “A Computational Framework of Intelligent Augmented Stroke Screening and Assessment (ISSA) Using Facial Video Data ” submitted to IEEE International Symposium on Biomedical Imaging (ISBI) 2020.
- The framework is calling for mass collaboration across the U.S. with a 3-D depth video collection application running on mobile phones to construct a large-scale database for various facial paralyse, and future work is expected to distinguish between facial paralysis with different causes.

University of Michigan - MiCHAMP

Ann Arbor, MI

Researcher - Michigan integrated Center for Health Analytics & Medical Prediction

Mar. 2018 – May 2019

- Adopt machine learning models and statistical methods for manipulation of medical & clinical data, including Chronic Hepatitis C (HALT-C), National Health and Nutrition Examination Survey (NHANES), Medical Expenditure Panel Survey (MEPS), Inflammatory Bowel Diseases. Advised by Dr. Waljee, Akbar.
- Piloted nationwide salary survey - DocDollars Survey in the purpose of better understand the discrepancy in salary for academic physicians. Advised by Dr. Nallamotheu, Brahmajee. Survey publicized in Sep. 2018. Analyzed responses collected. Abstract as co-first author "*Determinants of Compensation for U.S. Academic Physicians: Does Gender Matter?*" submitted to AHA QCOR 2019.
- Help with geological analytic works in Hepatitis C situation in Michigan. Compare the locations doctors who can treat Hepatitis C with individuals who have chronic Hepatitis C to identify potential barriers for treatment. for efficiently allocate much-needed and prohibitively expensive Hepatitis C medication.

University of Michigan - UMTRI

Ann Arbor, MI

Research Assistant – University of Michigan Transportation Research Institute

Aug. 2018 – Dec. 2019

- Collaborating with statistical learning models (BART, RF, SuperLearner etc.), mining the relation between vehicle damage dataset from NHTSA and the corresponding passenger injury level (on-going).
- Through processing vehicle collision images from NHTSA, analyze the damage detail of the vehicle, including angle of collision and severity of damage, and predict the injury of passengers. Directed by Prof. Flannagan, Carol.

Zhejiang University of Finance & Economics – School of Information

Hangzhou, Zhejiang, China

Researcher – National Natural Science Foundation of China project

May. 2018 – July. 2018

*(Under project "*Personalized recommendation, self-adaptive composition and optimization of resource services for mass collaboration*" supported by National Natural Science Foundation of China)

- Develop high performance model adopting imbalance learning idea and stacking ensemble methods for anomaly detection, demonstrated it through public data sets—Wisconsin Breast Cancer Datasets for cancer classification and prediction. SMOTE algorithm and stacking method are adopted and studied comparatively.
- Conference paper as first author "*Breast Cancer Diagnosis Using Imbalanced Learning and Ensemble Method*" accepted by 2018 3rd International Symposium of Mathematics and Computer Science, recommended and published on *Applied and Computational Mathematics*. Vol. 7, No. 3, 2018.

OTHER SELECTED PROJECTS

University of Michigan – Deep Learning (EECS498 Winter 2019) Advisor: Honglak Lee

Ann Arbor, MI

- Deploy pipeline of Webcam-image preprocessing-GAN generation for high-efficiency **Facial Expression Generation System**. Train the Generative Adversarial Network on Cohn-Kanade Dataset and Japanese Female Facial Expression (JAFPE) datasets.
- Customized clawer for Flickr images and match with required image using SIFT descriptor and k-NN.
- Course homework includes feature detection/matching, image stitching, k-NN classification of MNIST images, foreground/background segmentation.

Updated Oct. 19, 2019

University of Michigan – Computer Vision (EECS442 Fall 2018) Advisor: Jason J. Corso **Ann Arbor, MI**

- Deploy pipeline of Webcam-image preprocessing-GAN generation for high-efficiency **Facial Expression Generation System**. Train the Generative Adversarial Network on Cohn-Kanade Dataset and Japanese Female Facial Expression (JAFPE) datasets.
- Customized crawler for Flickr images and match with required image using SIFT descriptor and k-NN.
- Course homework includes feature detection/matching, image stitching, k-NN classification of MNIST images, foreground/background segmentation.

University of Michigan –Data Mining (EECS498 Fall 2018) Advisor: Danai Koutra **Ann Arbor, MI**

- Utilize Hadoop MapReduce for multiple data analyses, implemented frequent item sets, association rules, k-means algorithm and PageRank calculation.

University of Michigan – Introduction to Machine Learning (EECS445 Spring 2018) **Ann Arbor, MI**

- Construct deep neural-networks (VGG and Densely connected models) for reduced CIFAR-10 image classification, compare and optimize layer structures
- Utilize linear and quadratic SVMs for binary classification & prediction of Yelp! reviews. Improve model performance with feature engineering and hyperparameter tuning practice

SELECTED AWARDS AND HONORS

- Outstanding Graduate – Class of 2019 – Shanghai Jiao Tong University 2019
- Undergrads Excellence Scholarship - Shanghai Jiao Tong University 2018, 2017, 2016
- Dean’s List - University of Michigan 2019,2018,2017
- Dean’s List - Shanghai Jiao Tong University 2017, 2016, 2015

ADDITIONAL INFORMATION

Working

- Grader - EECS 442 – Computer Vision Winter 2019

Language Skills

- English: Proficient
- Chinese: Native

Test Scores

- GRE (Aug. 2019): 155 (Verbal) / 170 (Quantitative) / 4.0 (Analytical Writing)
- TOEFL (Sept. 2019): 104 (Reading: 28, Listening: 28, Speaking: 23, Writing: 25)

Certificates

- Social and Behavioral Human Subjects Research (IRB) Certified – Penn State University. Exp. Jul. 9, 2022