Tuo Li

Education

2008-2015 **Ph.D. in Computational Physics**, University of Illinois at Chicago.

Research Area: Anomaly Detection, Conditional Monitoring, Deep Learning, Signal Processing, Multivariate Statistical Modeling, Advanced Mechanics Modeling, and Machine Learning Applications.

2012-2013 MS in Statistics, University of Illinois at Chicago.

Master's Exam: High Pass.

2010-2012 MS in Applied Mathematics, University of Illinois at Chicago.

Master's Exam: High Pass.

2008-2011 MS in Physics, University of Illinois at Chicago.

Qualifying exam: All Pass.

Machine Learning and Data Science Work Experience

08/2020-Now Machine Learning Scientist, Amazon.com, Great Los Angeles Area.

• Research and develop objective recognation and detection modelings based on by Yolo (**Python**, **Keras**, **openCV**, **scikit-learn**).

- Conduct the e-commerce recommendation model to provide contextual product recommendations to users, it also helps users to discover additional relevant options along with a given input.
- \bullet Conduct listing/advertisement best match machine learning processing which scores listings with the goal of identifying the most relevance by consumer searches. The click conversion rate is increased by 30% based on the best match model .

05/2018-08/2020 Lead Data Scientist, Cars.com, Great Chicago Area.

- Lead a team of engineers and data scientists to conduct dealer retention, churn prediction, and marketing revenue generation on **AWS**. The dealer churn prediction model and dealer retention model generate \$5,000,000+ revenue annually.
- Lead research and development on machine learning image processing tool (**Tensorflow**, **skimage**, **scipy**) which enables *image recognition*, *image quality enhancement*, *and image scoring*. This tool is featured in cars.com technology medium and is able to process million-level listing images. [0]
- Mentor team members on data analysis and modeling tasks including deploy data science models into AWS (terraform, ecs, ec2, sagemaker, codecommit, cloudwatch), data visualization, data-story-telling.
- Manage data science engagements for targeting new automobile dealers. Lead research and design dealer churn models (**xgboost**, **lightgbm**, **scikit-learn**, **numpy**, **pandas**, **gensim**), and deploy them into production using *aws*, *jenkins*, *and terraform*.

10/2015-05/2018 Data Science Lead, Uptake Technologies, Great Chicago Area.

- Research and develop multivariate statistical modelings (**R data.table**, **xgboost**; **Python pandas**, **scikit-learn**, **scipy**) based on *PCA*, local kernel regression, tree-based model and local similarity based modeling.
- Hold 4 U.S. machine learning patents/patent applications regarding unsupervised learning, supervised learning, anomaly detections in multivariate data, and remedy of software anomalies.
- Develop and deploy machine learning anomaly detection (MLAD) cloud computing platform, which is monitoring over 1 billion streaming readings per day. This anomaly detection engine is productized and detecting anomalous for 500+ wind turbines all over the world. [1].
- Perform regular code reviews, write **R**(Rstudio) and **Python**(Jupyter) software packages and manage version control through **git**.
- Design and implement model performance report using MySQL, Elasticsearch, and Cassandra. This has significantly improved the robustness and accuracy of models' performance up to 50%.
- Lead a team of data scientists and software engineers. we are responsible for the development of machine learning technology with special emphasis on diagnostics, prognostics, **unsupervised learning algorithms**. Hold routine customer-facing meetings with subject matter experts regarding model validation and mechanical system prognostics. .

06/2015-08/2015 Data Scientist (Intern), Huawei Technologies, Great Chicago Area.

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10/2015-05/2016

- Conduct wireless network data mining, machine learning (scikit-learn, spark) and big data security analysis (Python) in order to detect unknown attacks, zero-day attacks, and advanced persistence threat. The analysis includes: 1. data preprocessing (Linear Regression, Principal Component Analysis); 2. user clustering using adapted algorithms (K-Means Clustering); 3. anomaly detection through predictive modeling (One-Class Support Vector Machines).
- Hold 1 U.S. patent [2] which illustrates a machine learning methodology to improve the anomaly detection rate. 98% TPR and 7.6% FPR were obtained by applying embodiment anomaly detection techniques to the KDD 99 dataset. The testing results outperform other known anomaly detection techniques.

Computer Skills

Programming R, Python, Matlab, Scala.

Data Tools MySQL, Spark.

Others Shiny, Rmarkdown, Spark, Bash Script, Git, Linux, Jupyter, HTML, CSS, LATEX, OpenOffice, GNUplot.

Machine Learning Patents and Patent Applications

- 10/2015 Methodology to Improve Anomaly Detection Rate.

 Zhibi Wang and Tuo Li, Huawei Technologies, US Patent 62/236,745.
- 09/2016 Detection of Anomalies in Multivariate Data.

 <u>Tuo Li</u> et al., Uptake Technologies, US Patent 63/382,639.
- 10/2017 Computer System and Method for Detecting Anomalies in Multivariate Data.

 <u>Tuo Li</u> and James P Herzog, Uptake Technologies, U.S Patent Application Serial No.:15/788,622.
- 11/2017 Systems and Methods for Detecting and Remedying Software Anomalies. Yuan Tang, <u>Tuo Li</u>, and James P Herzog., Uptake Technologies, U.S Patent 10/635,519.
- 04/2018 Computer System and Method for Creating a Supervised Failure Modell.

 <u>Tuo Li</u> et al., Uptake Technologies, US Patent 10/635,095.

Data Science and Data Analysis Publications

- 08/2019 Applications of Machine Learning Image Processing in Digital Marketing.

 <u>Tuo Li</u>, https://tech.cars.com/applications-of-machine-learning-image-processing-in-digital-marketing-982ee296dc8a
- 07/2015 Density Functional Theory Analysis of Hexagonal Close-Packed Elemental Metal Photocathodes.

 Tuo Li, B.L. Rickman, and W.A. Schroeder, Physical Review ST Accelerators and Beams 18.073401 (2015): 10.1103.
- 03/2015 Emission Properties of Group VIb Elemental Photocathodes.

 <u>Tuo Li</u>, B.L. Rickman, and W.A. Schroeder, Journal of Applied Physics 117.13 (2015): 134901.
- 02/2016 Photoelectric Emission Properties of Photocathode Materials.

 Tuo Li, Ph.D. thesis, University of Illinois at Chicago.
- 04/2017 PbTe(111) Sub-Thermionic Photocathode: A Route to High-Quality Electron Pulses.

 <u>Tuo Li</u> and W.A. Schroeder, arXiv preprint arXiv:1704.00194 (2017).
- 05/2017 Nonparametric Modeling of Face-Centered Cubic Metal Photocathodes. <u>Tuo Li</u> and W.A. Schroeder, arXiv preprint arXiv:1704.05371 (2017).
- 11/2012 Excited-state Thermionic Emission in III-Antimonides: Low Emittance Ultrafast Photocathodes.

 J.A.Berger, B.L. Rickman, <u>Tuo Li</u> and W.A. Schroeder, Applied Physics Letters 101.19 (2012): 4103.
- 11/2007 Four Wave Mixing with Matter Waves.

 <u>Tuo Li</u>, China Modern Education with Honor, 2007.