Tianlong Song

1915 2nd Ave, Apt 803, Seattle, WA 98101 | (517) 775-3821 | stlong0521@gmail.com
Personal Web: http://stlong0521.github.io/

SUMMARY

- Industrial experience with big data pipelines and cloud computing platforms (Amazon AWS)
- Industrial experience with software development and Python/Java/Scala programming
- Research experience with machine learning and data mining algorithms in functional brain connectivity
- Research experience with game theoretic and cryptographic techniques in wireless communications
- Knowledge of big data analytics, natural language processing, algorithm design and analysis

HIGHLIGHTED SKILLS

- Big Data, Software Development, AWS, SQL, Airflow, Python, Java, Scala, Hadoop, Spark
- Machine Learning, Data Mining, Natural Language Processing, scikit-learn

EXPERIENCE

Big Data Software Development Engineer, Zillow, Seattle, WA — Jun 2016 - Present

Big Data Platform Design and Implementation for Marketing and Zestimate

– Keywords: software development; big data pipeline, Airflow, Python, SQL, AWS

- Built an Airflow cluster, which works as a platform to author, schedule and monitor big data tasks for the marketing team
- Designed, implemented, tested and released an ETL service, which provides data sources for Zillow home value estimation (Zestimate)

Software Development Engineer Intern, Amazon, Seattle, WA — Jun 2015 - Aug 2015

Rack Order Assignment Optimization in Supply Planning at Amazon Web Services (AWS)

– Keywords: software development; Java; Scala; MySQL; Coral service framework; integer programming

- Implemented a web service that collects data and optimizes rack order assignments to minimize the total cost, using Coral service framework and Java/Scala programming
- Reduced the total cost by a big margin compared to the existing greedy solution, which is known to be nonoptimal and limited in handling varied constraints
- Gained the knowledge of software engineering practices and development life cycle, including coding standards, code reviews, source control management, testing, etc.

Research Assistant, Michigan State University, East Lansing, MI — Aug 2012 - May 2016

Pattern Recognition on Brain Regions via Regression Modeling

– Keywords: data mining; pattern recognition; regression; Python; feature extraction

- Performed data preprocessing by eliminating outliers in the raw data, which includes measurements on 165 brain regions for 81 subjects
- Applied forward feature selection and regularized linear regression to identify regions of interest (ROIs) towards a given target region
- Achieved a normalized MSE of 8.2e-4 for a 5-fold cross validation, and observed considerable overlap between the extracted 25 ROIs and the ground truth from literature on physiology

Alzheimer's Disease (AD) Diagnosis with Brain Connectivity Pattern Analysis

– Keywords: machine learning; classification; AdaBoost; Python; data analysis

- Constructed the feature space by applying Pearson correlation to six pairs of brain regions based on neuroimaging data

- Applied linear discriminant analysis (LDA) to extract the most distinguishable information in the selected feature space
- Performed a three-class classification using AdaBoost with 50 decision-tree classifiers, achieving an accuracy of 76% in the leave-one-out cross validation

Efficient and Secure System Design in Wireless Communications

– Keywords: game theory; cryptography; security; Matlab; optimization

- Proposed a game theoretic approach to find the optimal strategy for multichannel communications under cognitive jamming, where the jammer monitors the authorized user and adapts its jamming strategy accordingly
- Applied physical layer cryptographic techniques to enhance the security of existing 3G CDMA schemes under disguised jamming, where the jammer mimics the authorized signal using a similar transmission pattern
- Developed new efficient message-driven multicarrier schemes, which outperform existing 4G OFDM schemes in both spectral and power efficiency by up to 25%

SELECTED PROJECTS

Locating and Filling Missing Words in Sentences Based on Language Models Mar 2015 - May 2015

– Keywords: natural language processing; N-gram augmentation; word distance statistics; Python

- Developed an augmented N-gram model that locates and determines the missing word in each sentence
- Achieved missing word location accuracy of 51.47% and missing word filling accuracy of 32.15%

Large Scale Image Classification Based on a Multi-Class Logistic Regression Model Mar 2013 - May 2013

– Keywords; machine learning, image classification; multi-class logistic regression; Matlab

- Large data pool with 1,000,000 examples, which have 900 features and span a wide variety of 164 classes
- Developed a multi-class logistic regression model with random sampling in training examples for each iteration
- Achieved a mean average precision up to 50% with training time limited to only 6 hours on a regular PC

EDUCATION

Ph.D., Electrical and Computer Engineering, 4.0/4.0 Aug 2012 - May 2016

Michigan State University, East Lansing, MI

M.S. with Best Thesis Award, Electrical and Computer Engineering, 88/100 Sept 2009 - Mar 2012

Beihang University, Beijing, China

B.S. with Honors, Electrical and Computer Engineering, 91/100, Top 1 of 200+ Sept 2005 - Jun 2009

Beijing University of Chemical Technology, Beijing, China

SELECTED AWARDS

- Outstanding Graduate Student Nominee, Michigan State University (3/100+) 2015
- Best Student Paper Award, IEEE GlobalSIP 2014 (4/300+) 2014
- Graduate Office Fellowship, Michigan State University 2012
- National Fellowship, Beijing University of Chemical Technology (1/200+) 2007&2008

SELECTED PUBLICATIONS

- **T. Song**, W. E. Stark, T. Li and J. K. Tugnait, "Optimal Multiband Transmission Under Hostile Jamming", IEEE Transactions on Communications, Vol. 64, No. 9, 2016, pages: 4013-4027.
- **T. Song**, K. Zhou and T. Li, "CDMA System Design and Capacity Analysis under Disguised Jamming", IEEE Transactions on Information Forensics and Security, Vol. 11, No. 11, 2016, pages: 2487-2498.
- **T. Song**, T. Li and J. K. Tugnait, "Spectrally Efficient Multicarrier Transmission with Message-Driven Subcarrier Selection", IEEE Transactions on Communications, Vol. 62, No. 7, 2014, pages: 2444-2455.
- **T. Song**, Q. Chang and W. Qi, "Design of a Baseband Signal Generator in Navigation Satellite Signal Simulators", IEICE Transactions on Communications, Vol. E95-B, No. 02, 2012, pages: 680-683.