

Wei Fu

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EDUCATION

- North Carolina State University**, Raleigh, NC May. 2013 - Present
Ph.D. Computer Science | Adviser: Dr. Tim Menzies
- Beijing University of Posts and Telecommunications**, Beijing, China Sep. 2009 - Mar. 2012
M.S. Electrical Engineering
- Nanjing University of Technology**, Nanjing, China Sep. 2005 - Jun. 2009
B.S. Electrical Engineering

SKILLS AND INTERESTS

- Experience in Machine Learning, Deep Learning, Software Analytics, Hyper-parameter Tuning, NoSQL and DevOps.
- Proficient in *Python*, familiar with *Java*, *Matlab* and *R*, good at ML frameworks: Scikit-learn, Keras, Tensorflow, PyTorch.
- Interested in backend/infrastructure development as well as machine learning, text mining, and research positions.

SELECTED PROJECTS

NSF Funded: Search-based Software Engineering Research Sep, 2014 - Present
Research Assistant Under Dr. Tim Menzies, North Carolina State University, USA

- **Hyper-parameter Tuning for Software Analytics:** Software researchers and practitioners routinely use machine learning to explore software project data. However, they rarely tune hyper-parameter of their learners. By applying *Differential Evolution* on defect predictors, we find it (DE) can quickly find tunings that alter detection precision from 0% to 60%; DE can dramatically reduce clustering instability for LDA.
- **Differential Evolution v.s. Grid Search:** Grid search has become a de-facto hyper-parameter tuning technique for machine learning algorithms over years. However, for software analytics, we show that Differential Evolution as a tuner has better performance than grid search and also 210X faster.
- **Supervised v.s. Unsupervised Learning:** There's a debate about choices of defect predictors. In this project, we show that, in practice, unsupervised learning is not stable for deploying defect prediction, some supervised data is required to prune weaker models when building effort-aware just-in-time defect predictors.
- **Simple Techniques for Software Analytics:** *Deep Learning* has become a buzzword in both academia and industry. It seems that every single task should be solved by deep learning. In this project, we revisited a SE task recently solved by deep learning. However, after applying differential evolution-based parameter tuning on SVM, our results outperform the deep learning method in terms of performance metrics and also 84X faster.

NSF Funded: Transfer Knowledge between Software Projects Aug, 2015 - Present
Research Assistant Under Dr. Tim Menzies, North Carolina State University, USA

- **Heterogeneous Defect Prediction:** For new software projects, historical data is missing. To build defect predictors, we proposed that historical data with different metrics from different projects can be used to build software quality models to predict quality of the target project. By using the mathematical models, we identify categories of data sets as few as 50 instances are enough to build a defect prediction model.
- **Bellwether Effect in Software Analytics** We find a "bellwether" effect in software analytics. Given N data sets, we find there always one data set produces the best predictions on all the others. This "bellwether" data set then can be used for all subsequent predictions.

INTERNSHIP EXPERIENCE

Research Intern | ABB, Raleigh, NC May. 2016 - Aug. 2016
Software Project Data Visualization and Exploration

- The project aimed to 1) Cleaned and visualized historical software development data across all software development teams in ABB. 2) Define a universal mapping strategy to understand software development process in different teams.
- Contributions include 1) Design mapping rules and building a web interface to visualize and manage data with asp.net and database. 2) Based on ABB industrial data, building predictive models to improve quality of software development process. 3) Compare and analyze the different characteristics of open source software data and proprietary data for building analytics models. 4) Performed data analytics with Qlik.

SELECTED PUBLICATIONS

- W. Fu and T. Menzies. *Easy over Hard: A Case Study on Deep Learning*. **FSE'17**. [📄→tiny.cc/wfuDL](http://tiny.cc/wfuDL).
- W. Fu and T. Menzies. *Revisiting Unsupervised Learning for Defect Prediction*. **FSE'17**. [📄→tiny.cc/wfuOneWay](http://tiny.cc/wfuOneWay).
- JC Nam, W. Fu, S. Kim, T. Menzies, and L. Tan. *Heterogeneous Defect Prediction*. **TSE**, 2017. [📄→tiny.cc/wfuHDP](http://tiny.cc/wfuHDP).
- W. Fu, T. Menzies, X. Shen, *Tuning for Software Analytics: is it Really Necessary*. **IST**, 2016. [📄→tiny.cc/wfuTuning](http://tiny.cc/wfuTuning).
- R. Krishna, T. Menzies, and W. Fu. *Too Much Automation? the Bellwether Effect and Its Implications for Transfer Learning*. **ASE'16**. [📄→tiny.cc/wfuBellwether](http://tiny.cc/wfuBellwether).