# Xi He

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## Education

**Ph.D.** Industrial and System Engineering, Lehigh University — Aug 2014 - May 2019 (Exp)
**B.S. & M.S.** Mathematics, Nankai University, China — Sep 2008 - May 2014

## Skills

**Programming:** Python(Proficient), C++(Proficient), Matlab, R, Mathematica, Sql, Shell Script, Html
**Others:** Tensorflow/Pytorch, Spark, Mpi/OpenMP, Gurobipy, Cuda, Mac OS, Linus, LaTeX

## Working Experience

**Data Scientist Intern** *Alliance Data, Precima Division, R&D Dept.*, Chicago

- Built appropriate large scale integer model for budgeted category offer assignment optimization. Python, Sql, Odbc
- Designed and implemented Lagrangian Relaxation approach with efficient greedy heuristic for model solving. Gurobipy
- Proposed distributed multi-threads algorithm variant to solve up-to 1M customers case in less than 1.5hrs. Mpi4py **3 mos, Summer 2017**

**Data Scientist Intern** *Siemens Corporation, Corporate Research*, Princeton

- Constructed multi-agent Reinforcement Learning model for Job-shop Scheduling Problems regarding make-span minimization.
- Designed appropriate status and reward space for solving the RL model with performance comparison. Python **3 mos, Spring 2017**
- Developed scalable sub-sampled Hessian-free trust region framework for training deep neural networks. Python, Theano, Matlab
- Built $\epsilon$-approx second-order convergence guarantee for proposed algorithms integrating negative curvature direction. **6 mos, Fall 2016**
- Proposed semi-positive definite quadratic optimization model to measure default risk of a portfolio using normal copula. R
- Applied importance sampling to attain reliable and stable loss probabilities given optimal risk loading. **2 mos, Summer 2015**

## Research Experience

**Research Assistant** *Intel Corporation, Parallel Computing Lab.* Santa Clara

- Designed adaptive sample size sub-sampled Newton-CG algorithms for large scale empirical risk minimization. Python, pytorch
- Obtained iterative complexity bounds for convex loss case using adaptive sub-sampled Newton-CG algorithm. **2 mos, Fall 2017**
- Designed and implemented distributed Hessian-free optimization algorithms for deep neural network training. C++, MPI, Matlab
- Demonstrated the scaling properties of distributed Hessian-free approach comparing to SGD type methods. **3 mos, Spring 2016**

**Research Assistant** *Lehigh Univ.*

- Proposed dual free adaptive mini-batch SDCA for empirical risk minimization, both convex and nonconvex loss are considered. C++
- Achieved batch depended iterative complexity by considering proposed non-uniform mini-batch sampling strategy. **3 mos, Fall 2015**
- Proposed dual free SDCA algorithm with adaptive probability based on sub-optimality of each dual coordinate. C++
- Developed optimal adaptive probability distribution for optimal complexity bound and shown numerical evidence. **3 mos, Spring 2015**

## Selected Courses and Projects

**Massive Data Mining, Pattern Recognition**

- Designed question & answer system for 8th grade problems, attaining 39.5% accuracy using Apache Lucene etc. Python **Fall 2015**
- Released a Matlab package using various classifiers (SVM, KNN, etc.) for character-image recognition. Matlab **Spring 2015**

**Computation Method, Optimization in Machine Learning**

- Using $\ell_1$-regularized lasso model to recovery pictures with missing pixels, applied ISTA, FISTA and GPSR algorithms. C++ **Fall 2015**

**Integer Programming, Nonlinear Programming**

- Built a Matlab package for unconstrained nonlinear optimization applied typical algorithms and did comparison. Matlab **Spring 2015**
- Developed a Python package for mixed binary integer programming using branch and cut. Python **Spring 2014**

## Publications

[1] **He, Xi**, and Martin Takác. *Dual Free Adaptive Mini-batch SDCA for Empirical Risk Minimization.* Under Reviewed by Journal of Machine Learning Research 2017.

[2] **He, Xi**, Dheevatsa Mudigere, Mikhail Smelyanskiy, and Martin Takáč. *Large Scale Distributed Hessian-Free Optimization for Deep Neural Network.* AAAI 2017 Workshop on Distributed Machine Learning

[3] **He, Xi**, and Martin Takáč. *Dual free SDCA for empirical risk minimization with adaptive probabilities.* OptML@NIPS 2015.

[4] **He, Xi**, Ioannis Akrotirianakis, and Amit Chakraborty. *Estimating Portfolio Loss Probabilities with Optimal Risk Loading Coefficients and Fixed Dependency among Obligors.* 2015