# Dan Hu

422 Stonehaven Drive, Unit 17, Ames, IA, 50010 danhu@iastate.edu (515) 817-3609

## SUMMARY

- Solid background in **mathematical optimization including linear, mixed-integer, nonlinear and stochastic programming**.
- Strong skills of **machine learning, data mining** and **statistical modeling including generalized linear and nonlinear regression models, hypotheses testing, Bayesian and time series analysis.**
- Self-motivated team-player with the willingness to learn and contribute, fast-learner, and adaptive to fast-paced and complex environment.

## EDUCATION

**Ph.D.**, Operations Research **(Minor Statistics)**, Iowa State University, Ames, IA (3.90/4.00) Aug. 2015 – current

- Courses: Big Data Optimization, Data Mining, Machine Learning, Statistical Methods I, II, III, Theory of Probability and Statistics I, II

**M.S.**, Operations Research, Iowa State University, Ames, IA (3.90/4.00) Aug. 2013 – Jul. 2015

**B.S.**, Mechanical Engineering, Peking University, Beijing, China (3.70/4.00) Jun. 2013

- Courses: Calculus, Linear Algebra, ODE, Probability & Stats, C Programming, Data Structure & Algorithm

**B.A.**, Economics, Peking University, Beijing, China (3.70/4.00) Jun. 2013

## DATA SCIENTIST EXPERIENCE

[**Kaggle Competition**]

- **Bike Sharing Demand:** Forecasted demand of a city bike-share system with generalized linear models and data mining methods (GraphLab, scikit-learn packages in Python).
- **Quora Question Pairs:** Cleaned data using the NLTK package in Python and preprocessed data with TF-IDF. Performed feature selection with PCA. Used various machine learning models to predict if given Quora questions have the same meaning.

[**Data Mining Cup 2016**] Mar. 2016 – May. 2016

- **Generated feature matrix** with 1,539 features including given attributes of quantity, price, discount, etc. and used **feature selection** to identify the 500 most important features.
- Applied various machine learning models to predict return quantity for online shops, such as **logistic regressions, LDA, LASSO and XGBoost etc.**

## OPERATIONS RESEARCH EXPERIENCE

*Research Assistant, IMSE, Iowa State University* Aug. 2016 – current

[**Project with Department of Energy: Analysis of Power System Operational Uncertainty from Gas System Dependence**]

- Developed a **regression** model to generate the joint probability distribution functions.
- Used **Monte Carlo Simulation** and **nonlinear optimization** to locate cost probability distributions with various uncertain inputs.
- Implemented a mass transportation optimization problem to assess the distance between two probability distribution functions and to quantify the effect of uncertainties.
- Analyzed and evaluated the impacts of those uncertainties on various metrics including loss of load probability, expected unserved energy and risks.

*Research Assistant, IMSE, Iowa State University* Aug. 2013 – Aug. 2016

[**Project with Sandia National Laboratories and Department of Energy: Short-Term Planning of Integrated Gas and Electricity System Under Uncertainty**]

- Identified deterministic optimization model for daily operation problem for natural gas system and power system with wind energy included.
- Generated scenarios to characterize the wind energy uncertainty.
- Proposed a combined **stochastic optimization model** for daily operation of natural gas and power systems, therefore reduced the total one-day operational cost by 3%.
- Implemented a **decomposition method** to increase the computation efficiency in optimization.

*Teaching Assistant, IMSE, Iowa State University* Aug. 2013 – May. 2015

- Appointed as lead teaching assistant for "Engineering Economic Analysis" to lead recitation classes every week and coordinate work of other TAs. Advised students on their homework and course projects.
- Guest lecture of "Analysis of Stochastic Systems".

## PUBLICATIONS AND PRESENTATIONS

1. **Dan Hu** and Sarah M. Ryan, "Daily natural gas spot price modeling by regression" (working paper).
2. **Dan Hu** and Sarah M. Ryan, "Identifying the impacting uncertainties in the short-term power system operation problem" (working paper).
3. **Dan Hu** and Sarah M. Ryan, "Short-term scheduling of a Combined Natural Gas and Power System with Uncertain Wind Energy", *IEEE Transactions on Power Systems* (under review).
4. **Dan Hu** and Sarah M. Ryan, "Quantifying the Effect of Natural Gas Price Uncertainty on Economic Dispatch Cost Uncertainty", *IEEE 2017 Power and Energy Society General Meeting*.
5. **Dan Hu** and Sarah M. Ryan, "Analysis of Power System Operational Uncertainty from Gas System Dependence", PSERC IAB Meetings, Atlanta, GA, December 2016.
6. **Dan Hu** and Sarah M. Ryan, "Short-term scheduling of a Combined Natural Gas and Power System with Wind Energy", INFORMS annual meeting, Philadelphia, PA, November 2015.

## SKILLS

- R, Python, Shell, SAS, MATLAB, GAMS, CPLEX, Gurobi, C.
- Familiar with Windows & Linux platform.

## HONORS AND AWARDS

- Teaching Excellence Award, Iowa State University 2016
- Professional Development Grants, Iowa State University 2015, 2016, 2017
- Lujin Scholarship, Peking University 2011 & 2012
- Yihaijiali Scholarship, Peking University 2012

## PROFESSIONAL LEADERSHIP ACTIVITIES

- Student Member, IEEE, 2017 - present
- Student Member, IEEE PES, 2017 - present
- Student Member, INFORMS, 2015 - present
- Committee Member, Society of Women Engineering, Iowa State University, 2013 - 2014
- Mentor, College of Engineering, Iowa State University, 2013 - 2014
- Reviewer for IEEE Transactions on Smart Grid; The Engineering Economics