

# Hang Deng

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## EDUCATION

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### Rutgers University

*Ph.D. candidate in Statistics, GPA 4.0/4.0*

New Brunswick, NJ

Dec. 2021 (expected)

### Rutgers University

*M.Sc. in Statistics, GPA 4.0/4.0*

New Brunswick, NJ

Jan. 2017

### Fudan University

*B.Sc. in Mathematics and Applied Mathematics, GPA 3.6/4.0*

Shanghai, China

Jun. 2015

## RESEARCH INTERESTS

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Statistical Machine Learning, High-Dimensional Statistics, Deep Learning, Shape Constrained Regression, Infinite-Dimensional Models and Bootstrap Methods.

## WORK EXPERIENCES

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### Graduate Research Assistant

*Department of Statistics, Rutgers University*

Sep. 2016 – Current

*Piscataway, NJ*

- **Foundation of High-Dimensional Simultaneous Inference** (*Oberwolfach Leibniz Graduate Student Award*)
  - Established methodologies and high-dimensional CLT-type theories for sums of independent random vectors.
  - Demonstrated strong performance even when data dimension is *exponentially larger* than sample size.
  - Broad applications in linear models, variable selection, time series, and so on in ultra-high dimensional settings.
- **Statistical Machine Learning Under Qualitative Constraints**
  - Developed methodologies for statistical machine learning problems under qualitative shape constraints.
  - Demonstrated advantages of the proposed methods over commonly studied algorithms in theory and simulation.
  - Proposed the *first* valid parameter-tuning-free inference procedures for monotonicity and convexity constraints.

### National Science Foundation Graduate Internship

*Lawrence Livermore National Laboratory*

Jul. 2017 – Sept. 2017

*Livermore, CA*

- Collaborated with the Cancer Registry of Norway to construct personalized cervical cancer screening policies based on screening test records of 1.7 million women and survey data of more than 30,000 women in Norway.
- Created a rich temporal dataset from several static data sources; formulated the problem as a temporal data classification problem and built the model with long short-term memory (LSTM) neural networks and transfer learning. (Tools: R, Python and Tensorflow.)
- Supported by *National Science Foundation Mathematical Sciences Graduate Internship Program*. See my internship story at [SIAM News](#) and the [NSF program website](#).

## APPLIED PROJECTS

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### Feature Selection via Supervised Spectral Clustering

Apr. 2017 – May 2017

- Proposed a feature selection method using spectral clustering in a supervised way to facilitate both prediction accuracy and interpretability of the random forest algorithm.
- Demonstrated better interpretability of the proposed method than multinomial logistic regression and vanilla random forest algorithm while controlling the prediction error at the same or even lower level using real datasets.

### Solar Energy Daily Forecast with Meteorological Data

Feb. 2017 – Apr. 2017

- Investigated various time series models (ARMA-GARCH, TAR, VAR, factor model, etc.) and compared their performance of precise short-term solar energy forecast and interpretability.
- Developed a two-step univariate ARMA model with residuals linearly explained by meteorological measurements. The model outperforms the investigated multivariate time series models with 10% improvement in mean absolute error on average.

## PUBLICATIONS

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- [1] **Deng, Hang.** “*Slightly conservative bootstrap for maxima of sums*”. Submitted. Available at arXiv:2007.15877 (2020).
- [2] **Deng, Hang,** Qiyang Han, and Bodhisattva Sen. “*Inference for local parameters in convexity constrained models*”. Submitted. Available at arXiv:2006.10264 (2020).
- [3] **Deng, Hang,** Qiyang Han, and Cun-Hui Zhang. “*Confidence intervals for multiple isotonic regression and other monotone models*”. Accepted by **Annals of Statistics**, to appear. Available at arXiv:2001.07064 (2020).
- [4] **Deng, Hang,** and Cun-Hui Zhang. “*Isotonic regression in multi-dimensional spaces and graphs*”. **Annals of Statistics**, 48 (2020), no. 6, 3672–3698.
- [5] **Deng, Hang,** and Cun-Hui Zhang. “*Beyond Gaussian approximation: Bootstrap for maxima of sums of independent random vectors*”. **Annals of Statistics**, 48 (2020), no. 6, 3643–3671.
- [6] Abdulla, G. M., **H. Deng,** B. Soper, J. Nagrad, and M. Nygard. “*Filling the gaps: using a static data source to create a rich temporal dataset*”. No. LLNL-CONF-752118. Lawrence Livermore National Lab.(LLNL), Livermore, CA, (2018). Technical report at *Second ISC HPC Applications in Precision Medicine Workshop, 2018*

## AWARDS

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**Oberwolfach Leibniz Graduate Student**, Mathematical Research Institute of Oberwolfach, Germany, 2018.

**Best Ph.D. Qualifying Exam Performance**, Department of Statistics, Rutgers University, 2016. *Awarded for the highest score in qualifying exam.*

**Conference Travel Award**, Rutgers University, 2018.

**TA/GA Professional Development Fund Award**, Rutgers University, 2017-2018.

**Outstanding Graduate of Fudan University**, Fudan University, 2015.

**Scholarship for Outstanding Students at Fudan University**, Fudan University, 2012-2014.

## TEACHING

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**Rutgers University**, New Brunswick, NJ

- **Instructor:** Linear Algebra and Multivariable Calculus Review.
- **Teaching Assistant:** Computing and Graphics in Applied Statistics, Introductory Statistics for Business, Algorithm Trading & Portfolio Management, Design of Experiments, Basic Statistics for Research, Statistics I.

## TECHNICAL STRENGTH

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- **Selected Courses:** Advanced Theory of Statistics (I & II), Advanced Topics in Statistical Learning, Advanced Topics in Time Series, Regression Theory, Linear and Nonlinear Optimization, Introduction to Data Structure and Algorithms, Interpretation of Data II.
- **Programing Skills:** Python (tensorflow, scikit-learn, pandas, etc.), R, C++, MATLAB, SQL and L<sup>A</sup>T<sub>E</sub>X.

## PROFESSIONAL SERVICES

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- **Meeting Session Chair:** 2020 Joint Statistical Meetings – Session 492.
- **Journal Reviewer:** Annals of Statistics, Probability Theory and Related Fields, Statistical Sciences, Biometrics, Electronic Journal of Statistics, and Statistics and Probability Letters.