# Veeranjaneyulu Sadhanala


**Contact Information**

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**Research Interests**

Shape constrained regression, Graph signal processing, Optimization and Recommendation systems

**Education**

**Carnegie Mellon University**, Pittsburgh, Pennsylvania USA — Aug 2013 - May 2019

*Ph.D. , Machine Learning* Advisor: Ryan J. Tibshirani
Analyzed accuracy of certain shape constrained additive models and total variation type smoothing methods on regular grid graphs. Developed and studied some efficient smoothing approaches for general graphs via sparsification. Studied a parallel Frank-Wolfe method that is useful for solving some structured classification/prediction problems.

**Indian Institute of Technology**, Bombay, India — Jul 2005 - May 2009

*B.Tech., Computer Science and Engineering* Advisor: S. Sudarshan
Final project: keyword search in databases represented as graphs via foreign key references.

**Work Experience**

**University of Chicago**, Chicago, Illinois USA — Aug 2019 - Current
Post-doctoral researcher working on interpreting black-box machine learning models with Prof. Sendhil Mullainathan and Prof. Tengyuan Liang

**Amazon**, San Jose, CA, USA
*Summer Internship* — Jun 2016 - Aug 2016
Developed algorithms to maximize the connectivity of a wireless mesh network with degree constraints. Modeled connectivity using effective resistance, Fiedler value and the trace of the graph Laplacian. Used SDP, ILP solvers from Gurobi and other packages. Formulated a max-k-cut to minimize network interference and developed greedy and simulated annealing methods to solve it.

**Morgan Stanley**, New York, NY, USA
*Quantitative Analyst/Associate* — Jul 2009 - May 2013
Developed software for valuation of interest rate and other derivatives in C++ using analytical formulas, numerical integration, backward induction and numerical PDE solvers. Brought around 250000 interest rate swaps and swaptions in various currencies in the firm into production through our library. Fixed the valuation of interest rate swap stubs. Facilitated Interop between C++ and Java, F# using SWIG. Developed a Domain Specific Language for specifying stochastic differential equations. Mentored two junior colleagues on the valuation of inflation derivatives and swaptions. Collaborated with teams from various regions: Americas, Europe, India, and Japan.

**Papers**

Additive Models with Trend Filtering
**Veeranjaneyulu Sadhanala**, Ryan Tibshirani.
Annals of Statistics, 2019.

A Higher-Order Kolmogorov-Smirnov Test
**Veeranjaneyulu Sadhanala**, Aaditya Ramdas, Yu-Xiang Wang, Ryan Tibshirani.
Oral Presentation. International Conference on Artificial Intelligence and Statistics, 2019.

Higher-Order Total Variation Classes on Grids: Minimax Theory and Trend Filtering Methods
**Veeranjaneyulu Sadhanala***, Yu-Xiang Wang*, James Sharpnack, Ryan Tibshirani.

Advances in Neural Information Processing Systems, 2017.
(* indicates equal contribution)

Total Variation Classes Beyond 1d: Minimax Rates, and the Limitations of Linear Smoothers
**Veeranjaneyulu Sadhanala***, Yu-Xiang Wang*, Ryan Tibshirani.
Advances in Neural Information Processing Systems, 2016.

Graph Sparsification Approaches for Laplacian Smoothing
**Veeranjaneyulu Sadhanala***, Yu-Xiang Wang*, Ryan Tibshirani.
International Conference on Artificial Intelligence and Statistics, 2016.

Parallel and Distributed Block-Coordinate Frank-Wolfe Algorithms
Yu-Xiang Wang, **Veeranjaneyulu Sadhanala**, Wei Dai, Willie Neiswanger, Suvrit Sra, and Eric Xing. International Conference on Machine Learning, 2016.

Scheduling of dataflow models within the reconfigurable video coding framework
Jani Boutellier , **Veeranjaneyulu Sadhanala**, Christophe Lucarz , Philip Brisk , Marco Mattavelli.
IEEE Workshop on Signal Processing Systems, 2008.

## Teaching Experience

**Carnegie Mellon University**, Pittsburgh, Pennsylvania USA

*Teaching Assistant* — Fall 2014 - Spring 2015
Introduction to Machine Learning(10-715), Fall 2014, CMU
Convex Optimization(10/36-725), Spring 2015, CMU

## Professional Services

Reviewed for Annals of Statistics (2017-2020), Journal of the American Statistical Association (2017), SIAM Journal on Optimization (2016), Neural Information Processing Systems (2016, 2018,2019), International Conference on Artificial Intelligence and Statistics (2016-2021), Journal on Advances in Signal Processing (2018), Optimization Methods and Software (2015), Applied and Computational Harmonic Analysis (2021).

## Programming Skills

Proficient in C++, Java, Python, MATLAB, and R. Can write in Scala and SQL. Can work with TensorFlow. Experienced in implementing numerical algorithms. Co-developed `glmgen` package for trend filtering a time series.

## Course Knowledge

Statistical machine learning, Convex optimization, Probabilistic graphical models, Deep neural networks for Natural language processing and Computer vision.