# SOUVIK DUTTA

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/TheKivs /souvik-dutta /TheKivs



**Resumé Summary:** • Doctoral candidate in Theoretical Physics, with a strong background in mathematics and applied statistics • Research experience with **Machine Learning** algorithms and handling large datasets • Moderate experience with **Scikit-learn**, **Pandas**, **Pytorch** libraries • ML Research interests: Deep Boltzmann machines, Multi-task networks, CNN • Seasoned collaborative, cognitive, mentorship and communication skills


## EDUCATION

- **Ph.D. candidate**, University of Illinois Urbana-Champaign, USA — Aug 2013 - **present**
  - ◇ **Field of research**: Condensed Matter Physics, Advisor: Dr. Thomas Faulkner [Publications]
  - ◇ **Relevant Courses:** Machine Learning, Data Mining, Computer Vision, Data Structures, Graph Theory
- **B.Tech.**, Indian Institute of Technology (IIT) Bombay, India — Jul 2009 - May 2013
  - ◇ **Major**: Engineering Physics (w/Honors), **Minor**: Computer Science & Engineering
  - ◇ **Relevant Courses:** Data Structures & Algorithms, Optimization, Data Analysis & Interpretation
  - ◇ **Thesis**: "K-Nearest Neighbor **clustering algorithms** at particle colliders", Advisor: Dr Gavin Salam

## WORK EXPERIENCE

- **Graduate Research Fellow**, University of Illinois Urbana-Champaign, USA — Aug 2015 - present
  - ◇ Applied optimization techniques to improve fidelity of quantum computation against decoherence by **20%**
  - ◇ Deployed **2 novel algorithms** for solving infinite-dimensional optimization problems in $\mathcal{O}(N^k)$ time [talk]
- **Teaching Assistant**, University of Illinois Urbana-Champaign, USA — Sep 2013 - Jul 2015
  - ◇ Organized and led **R/IPython** tutorial sessions for a graduate class on Statistics and Data Analysis [link]
  - ◇ Taught hands-on sessions in **MATLAB** for solving problems in tensor calculus and differential geometry
- **Research Intern**, University of Milan, Italy — May 2013 - Jul 2013
  - ◇ Designed **3** memory-efficient optimization algorithms for evaluation of various lattice QCD observables
  - ◇ Achieved **15% reduction** in computational cost with **boostrap aggregated** ensemble learning algorithms
- **Machine Learning Research Intern**, CERN, Switzerland — May 2012 - Aug 2012
  - ◇ Spearheaded the large-dataset preprocessing and **KNN clustering** library FastJet in **Python** [paper]
  - ◇ Improved complexity for **online data cleaning and clustering** from prior best $\mathcal{O}(N^3)$ to $\mathcal{O}(N \log N)$

## OTHER RELEVANT PROJECTS

- **Edge detection and reconstruction of low-res images**, University of Mainz, Germany [link]
  - ◇ Implemented techniques in computer vision to detect edges in low-resolution spectrogram images [article]
  - ◇ Devised comparison criterion among 4 image filters using **OpenCV** and automatized filter selection
- **Churn detection and intervention**, Flipkart.com, Mumbai, India
  - ◇ Designed intervention model to increase customer lifetime value; predicted churning with **84% accuracy**
  - ◇ Deployed a **16% more** memory-efficient ensemble classification library using **OpenMP**, **MPI**, **C++**

## TECHNICAL SKILLS

- **Programming:** Python, C++, Java, R, PostgreSQL, MATLAB, Mathematica, GNU Octave
- **Libraries:** TensorFlow, PyTorch, Keras, Scikit-learn, Pandas,NumPy, SciPy, Matplotlib, Seaborn
- **Algorithms:** KNN, K-means clustering, Bayesian classification, Logistic Regression, Decision Trees, SVM, Regularization theory, PCA, Ensemble learning, Classifier performance, MCMC, Q-learning
- **Mathematics:** Linear algebra, Probability theory, Multivariate vector calculus, Optimization algorithms