Nilavra Pathak

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Profile

I am a final year Ph.D. candidate with strong analytical skills and desire to solve problems real world problems. I have experience in identifying and highlighting key insights, signals, and trends deep within the underlying data. I can tailor machine learning algorithms (Bayesian analysis, probabilistic graphical models, Deep Learning) with domain-specific models to provide solutions. I am proficient in programming with Python, R, and MATLAB. I have extensive experience in working in collaborative projects and present insights in a storytelling format.

Education

Ph.D. in Information Systems *Aug 2013 – Present*
University of Maryland Baltimore County, Baltimore, Maryland, USA

M.E. in Computer Science *Aug 2011 – May 2013*
Jadavpur University, Kolkata, India

B.Tech. in Computer Science & Engineering *Aug 2007 – May 2011*
St. Thomas' College of Engineering & Technology, Kolkata, India.

Skills

Software Skills Python, R, MATLAB, LaTeX, SQL.

Data Science Skills

- **Machine learning & Statistics:** Probabilistic model development and implementation (Variants of Bayes Nets, Hidden Markov Models, Hierarchical models, etc.), Bayesian Data Analysis, Parameter Estimation (MLE, MAP, Markov Chain Monte Carlo, Variational Inference), Hypothesis testing, Deep learning (CNN, LSTM, Auto-encoders, etc.), Classification (SVM, K-NN, Random Forest, Bayesian Networks, etc), Regression (GLM, GAM), Time series analysis (State space models, AR models, Exponential smoothing models, GARCH, etc.).
- **Data processing:** Data exploration by summary statistics, data cleaning, data sampling.

Analytics Tools

- **Probabilistic Programming:** PyMC3, Theano.
- **Deep Learning:** Keras, Tensorflow.
- **Machine Learning & Statistics:** Scikit-learn, Caret, MGCV.
- **Data visualization:** GGplot, Matplotlib, Seaborn, Python Dash.
- **Mathematical optimization:** Optimization toolbox in matlab & Scipy in Python.

Work Experience

Investment Intern, *T. Rowe Price, Multi-Asset Research*, Baltimore, MS *May 2018 – August 2018*

- Augmented the existing Monte Carlo simulation framework with bond ladder and deferred annuity models and integrated a complex retirement portfolio into the investor's utility framework. Found an optimal multi-asset allocation that maximizes investor's utility in retirement and examined sensitivity of the solution to investor's preference parameters.
- Built an interactive proof-of-concept front-end for the portfolio managers' tool.
- Collaborated with Quantitative Analysts and Portfolio Managers to present findings to client.

Research Intern, *IBM Research Ireland*, Dublin, Ireland *August 2016 – Jan 2017*

- Employed statistical and deep learning techniques to analyze and forecast gas usage in commercial buildings.
- Compared deep learning with conventional statistical techniques and studied the trade-off between interpretation and accuracy.

Graduate Assistant, *UMBC*, Baltimore, USA *August 2013 – Present*

- Led weekly laboratory sessions on *Introduction to Computer Programming* to class of ∼75 freshman for 2 semesters.
- Taught *Computer Programming II* to a class of ∼30 junior and sophomore students for 1 semester.

Research Projects

Building thermal modeling: Developed a hierarchical Bayesian latent state space model to assess buildings' insulation quality. Performed a Bayesian analysis to evaluate the effect of prior selection on dataset size and knowledge transfer. *Jan 2018 – Present*

Thermal imaging based power analytics: Constructed a low-cost IR camera-based system to capture low-resolution thermal images to detect energy usage and air leak in buildings. *Jan 2016 - Present*

Non-intrusive load monitoring: Developed and analyzed algorithms for non-intrusive load monitoring using probabilistic graphical models, sparse coding, and deep learning. *Aug 2015 – Dec 2017*

Acoustic based power analytics: Constructed an acoustics-based home appliance detection system to identify and profile the appliances using probabilistic graphical models. *Jan 2014 - Oct 2014*

Activity aware energy analytics: Built a system that combines daily usage information with the circuit breaker data. Effectively reduced the set of candidate appliances and accurately identified usage characteristics and energy consumption of low-load appliances. *Aug 2013 - May 2014*

Doctoral Dissertation

Title: *Analysis of Energy Disaggregation & Applications*

Advisor: *Nirmalya Roy*

Brief Description: Analysis and development of large scale and context aware energy disaggregation algorithms for forecasting and building quality assessment.

Selected Publications

Estimating Buildings' Parameters over Time Including Prior Knowledge, *Preprint '19*

NonIntrusive Air Leakage Detection in Residential Homes, *ICDCN '18*

Forecasting Gas Usage for Big Buildings Using Generalized Additive Models & Deep Learning, *Smartcomp '18*

Longitudinal Energy Waste Detection with Visualization, *Buildsys '17*

Fine-grained Appliance Usage and Energy Monitoring through Mobile *PMC '16*

AARPA: Combining Mobile and Power-Line Sensing for Fine-Grained Appliance Usage and Energy Monitoring, *MDM '15*

Acoustic Based Appliance State Identifications for Fine-Grained Energy Analytics, *Percom '15*

Mobeacon: An iBeacon-Assisted Smartphone-Based Real Time Activity Recognition Framework *Mobiquitous '15*

Iterative Signal Separation Assisted Energy Disaggregation, *IGSC '15*

A full list of publications is available on my Google Scholar page.

Awards and Honors

Constellation E2 Energy to Educate *2016*

Percom NSF Travel Grant *2015*

Winner, Graduate Completed Research category, Information Systems research poster contest, UMBC *2014*

Professional Memberships

IEEE Student Member *2014 – Present*

ACM Student Member *2016 – Present*

UMBC Information Systems Graduate Student Organization, Secretary *2015 – 2016*