DHRUV MADEKA https://github.com/dmadeka ◆ www.linkedin.com/in/dhruvmadeka
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EDUCATION

New York University, Machine Learning and Data Science, New York, NY September 2016-
• Courses in Foundations of Machine Learning, Deep Learning, Deep learning for NLP
• GPA: 4.00

Boston University, M.S. Mathematical Finance, Boston, MA January 2014
• GPA: 4.00
• Special Recognition Award: Best Student by GPA

University of Michigan, B.S.E. Industrial & Operations Engineering, Ann Arbor, MI 2012
• Graduated Cum Laude
• Dean's List, University Honors

EXPERIENCE

Amazon 2017-
Senior Machine Learning Scientist, Supply Chain Optimization Team New York, NY

Production Deployment
• Led the science team that deployed large scale encoder-decoder models to predict distributions of demand worldwide for all products on the Amazon website
• Worked with scientists, engineers, product managers across multiple organizations to drive a large-scale successful deployment of an ML solution to a classical problem in the Supply Chain
• Led the development of a python codebase in keras-mxnet, pyarrow and numpy that performed distributed training and model management for different stages of launch
• Contributed to the research efforts by developing a feature selection mechanism for the model to learn seasonality, contextual awareness for promotion lift forecasting and an attention mechanism for learning long-term dependencies
• Drove higher standards in coding for both science and engineering by driving scientists to perform code reviews and unit testing and engineering by contributing major software changes back to keras-mxnet and pyarrow

Research
• Developed a novel method for decoding time-series with context awareness that was published in the NIPS Time Series workshop in 2017
• Developed novel techniques in generative modelling for time series that led to publications and talks at ICML's Deep Generative Models workshop and the KDD Time Series workshop in 2018
• Active research in model-free and model-based deep reinforcement learning for performing dynamic inventory management, including novel innovations in continuous action space IMPALA methods for PPO based agents
• Developed non-machine learning solutions for different problems related to consistency of forecasts, improvements to stochastic gradient descent for sampled training and using neural networks on censored data
• Actively contributed to the internal science community through numerous talks, workshop organizations and publications at internal Amazon conferences

Bloomberg LP 2014-2017
Quantitative Researcher, Quantitative Research Department New York, NY

Mathematical Research:
• Developed new models for the US Presidential Elections, using techniques from Statistics and Machine Learning, that outperformed established players such as FiveThirtyEight and the New York Times
• Application of deep networks and advanced stacking models to predicting bond default
• Research in the application of Deep Learning to data retrieval from charts
• Research in new methods for scoring model predictions and their applications to online learning - which was subsequently incorporated in multiple Bloomberg functions
• Advanced research work in statistics, particularly in time series estimation and prediction through move-based statistics
• Research in the use of functional Ito calculus as a more efficient way to estimate conditional expectations

Software Development:

- Founding developer and primary maintainer of the leading open-source python interactive visualization library - bqplot
- Work in prototyping different research projects using MXNet and Keras
- Development of an object oriented framework used for creating interactive dashboards in the Jupyter Notebook to visualize training of deep networks – including the development of innovative new quantities to visualize for gauging the generalization capability of the network
- Assisted in the development of a Python based quantitative library for an advanced research platform using numpy, pandas, scikit-learn
- Gained experience in high-performance Python development, including Cython (primarily) and JIT compilers such as numba (for certain use cases)
- Developed advanced functionality for the generic simulation of Stochastic Differential Equations through higher order numerical schemes

SKILLS Python – *development on the numpy, pandas, ipywidgets and bqplot libraries*, MXNet, Keras, Machine Learning, Data Analysis, Data Visualization, Stochastic Calculus, Malliavin Calculus, Probability Theory, Advanced Statistics, R, Econometrics, Derivatives

PUBLICATIONS Cliché, M., Rosenberg D., Madeka, D., Yee, C., "Scatteract: Automated extraction of data from scatter plots", ECML-PKDD 2017

Wen, R., Torkkola, K., Narayanaswamy, B., Madeka, D., "A Multi-Horizon Quantile Recurrent Forecaster", NIPS Time Series Workshop 2017

Madeka, D., Swiniarski, L., Foster, D., Razoumov, L., Torkkola, K., Wen, R., "Sample Path Generation for Probabilistic Demand Forecasting", ICML Deep Generative Models Workshop 2018

INVITED PRESENTATIONS

- Morgan Stanley, Internal Presentation, "An economic understanding of the Recovery Theorem"
- University of Michigan, Practitioners Seminar, "Dynamic Factor Model Asset Allocation"
- Bloomberg Quant Seminar, April 2015, "Dynamic Factor Model Asset Allocation"
- Bloomberg Quant Seminar, August 2015, "Malliavin Calculus made simple"
- Bloomberg Quant Seminar, November 2016, "Election Methodologies"
- Columbia University, Invited Guest Lecturer, MATH 4079, "McKean Stochastic Differential Equations"
- Startup ML Conference, Invited Speaker, "Machine Learning for Delinquency and Default Risk"
- NYC d3-js Meetup, Invited Speaker, "Interactive Visualization in the Jupyter Notebook"
- PyData Ann Arbor, Invited Speaker, "Interactive Visualization in the Jupyter Notebook"
- TD Ameritrade Data Science Innovation Center, Invited Guest, "Machine Learning in Finance"
- University of Michigan, Mathematics Seminar, "Machine Learning in Finance"
- PyData Seattle, July 2017, Invited Speaker, "bqplot – Seamless Interactive Visualizations in the Jupyter Notebook"
- SciPy, July 2017, Invited Speaker, "bqplot – Seamless Interactive Visualizations in the Jupyter Notebook"
- NYU Mathematics Seminar, November 2017, "Deep Learning"
- SciPy, July 2018, Invited Speaker, "Machine Learning workflows in Jupyter"
- KDD Time Series Workshop, August 2018, Invited Speaker, "Sample Path Generation for Probabilistic Demand Forecasting"
- ICLR Reproducibility in Machine Learning Workshop, May 2019, Invited Speaker, "Coordinating deployments of complex models at scale"

WORKS IN PROGRESS

- Madeka, D., "Accurate Prediction of Electoral Outcomes"

  We present novel methods for predicting the outcome of large elections. Our first algorithm uses a diffusion process to model the time uncertainty inherent in polls taken with substantial calendar time left to the election. Our second model uses the Option Market. Our third model uses Online Learning along with a novel ex-ante scoring function to combine different forecasters along with our first two models. We also consider Bayesian Regressions and a Graphical Model. We also present new density based scoring functions that can be used to better evaluate the efficacy of forecasters.