Charles Topliff
ctopliff0@gatech.edu | ctopliff.github.io

Education

Georgia Institute of Technology | Atlanta, GA *August 2018 - Present*
National Defense Science & Engineering Graduate (NDSEG) Fellowship
PhD. Machine Learning

University of Kansas | Lawrence, KS *August 2014 – May 2018*
BS in Electrical Engineering, Magna Cum Laude

Research Experience

Graduate Research Fellow | Atlanta, GA *May 2019 – Present*
Advised by Dr. Morris Cohen & Dr. Mark Davenport

- Trained convolutional autoencoders and other generative models for dimensionality reduction of coronal images to enable downstream time series forecasting tasks
- Applied long short-term memory networks to time series forecasting problems in predicting geomagnetic substorms, improving the state of the art for substorm forecasting
- Frequently applied high performance computing resources to enable massively parallel training of neural networks for large scale hyperparameter searches, leading to more comprehensive training process

Graduate Research Assistant | Atlanta, GA *August 2018 – May 2019*
Advised by Dr. Douglas Williams & Dr. William Melvin

- Implemented value iteration algorithms utilizing efficient linear program solvers to solve for the optimal decision making policy in high-dimensional scenarios
- Investigated the use of Partially-Observable Markov Decision Processes in adaptive control for radar decision making in adversarial scenarios

Projects

Semantic Classification of Financial Documents for Forecasting *Spring 2021*

- Applied ML techniques to the problem of predicting fixed income rate movements as a result of Federal Open Market Committee (FOMC) announcements.
- Pretrained BERT model used to predict positive, neutral, or negative semantics of FOMC documents to build overall semantic score; regressions to predict the movement of 1-Year to 10-Year instrument movements.

IMDB Semantic Classification *Spring 2019*

- Applied long short-term memory networks to the problem of classifying semantics of IMDB movie reviews using n-gram embedding models, found an improvement over baseline methods.
- Compared model to different classical classification models such as logistic classification and kernelized support vector machines as a baseline.

Coursework / Skills

Relevant Coursework: Statistical Machine Learning, Digital Signal Processing, Convex Optimization, Deep Learning, Theoretical Statistics, Stochastic Processes in Finance, Natural Language Processing, Numerical Methods in Finance.
Programming / Software / Platforms: Python, R, MATLAB, Git, Vim, VSCode, Slack, Linux (Ubuntu, Red Hat), High Performance Computing (PBS, Ray Hyperparameter Tuning library).

Publications / Conference Presentations

• **C. Topliff**, M. Cohen, W. Bristow "Simultaneously forecasting global geomagnetic activity using Recurrent Networks." arXiv preprint arXiv:2010.06487 (2020). (NeurIPS Workshop ML4PS).
• **C. Topliff**, W.M. Melvin, D. Williams “Application of POMDPs to Cognitive Radar” 2019 53rd Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, 2019, Accepted.
• J. Kota, **C. Topliff**, R. Prasanth, G. Ushomirsky and S. Kogon, "Radar Waveform Design Using Lagrangian Dynamics for Co-Channel Interference Mitigation," 2019 IEEE Radar Conference (RadarConf), Boston, MA, USA, 2019, pp. 1-5.
• J. Kota, **C. Topliff**, R. Prasanth, G. Ushomirsky and S. Kogon, "RF Convergent Waveform Design Using Time-Modulated Phase Functions,"2018 52nd Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, 2018, pp. 409-413.