Michael Sankur

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Professional Experience

HyperGiant Industries
Data Scientist 2021 - 2023

- Designed and implemented solution strategy for optimization of electric grid operator response for reducing severe weather effects on electric transmission grid.
- Used tensorflow to build models of effects of weather on electricity generation capacity and user demand.
- Implemented predictive optimization using CPLEX, coupled with models weather effect models, for reducing incidents of high electric line loading.
- Produced simulation framework of electric transmission grid, using OpenDSS in Python, for development and testing of preventative and response strategies for extreme weather events, and deploy on FastAPI endpoint.
- Tested time-series anomaly detection with temporal convolutional neural networks.
- Developed and maintained CICD process for simulation, modeling, and optimization, with Microsoft Azure and Docker.

Lawrence Berkeley National Lab Berkeley, CA
Data Scientist 2016 - 2021

- Led team of three engineers in agile development of comprehensive software package for computation-speed-focused power grid simulation for integration with reinforcement learning.
- Led team of two engineers in development of Modelica package for multiple reinforcement learning implementations, including extremum seeking.
- Researched unsupervised and reinforcement learning for optimization of control policies for complex and integrated energy systems.
- Employed reinforcement learning with tensorflow and pytorch for optimization of building energy use controllers.
- Developed models of battery energy storage, grid-integrated power electronics, and associated controller algorithms, for reinforcement learning, and deployed within tensorflow environment.
- Deployed and monitored online model-free optimization algorithms for increased integration and additional utility of distributed energy resources on electric distribution grids.
- Derived linearized model of power flow physics for use in scalable optimization programs, such as LP, QP, MILP. Deployed model in multiple optimization power grid optimization algorithms, including model-predictive control.
- Investigated applications of advanced nonlinear optimization tools, such as semidefinite programs, to electric power grid problems.

Education

Doctorate of Philosophy, Mechanical Engineering 2017
University of California, Berkeley Berkeley, CA

Master of Science, Mechanical Engineering 2015
University of California, Berkeley Berkeley, CA

Master of Science, Aerospace Engineering 2009
University of California, San Diego San Diego, CA

Bachelor of Science, Mechanical Engineering *cum laude* 2008
University of California, San Diego San Diego, CA

Technology Skills

Programming Languages: Python, MATLAB, Julia
Machine Learning: Tensorflow, Keras, sci-kit learn, deep learning, unsupervised learning
Cloud and Computing: AWS, PostgreSQL, docker, FastAPI
Optimization: Convex, nonconvex, mixed-integer, model-free, online, stochastic
Simulation: Dynamic, discrete-event, agent-based

Certifications

Databricks Associate Developer for Apache Spark 3.0 2023

Selected Publications

M. D. Sankur, D. Arnold. "Extremum Seeking over a Discrete Action Space." presented at the *2021 American Control Conferece*, 2021.

M. D. Sankur, R. Dobbe, A. von Meier, E. Stewart, D. Arnold. "Optimal voltage phasor regulation for switching actions in unbalanced distribution systems." *2020 IEEE Power & Energy Society General Meeting (PESGM)*. IEEE, 2020.

M. Sankur, M. Baudette, J. MacDonald, D. Arnold, "Batch measurement extremum seeking control of distributed energy resources to account for communication delays and information loss," in *Proceedings of the 2020 Hawaii International Conference on System Sciences*, 2020.

M. Sankur, R. Dobbe, A. von Meier, D. Arnold, "Model-free optimal voltage phasor regulation in unbalanced distribution systems." *IEEE Transactions on Smart Grid* 11.1 (2019): 884-894.

M. Sankur, D. Arnold, "Extremum Seeking Control of Distributed Energy Resources with Decaying Dither and Equilibrium-based Switching," in *Proceedings of the 2019 Hawaii International Conference on System Sciences*, 2019.

M. Sankur, D. Arnold, and D. Auslander, "Dynamic Programming for Optimal Load-Shedding of Office Scale Battery Storage and Plug-Loads," in *Proceedings of the 2015 IEEE Power and Energy Society General Meeting*, Denver, CO, USA, 2015.

M. Sankur, D. Arnold, and D. Auslander, "Model Predictive Control of Commercial Office Plug-Loads and Battery Storage Systems," in *Proceedings of the 2014 ASME Dynamic Systems and Control Conference*, San Antonio, TX, USA, 2014.

Full publication list: `https://scholar.google.com/citations?user=J_eybbEAAAAJ&hl=en`