Travis J. Kessler

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Machine learning engineer and data scientist with more than nine years of experience in academic research and open-source software development. Confident in directing teammates and students as a project manager and instructor. Capable of communicating across numerous scientific, engineering, and business disciplines. Achievements include successfully developing machine learning models to efficiently discover cleaner, economically viable liquid fuels and fuel additives. Skilled in applied machine learning, data mining/pipelining, probability and statistics, and software engineering development/management.

TECHNICAL SKILLS

- Python, C, C++, MATLAB
- TensorFlow/Keras, PyTorch
- SciKit Learn, Numpy, Pandas
- Jupyter Notebook
- OpenCV
- Predictive/statistical modeling
- Clustering and classification
- Regression and LLMs
- Data visualization
- Web scraping
- AWS, GCS, Azure
- SQL (Postgres, MySQL)
- NoSQL (MongoDB)
- Git/SVN
- Docker

EDUCATION

PhD Computer Engineering – GPA 3.79
University of Massachusetts Lowell
May 2023

BS Computer Engineering – GPA 3.56
University of Massachusetts Lowell
May 2018

EXPERIENCE

Research Engineer *Oct. 2023 – Present*
AIMdyn Inc.

- Utilizes Koopman Operator Theory based generative AI and other cutting-edge machine learning methods for the analysis, prediction, and control of complex dynamical systems

Graduate Research Assistant *Jan. 2019 – Sep. 2023*
University of Massachusetts Lowell Energy and Combustion Research Laboratory

- Leveraged predictive models (e.g., deep learning, graph neural networks, etc.) to advance alternative fuel research
- Investigated methods for neural network feature selection and hyper-parameter tuning, including random forest trees, principal component analysis, artificial bee colonies, and various optimization algorithms
- Evaluated predictor/target variable relationships using a variety of statistical methods
- Managed a team of undergraduate computer science/engineering students in tasks related to current research efforts
- Published research efforts in *The Proceedings of the Combustion Institute*, *The Journal of Open Source Software*, and the *American Society of Mechanical Engineers Internal Combustion Engine Fall Conference*

Technical Operations/DevOps Engineer *June 2018 – Jan. 2019*
Valora Technologies

- Used data mining techniques to extract client-specified information from legal, financial, and government documents
- Constructed data pipelines to usher client documents from intake to delivery of extracted information (ETL)
- Trained newly hired DevOps engineers in data pipelining/mining workflow configuration

Undergraduate Research Assistant *June 2015 – May 2018*

University of Massachusetts Lowell Energy and Combustion Research Laboratory

- Optimized predictive models to predict chemical properties based on molecular structure (QSAR/QSPR)
- Implemented optimal neural network architectures for multidimensional input and target data
- Developed open-source machine learning, feature extraction, and hyper-parameter tuning software packages
- Published research efforts in *Fuel*, *The Journal of Open Source Software*, and the *American Society of Mechanical Engineers Internal Combustion Engine Fall Conference*

SELECTED AWARDS & HONORS

Dean's Gold Medal for Outstanding Academic Achievement	*May 2023*
Computer Engineering Department Award for Outstanding Ph.D.	*May 2023*
Best Presentation, ASME ICEF 2019 Conference	*Oct. 2019*
1st place, Symbotic Warehouse Robot Prototyping Competition	*May 2018*
Innovative Technology Solution, UMass Lowell DifferenceMaker 50K Idea Challenge	*April 2017*
1st place, Francis College of Engineering Prototyping Competition	*Dec. 2016*

PUBLICATIONS

PB11. Amina SubLaban, **Travis Kessler**, Noah Van Dam, J. Hunter Mack. "Artificial Neural Network Models for Octane Number and Octane Sensitivity: A Quantitative Structure Property Relationship Approach to Fuel Design". *Journal of Energy Resources Technology* (2023). https://doi.org/10.1115/1.4062189

PB10. **Travis Kessler**, Amina SubLaban, J. Hunter Mack. "Predicting the Cetane Number, Sooting Tendency, and Energy Density of Terpene Fuel Additives". *ASME Internal Combustion Engine Division Fall Technical Conference* (2022). https://doi.org/10.1115/ICEF2022-91163

PB9. **Travis Kessler**, Thomas Schwartz, Hsi-Wu Wong, J. Hunter Mack. "Evaluating Diesel/Biofuel Blends Using Artificial Neural Networks and Linear/Nonlinear Equations". *ASME Internal Combustion Engine Division Fall Technical Conference* (2021). https://doi.org/10.1115/ICEF2021-67785

PB8. **Travis Kessler**, Thomas Schwartz, Hsi-Wu Wong, J. Hunter Mack. "Predicting the Cetane Number, Yield Sooting Index, Kinematic Viscosity, and Cloud Point for Catalytically Upgraded Pyrolysis Oil Using Artificial Neural Networks". *ASME Internal Combustion Engine Division Fall Technical Conference* (2020). https://doi.org/10.1115/ICEF2020-2978

PB7. **Travis Kessler**, Peter C. St. John, Junqing Zhu, Charles S. McEnally, Lisa D. Pfefferle, J. Hunter Mack. "A comparison of computational models for predicting yield sooting index". *Proceedings of the Combustion Institute* (2020). https://doi.org/10.1016/j.proci.2020.07.009

PB6. **Travis Kessler**, Thomas Schwartz, Hsi-Wu Wong, J. Hunter Mack. "Screening Compounds for Fast Pyrolysis and Catalytic Biofuel Upgrading Using Artificial Neural Networks". *ASME Internal Combustion Engine Division Fall Technical Conference* (2019). https://doi.org/10.1115/ICEF2019-7170

PB5. Sanskriti Sharma, Hernan Gelaf-Romer, **Travis Kessler**, J. Hunter Mack. "ECabc: A feature tuning program focused on Artificial Neural Network hyperparameters". *Journal of Open Source Software* (2019). https://doi.org/10.21105/joss.01420

PB4. **Travis Kessler**, Eric Sacia, Alexis Bell, J. Hunter Mack. "Artificial neural network based predictions of cetane number for furanic biofuel additives". *Fuel*, 206, 171-179 (2017). https://doi.org/10.1016/j.fuel.2017.06.015

PB3. **Travis Kessler**, Gregory Dorian, J. Hunter Mack. "Application of a Rectified Linear Unit (ReLU) Based Artificial Neural Network to Cetane Number Predictions". *ASME Internal Combustion Engine Division Fall Technical Conference* (2017). https://doi.org/10.1115/icef2017-3614

PB2. **Travis Kessler**, J. Hunter Mack. "ECNet: Large scale machine learning projects for fuel property prediction". *Journal of Open Source Software* (2017). https://doi.org/10.21105/joss.00401

PB1. **Travis Kessler**, Eric Sacia, Alexis Bell, J. Hunter Mack. "Predicting the Cetane Number of Furanic Biofuel Candidates Using an Improved Artificial Neural Network Based on Molecular Structure". *ASME Internal Combustion Engine Division Fall Technical Conference* (2016). https://doi.org/10.1115/icef2016-9383

PRESENTATIONS

PR5. Amina SubLaban, **Travis Kessler**, J. Hunter Mack. "Analysis of Inlier and Outlier Compounds with respect to Artificial Neural Network Cetane Number Prediction Accuracy". *Eastern States Section of the Combustion Institute Spring Technical Meeting* (2022).

PR4. **Travis Kessler**, Amina SubLaban, J. Hunter Mack. "Predicting Research and Motor Octane Number using a Single Artificial Neural Network". *American Chemical Society Fall Conference* (2021).

PR3. **Travis Kessler**, Corey Hudson, Leanne Whitmore, J. Hunter Mack. "Prediction of Research/Motor Octane Number and Octane Sensitivity Using Artificial Neural Networks". *Eastern States Section of the Combustion Institute Spring Technical Meeting* (2020).

PR2. J. Hunter Mack, **Travis Kessler**. "A Computational Approach to Screening Alternative Fuel Candidates". *New England Energy Research Forum* (2019).

PR1. **Travis Kessler**, J. Hunter Mack. "Predicting Biofuel Properties with an Artificial Neural Network". *UMass Lowell Student Research and Engagement Symposium* (2016).