Michael William Fouts

michaelwfouts@gmail.com • Morgantown, WV

Professional Profile

Data scientist and engineer with experience in data modeling/analytics, project management, compliance, and technical training with a specialty in utilities. View personal data science projects at michaelwfouts.github.io.

Education

Graduate

West Virginia University, Morgantown, WV   August 2022- Exp. July 2025
Benjamin M. Statler College of Engineering and Mineral Resources and Honors College
Major: Chemical Engineering (Ph.D.)
Cumulative GPA: 4.00/4.00

Undergraduate

West Virginia University, Morgantown, WV   August 2013 -May 2017
Benjamin M. Statler College of Engineering and Mineral Resources and Honors College
Major: Chemical Engineering; Minor: Mathematics
Cumulative GPA: 4.00/4.00

Work Experience

West Virginia University; Morgantown, WV
Machine Learning Research Assistant   August 2022 – Present

- Created Bayesian technique using Hamiltonian Monte Carlo to create Physics Informed Machine Learning (PIML) models with multiple Gaussian Processes approximated through a set a linear function in overall non-linear models. Improves on current methodologies of Physics informed Neural Networks (PINNs) for models with moderate input space via up to a 10x reduction in clock time training of models using JAX acceleration. Examples include data driven modeling of reaction rate kinetics and time dependent adsorption.
- Created feature for generalized machine learning codebase that uses a Gibbs Sampling based Markov Chain Monte Carlo approach in combination with algorithmic model creation (overall technique called Bayesian Smoothing Spline ANOVA or BSS-ANOVA) to incorporate a prior model as an input to quickly update predictions based on new portions of the data space being explored, such as in process control scenarios. Coded in Python.
- Ran computational models and performed a hyperparameter grid search using PySINDy (Python package for Sparse Identification of Nonlinear Dynamics) to evaluate and compare results with novel machine learning methodologies in the research group. Results sent as part of publication.
- Contribute to Python package *FokL* on PyPi that creates Bayesian linear models using BSS-ANOVA basis functions with forward variable selection. Package currently has over 22,000 downloads.
- Mentored six undergraduate students, two as direct reports, in data science such as creating models in Python with BSS-ANOVA, creating package maintenance routines using *tox*, replicating paper results, such as localized modeling of Gaussian Processes via discretized K-means clustering of the input space, creating web hosted documentation, as well as supporting their own independent research.
- Lead the Student Group for the NSF funded TRIMMing CO_2 Project, facilitating an environment for interuniversity collaboration through monthly research presentation meetings.

Independent Consultant; Remote   April 2024 - Present

- Worked with Lunexus Space/Harappa Modeling on modeling of Recycling of Satellite Photovoltaics in Space (under NDA)

Deloitte Consulting, LLP; Arlington, VA
Data Science Consultant   July 2021 – August 2022

- Performed data engineering, exploratory analysis, and Qlik dashboard development for USPS for use cases including financial analysis of billions of dollars worth of purchases, identification of excess logistical resources saving tens of millions of dollars, and tracking of employee availability through the

COVID pandemic. Created automation workflows using R that saves ~5 hours weekly to transform and aggregate data for reporting. Led other USPS employees in onboarding and on additional automation tasks.

- Created qualification/document recommendation system based on Requests for Proposals (RFPs) that saved ~2 hours (40%) per proposal across 37 engagements in research time for supporting documentation to write responding proposals. System created in python takes documents, parses their text, performs the analyses (document/cosine similarity with TF-IDF vectorization) and outputs the recommendations in a Plotly Dash visualization. Moved code base to AWS (EC2, S3, CodeCommit) cloud to better integrate multiple collaborators.
- Performed text analysis on 24 Climate Adaptability Plan's submitted by Federal Government Agencies to identify overarching themes and identify unique keywords to each individual agency's plan to determine what they are most concerned with and Deloitte's ability to help them achieve their goals.
- Created data pipeline using Python to automate the data ingestion from excel spreadsheets saving ~10 hours (30% of work) per quarter.
- Created fake data using python libraries to develop a Qlik Proof of Concept Dashboard showing Deloitte's analytic capabilities with the technology at a FedTech conference

Eastern Gas Transmission & Storage (A Berkshire Hathaway Company); Bridgeport, WV

Gas Measurement & Instrumentation Data Quality Engineer	July 2019 – July 2021
Gas Measurement & Instrumentation Engineer	June 2017 – July 2019
Gas Measurement & Instrumentation Intern	May 2015 – Aug. 2016

- Created a system that automatically identifies compliance and equipment issues on test reports using SQL queries increasing the number of issues found by ~120% and saving ~400 hours/year compared to manual audits. System also performs audits not previously done estimated to save ~1600 additional hours/year compared to being completed manually. System doubles as a continuous training opportunity for technicians, having reduced the number of report errors by 44% over a 7 month period. Metrics reported using R Markdown.
- Worked as Project Manager and Business Lead on a big data project to monitor lost and unaccounted for gas. Outside of management, personal contributions included creating and modifying dashboards using R Shiny. Project saved ~100 hours/year work in 2020 and is projected to increase to at least 400 additional hours saved/year in 2021. System identifies ~20 significant anomalies per month averaging measurement adjustments on the magnitude of thousands of dollars.
- Lead transmitter replacement program calculating the capability index of process transmitters to identify issues with their performance and develop a replacement program to increase system accuracy.
- Performed comprehensive lab analysis of analyzers and transmitters, including designing tests and collecting data, to evaluate product performance. Required to present technical data for internal reporting. Results helped lead to millions in purchases for the standardization of new equipment.
- Designed and helped commission measurement and regulation stations. Worked with Project Engineering and Field Engineering on several engineering/capital projects. Created VBA code that reduced design time by 2-3 hours per design (20-40% time reduction) by automating calculations and generating reports in Word.
- Created VBA code to automate the sending of customer test reports that saved ~140 hours/year.
- Managed a ~$1.12 million/~$2.52 million capital project budget within 2% in 2018/2019 respectively.
- Lead internal standards creation, evaluation, and enforcement processes to ensure high quality documentation.
- Represented business unit as subject matter expert for meter testing compliance software working with operations to ensure proper documentation and IT for proper data storage and upgrades.

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Pierpont Community and Technical College; Fairmont, WV

Adjunct Gas Measurement Instructor   Four Semesters from 2020-2024
- Created open source online textbook for Gas Measurement class, available at michaelwfouts.github.io/gas-measurement-book.
- Lead development of orifice meter lab using 3D printed single chamber orifice meters to enhance the hands on learning of students. Included working with contractors to create models, securing funding from Pierpont, and learning how to print the meters on a personal printer.
- Taught Gas Measurement course required for second year students in the Petroleum Technology Associates program. Educated students on a curriculum combining hands on and lecture learning. Developed online components to better accommodate during the COVID-19 pandemic.

National Aeronautics and Space Administration (NASA) IV & V; Fairmont, WV

NEAP Intern   Summer 2011/2013
- Created failure traces within James Webb Space Telescope's fault management database
- Conducted advanced software analysis using MATLAB and Simulink

Honors and Awards

2024 Appalachian Basin GPA Midstream Scholar
2017 West Virginia University Outstanding Senior (Top 1% of all West Virginia University)
2013-2017 Statler Engineering Excellence Scholar
2013-2014 Statler Undergraduate Research Scholar
2013 WVU Neil S. Bucklew Scholar
2013 Dominion Memorial Scholar

Service and Leadership

2022-2023 Vice President of Chemical and Biomedical Engineering Graduate Student Organization
2016-2017 Vice President of Engineers Without Borders Chapter at WVU
2016-2017 Treasurer of WVU American Institute of Chemical Engineers Chapter at WVU
2016-2017 Undergraduate Academic Affairs Committee Representative
2015-2017 Omega Chi Epsilon (Chemical Engineering Honorary)
2014-2017 Tau Beta Pi Member (Engineering Honorary)
2014-2016 PR Officer/Webmaster for Engineers Without Borders Chapter at WVU
2014-2015 President of Helvetia (WVU Honorary)
2013-2015 WVU Campus Tutor
2013-2014 Intramurals Captain for Engineers Without Borders Chapter at WVU

Conference Presentations

- 2024, Michael W. Fouts, Fernando Lima, David Mebane AIChE (American Institute of Chemical Engineers) - *Fast Training Physics Informed Machine Learning Models Using Gaussian Processes*
- 2024, Michael W. Fouts Derek P. Slack, Fernando Lima, David Mebane AIChE (American Institute of Chemical Engineers) - *Modeling Online Dynamic Processes with Fast Training Gaussian Processes*
- 2018-19, Michael W. Fouts, Alysia Salva Appalachian Underground Corrosion Short Course – *The Effects of Natural Gas Quality on Internal Corrosion*
- 2017, E. Ciftyurek, X. Xie, M. Fouts, K. Sabolsky , J. W. Zondlo, J. Wang, and E. M. Sabolsky. *Electrochemical Double Layer Supercapacitor (EDLC) Fabricated with Activated Carbon Derived from Eastern White Pine.*

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Skills

Software and Programming - Proficient in Python, SQL, R, VBA, Git, Jupyter Notebooks, AWS (EC2, S3, CodeCommit), LaTeX, GitHub, Aspen Plus, CHEMCAD, Qlik, Tableau, Anaconda, VS Code, and Microsoft Office.

Equipment - A wide variety of Meters including Ultrasonic, Coriolis, Turbine, Orifice, Rotary, and Diaphragm; Gas Chromatographs; Oxygen, Moisture, and Sulfur Analyzers; Pressure, Temperature, and Differential Pressure Transmitters; Flow Computers and PLC's; Control Valves and Instrumentation; Regulators; and Actuators

Certifications

AWS Certified Cloud Practitioner (Valid through Sept. 9, 2024)

References

References are available upon request