Hassan Dashtian

DATA SCIENCE · COMPUTATIONAL SCIENCE · GEOINFORMATICS

(+1) 213-317-5156 | dashtian@utexas.edu | www.hdashtian.com | 10611 Exploration Way, Austin, TX 78758

Summary

Result-oriented scientist with over 7 years of experience in computational science, data analytics, algorithm design, machine learning, and pre- and post-processing of large volumes of data in energy, environment, and social sciences. Hands-on expertise in cloud computing, distributed systems, and executing numerical simulations. Having experience developing, testing, and managing large-scale data streaming frameworks. Demonstrated ability to collaborate effectively within multidisciplinary teams on complex projects.

Education

University of Southern California (USC) — Los Angeles, CA

Ph.D., Chemical Engineering — *2012 - 2018*

M.S., Computer Science, High Performance Computing and Simulation — *2016 - 2018*

M.S., Chemical Engineering — *2012-2014*

Sharif University of Technology — Tehran, Iran

M.S., Petroleum Engineering — *2008 - 2010*

Petroleum University of Technology — Ahvaz, Iran

B.S., Petroleum Engineering — *2004 - 2008*

Experience

Bureau of Economic Geology, The University of Texas at Austin — Austin, TX

Research Assistant Professor (formerly Research Associate) — *Jan 2021 – Present*

- Developed cloud-based tools for analyzing the resilience of electrical grid expansion in Texas under various scenarios involving different mixes of energy sources.
- Developed deep learning tools to identify the sector and industry of sources of methane emissions in real-time using EMIT satellite data.
- Dust storms and solar energy transition in West Texas: used AIRS satellite data to convert dust score into possible reduction in solar efficienty.
- Developed deep learning algorithm to estimate soil moisture over Texas in real-time by assimilating several ground-based sensor data, meteorological data and NASA SMAP satellite data.
- Texas Soil Observation Network (TxSON): Developed automated high speed data collection, cleansing, quality control and quality assurance, and visualization in a parallel scheme. Data include remotely sensed in-situ soil moisture data, NASA SMAP satellite data, the U.S. Drought Monitor and Google search trends data.
- Developed a framework to scrape and analyze Google search trends related to climate change issues such as drought, flood, heat and etc. Used Natural language processing (NLP) and machine learning clustering to draw insights from the data.

Computational Media Lab, The Department of Journalism and Media, Moody College of Communication, The University of Texas at Austin — Austin, TX

Data Scientist — *May 2020 – Dec 2021*

- Combined natural language processing tools with machine learning models for analysing large volume of data related to healthcare and environmental issues and classify them based on the contents.
- Developed automated high speed data collection, cleansing and visualization framework. Used network theory and multi-layer networks to study large volume of data derived from social media platforms such as Twitter, Venmo, YouTube and Parler (2 TB). Developed and implemented a parallel scheme for simulation of information diffusion in social networks.
- Developed cloud-based machine learning models for classification and detection of misinformation in textual data.

AquaNRG — Houston, TX

Data Scientist/Senior CFD Modeler — *April 2019 – May 2020*

- Developed cloud-based machine learning pipelines to predict fluid flow properties based on massive amount of physics-based simulation datasets (aiRock). aiRock has been awarded $\sim$ 1,500,000 USD.
- Developed multiscale geochemical simulator which uses CT-scan images of reservoir rock and performs physics-based modeling complemented by data driven approaches such as machine learning to estimate petrophysical properties of reactions.
- Worked closely with a team of UX/UI designer, front- and back-end developers and successfully delivered a cloud-based physics informed predictive platform.

Bureau of Economic Geology, The University of Texas at Austin Austin, TX

Research Scientist Associate *May 2018 – April 2019*

- Developed a machine learning approach for stochastic seismic inversion which uses Tensorflow and GPUs to speedup computations. The multi-GPU implementation (4 GPUs) is 12x faster than single CPU.
- By developing and implementing a hybrid physics-informed machine learning model, detected and estimated gas leakage properties in a gas monitoring system. The approach reduces the number of sensors and cost, uses numerical simulation to couple unsupervised learning and inverse modeling to reconstruct real-time signals and predict gas convection-diffusion properties.
- By performing data quality management and data cleansing, generated a representative sample of 374 Gb of real-time pressure-temperature data of production and monitoring data, that can be easily visualized and used in streaming processing to draw insight. Reduced the cost and time of data processing.
- Developed source codes to analyze time-lapse geological data and extract geochemical information and extracted valuable insight from the data. Implemented statistical models and web-based visualization tools for real time streaming of production data.

University of Southern California Los Angeles, CA

Research Assistant *September 2012 - May 2018*

- Developed highly parallel computational algorithm to simulate solute transport in porous materials.
- By implementing a mixed-precision conjugate gradient algorithm, developed GPU-based PDE solver to perform numerical simulation which is 8x faster than CPU-based one.
- Developed algorithms and user-friendly interface for processing and visualizing geophysical data up to 1 Gb.
- Awarded as Best Teaching Assistant for teaching and managing classes up to 75 students in 10 semesters.

Honors & Awards

2022	**Awarded,** Bureau of Economic Geology best poster award	*Austin, TX*
2015	**Awarded,** USC Best Teaching Assistant Award	*Los Angeles, CA*
2012	**Awarded,** Viterbi School of Engineering Ph.D. Fellowship	*Los Angeles, CA*

Funding/Proposals

Funds

2024-2025	**156K USD,** NSF RAPID: Hurricane Helene (2024) Rainfall, Brown Ocean Signature, AI and Physics Model Guidance, and Social Media Sentiment	*PI*
2021-2025	**103K USD,** State of Texas Advanced Resource Recovery (STARR) TxSON	*Co-I*
2024	**35k USD,** TX A & M Agrilife - Protecting Military Readiness	*PI*
2022	**12k USD,** BEG proposal development award	*PI*

Pending

2025	**633k USD,** Quantifying and Predicting Carbon Cycle Dynamics in Dryland Ecosystems in Texas, NASA	*PI*
2024	**345k USD,** Membership in the NISAR Operations Science Team - Soil Moisture Focus, NASA	*Co-I*

Publications

Papers & Reports

Dashtian, H., Young, M. H., Young, B. E., McKinney, T., Rateb, A. M., Niyogi, D., & Kumar, S. V. (2024). A Framework to Nowcast Soil Moisture with NASA SMAP Level 4 Data Using In-Situ Measurements and Deep Learning, Journal of Hydrology: Regional Studies. 56, 102020

Young, M. H., **Dashtian, H.**, McKinney, T., & Young, B. (2023). Real-Time, Simultaneous Soil Water Content and Meteorological Data Measurement to Support TRACER over Harris County, Texas Field Campaign Report: Part I. Available here.

- **Dashtian, H.**, Young, M. H. (2023). Soil Water Content and Meteorological Data to Support Tracking Aerosol Convection Interactions ExpeRiment (TRACER) over Harris County, Texas, https://doi.org/10.18738/T8/FN3RWZ, Texas Data Repository, V1
- Kong, G., Schott, A. S., Lee, J., **Dashtian, H.**, & Murthy, D. (2023). Understanding e-cigarette content and promotion on YouTube through machine learning. Tobacco control, 32(6), 739-746.
- Murthy, D., Lee, J., **Dashtian, H.**, & Kong, G. (2023). Influence of User Profile Attributes on e-Cigarette–Related Searches on YouTube: Machine Learning Clustering and Classification. JMIR infodemiology, 3(1), e42218.
- Shankar, S., Murthy, D., & **Dashtian, H.** (2023). Social Media COVID-19 Contact Tracing Using Mobile Social Payments and Facebook Data. arXiv preprint arXiv:2303.02374.
- Dunlap, D. B., Bakhshian, S., Pawar, R. J., White, J. A., Soltanian, R., & **Dashtian, H.** (2022). Introduction to special section: CO2 geologic storage and utilization: Recent advances and future perspectives. Interpretation, 10(3), SGi-SGi.
- **Dashtian, H.**, Murthy, D., & Kong, G. (2022). An exploration of e-cigarette–related search items on YouTube: network analysis. Journal of Medical Internet Research, 24(1), e30679.
- **Dashtian, H.**, & Bakhshian, S. (2021). Effects of salinity and shear stress on clay deformation: A molecular dynamics study. The Journal of Chemical Physics, 155(13).
- **Dashtian, H.**, & Murthy, D. (2021). Cml-covid: A large-scale covid-19 twitter dataset with latent topics, sentiment and location information. arXiv preprint arXiv:2101.12202.
- **Dashtian, H.**, & Sahimi, M. (2019). Efficient simulation of fluid flow and transport in heterogeneous media using graphics processing units (GPUs). arXiv preprint arXiv:1908.03301.
- Soltanian, M. R., Hajirezaie, S., Hosseini, S. A., **Dashtian, H.**, Amooie, M. A., Meyal, A., ... & Zhang, X. (2019). Multicomponent reactive transport of carbon dioxide in fluvial heterogeneous aquifers. Journal of Natural Gas Science and Engineering, 65, 212-223.

- **Dashtian, H.**, Bakhshian, S., Hajirezaie, S., Nicot, J. P., & Hosseini, S. A. (2019). Convection-diffusion-reaction of CO2-enriched brine in porous media: A pore-scale study. Computers & Geosciences, 125, 19-29.
- Nicot, J. P., Hosseini, S. A., **Dashtian, H.**, & Kamali, A. (2019). Headspace Gas Monitoring to Infer Dissolved Gas Concentrations at the Glenhaven Site (QLD). Available here.
- **Dashtian, H.**, Shokri, N., & Sahimi, M. (2019). Pore-network simulation of drying of heterogeneous and stratified porous media. In Convective Heat Transfer in Porous Media (pp. 87-101). CRC Press.
- **Dashtian, H.**, Shokri, N., & Sahimi, M. (2018). Pore-network model of evaporation-induced salt precipitation in porous media: The effect of correlations and heterogeneity. Advances in water resources, 112, 59-71.
- **Dashtian, H.**, Wang, H., & Sahimi, M. (2017). Nucleation of salt crystals in clay minerals: molecular dynamics simulation. The Journal of Physical Chemistry Letters, 8(14), 3166-3172.
- **Dashtian, H.**, Yang, Y., & Sahimi, M. (2015). Nonuniversality of the Archie exponent due to multifractality of resistivity well logs. Geophysical Research Letters, 42(24), 10-655.
- **Dashtian, H.**, & Sahimi, M. (2014). Coherence index and curvelet transformation for denoising geophysical data. Physical Review E, 90(4), 042810.
- **Dashtian, H.**, Jafari, G. R., Koohi Lai, Z., Masihi, M., & Sahimi, M. (2011). Analysis of cross correlations between well logs of hydrocarbon reservoirs. Transport in porous media, 90, 445-464.
- **Dashtian, H.**, & Sahimi, M. (2013). Analysis of pressure fluctuations in fluidized beds. III. The significance of the cross correlations. Chemical Engineering Science, 101, 390-400.
- **Dashtian, H.**, Jafari, G. R., Sahimi, M., & Masihi, M. (2011). Scaling, multifractality, and long-range correlations in well log data of large-scale porous media. Physica A: Statistical Mechanics and its Applications, 390(11), 2096-2111.

Manuscripts to be submitted/under consideration

- Singh, M., Krishnan, R., Venkataraman, C., Persad, G., Yang, Z.L., Prajeesh, A.G., Choudhury, A.D., **Dashtian, H.**, Niyogi, D. and Prajeesh, A.G., 2025. Aerosol impacts on land-atmosphere coupling exacerbate droughts over South Asia. Authorea Preprints.
- Bakhshian, S., Haddad, M., **Dashtian, H.**, Chavoshi, A., Hovorka, S., McKinney, T., Young, M. H., Romanak, K., & Ahmadian, M. (2024). Near-surface monitoring of plugged and abandoned wells for real-time leakage detection. Available at SSRN 5071375.
- Chavoshi, A., **Dashtian, H.**, Bakhshian, S., Young, M. H., & Niyogi, D. (2024). PINN-SM: A Physics-Informed Neural Networks Model for Vadose Zone Soil Moisture Profile Prediction. Authorea Preprints.
- **Dashtian, H.**, Young, M. H. (2024). Real-time quality control and quality assurance of ground-based soil moisture data using parallel computing.
- Greig, T. E., **Dashtian, H.**, & Young, M. H. (2024). Tracking changes in drought/flood related information and users' reactions, implications for disaster prevention and climate change response.
- **Dashtian, H.**, Sahimi, M., Bakhshian, S., Hosseini, S. A., Nicot, J. P., & Hovorka, S. D. (2024). Monitoring pore scale effects of field scale CO2 injection and storage from time-lapse well log data.
- **Dashtian, H.**, Bakhshian, S., Nicot, J. P., & Hosseini, S. A. (2024). Hybrid machine learning, physics-based modeling, and real-time monitoring approach for characterization of gas leakage in monitoring wells.

Conferences

- Sudharsan, N., Singh, M., Kamath, H., Chavoshi, A., **Dashtian, H.**, Dawson, C., Yang, Z.-L., & Niyogi, D. (2025, January 14). 24AI hindcasting with Google DeepMind's GraphCast: A 45-year retrospective analysis from 1979 to 2024. 105th AMS Annual Meeting. AMS.
- Fields, J., Drager, A. J., Jensen, M. P., Park, J. M., & **Dashtian, H.** (2024). Influence of soil moisture on cloud properties and rainfall in the Houston area during TRACER. 104th AMS Annual Meeting, Baltimore, Maryland.
- Dhandha, P., Gil-Egui, R., Bakhshian, S., & **Dashtian, H.**. (2024, December 13). The emotional landscape of carbon capture and sequestration: Insights from social media and public forums. AGU24. AGU.
- Chen, J., Wang, D., Liu, Y., Tai, S.-l., Young, M. H., **Dashtian, H.**, Fast, J. D., Kaul, C., Varble, A., Berg, L., Qian, Y., Yang, Z., & Jensen, M. (2023), Impacts of Rural Soil Moisture in the Sea Breeze Clouds in Houston Region. AGU 2023 Annual Meeting, SF, CA.
- **Dashtian, H.**, Hosseini, S. A. (2019). A machine learning approach for stochastic seismic inversion on high performance computing facilities. In Proceedings of the 2019 Rice Oil & Gas HPC Conference. Rice University, Houston, TX.
- **Dashtian, H.**, Wang, H., & Sahimi, M. (2017). Evaporation induced nucleation of NaCl in clay minerals: Mechanism and potential sites. In AIChE Annual Meeting, October 29 - November 3, Minneapolis, MN.
- **Dashtian, H.**, & Sahimi, M. (2016). Pore-Network Simulation of Fluid Flow and Transport in Porous Media on GPUs, GPU Technology Conference, April 4-7, Silicon Valley, CA.
- **Dashtian, H.** & Sahimi, M. (2016). Pore Network Modeling of Salt Precipitation in Porous Media, 8th International Conference on Porous Media & Annual Meeting, May 9-12, Cincinnati, Ohio.
- **Dashtian, H.**, Bakhshian, S., Yang, Y. & Sahimi, M. (2016). Molecular Dynamics Simulation of Clay Swelling and Adsorption of CO2, DOE EFRC Mid-Term Reviews, March 2, Washington DC.
- **Dashtian, H.**, Bakhshian, S., Yang, Y. & Sahimi, M. (2015). Molecular Dynamic Simulation of Clay Particles Swelling, AIChE Annual Meeting, November 6-9, Salt Lake City, UT.
- **Dashtian, H.** & Sahimi, M. (2015). Denoising of Seismic Data Using Curvelet Transformation: The effect of desnoising on the content of the petrophysical data, SPE paper 15WRM-P-124-SPE, SPE Western Regional Meeting, Garden Grove, CA.
- **Dashtian, H.**, Bakhshian, s., Mirzaii, A. & Alanazi, B. (2009). A review on the impact of drilling mud disposal on environment and underground water resources in southern Iran, SPE Paper 125690.
- Karimyan, E., **Dashtian, H.** & Shahbazi, K. (2009). A Novel Drilling Fluid for Under-balanced Drilling, Shiraz, 1st EAGE International Petroleum Conference and Exhibition.