Keyhan Gavahi

Tuscaloosa, AL | 678.578.9445 | kayhangavahi@gmail.com | kgavahi.github.io

EDUCATION

The University of Alabama
Ph.D., Computational Hydrology, **GPA 4.0**   Jan 2019 – Dec 2023
(**Research**: Implementing Advanced Machine Learning and Deep Learning Models for Complex Hydrosystems Analysis)

M.S., Computer Science, Data Science, **GPA 4.0**   May 2022 - Aug 2023

AmirKabir University of Technology, Feb 2018   **Shiraz University,** Sept 2014
M.S. Civil Engineering, **GPA 4.0**   **B.S.**, Civil Engineering, **GPA 3.8**

SUMMARY

Highly skilled geospatial data scientist with +7 years of experience in ML/DL. Possess expertise in working with large volumes of high resolution imagery data, totaling over 100TB during my Ph.D. Adaptable, innovative thinker with strong problem-solving skills and a passion for continuous learning. Proficient in extracting insights from various data types, including complex high resolution, digitized spatiotemporal environmental data.

TECHNICAL SKILLS

Python (Xarray, GDAL, Geopandas, Rasterio), Machine Learning (SVM, random forest, gradient boosting, RNN, LSTM), Deep Learning (YOLO, R-CNN, FPN, U-net, ResNet), Neural Networks, Computer Vision (Image Classification, Object Detection, VAE, GAN), Time-series analysis, Geospatial Modelling, Predictive Analytics, Bayesian Modeling, PyTorch, Tensorflow, Keras

WORK EXPERIENCE

✦ **The University of Alabama**
Center for Complex Hydrosystems Research, *ML/AI Research Assistant*   Jan 2019 – Dec 2023

- **DeepYield**: Used +37 TB of **satellite remote sensing** and agricultural data to **design** and **deploy** a combined 3DCNN and ConvLSTM model to **predict crop yield** over 1836 counties in the US with 93% accuracy. (Github, paper).
- Developed a DL algorithm for **spatiotemporal** data **fusion** of 7 **satellite precipitation products** (> 50TB data) over the Contiguous US. The fused product improved the accuracy by 30% (Github, paper).
- Developed an end-to-end automated data and ML pipeline to **downscale** SMAP **soil moisture satellite data** from **36km to 1km spatial resolution**. The package automatically downloads, preprocess, and postprocess remotely sensed data from multiple sources to downscale SMAP over Contiguous US in minutes (Github, paper).
- Used **Bayesian statistics**, **geospatial analysis**, **image processing**, and **machine learning** to develop a software (in Python) on UA's **high-performance computing** cluster for **monitoring droughts** over the entire US (paper).
- Gained hands-on experience in **data collection**, **cleansing**, **visualization, data quality assessment** and developed knowledge of data science techniques including **data wrangling**, **feature extraction**, **supervised**, and **unsupervised** machine learning algorithms.
- Presented comprehensive progress reports/presentations to peers and collaborators and coordinated with project stakeholders to translate the cost/benefits of ML/DL products.

Human Technology Interaction Lab, *ML/AI Research Assistant*   May 2022 – Aug 2023

- Compiled, cleaned, and manipulated time-series datasets to train and evaluate models for autism spectrum disorder (ASD) detection in children with 91% accuracy.

SELECTED PUBLICATIONS

✦ **Peer-Reviewed Journals**
- **Gavahi, K**., Foroumandi, E., & Moradkhani, H. (2023). A deep learning-based framework for multi-source precipitation fusion. Remote Sensing of Environment (link).

- **Gavahi, K**., Abbaszadeh, P., & Moradkhani, H. (2021). DeepYield: A combined convolutional neural network with long short-term memory for crop yield forecasting. Expert Systems with Applications ([link](#)).
- **Gavahi, K**., Abbaszadeh, P., Moradkhani, H., Zhan, X., & Hain, C. (2020). Multivariate assimilation of remotely sensed soil moisture and evapotranspiration for drought monitoring. Journal of Hydrometeorology (link).
- **Gavahi, K**., Abbaszadeh, P., & Moradkhani, H. (2022). How does precipitation data influence the land surface data assimilation for drought monitoring? Science of the Total Environment (link).
- Abbaszadeh, P., **Gavahi, K**., Alipour, A., Deb, P., & Moradkhani, H. (2022). Bayesian multi-modeling of deep neural nets for probabilistic crop yield prediction. Agricultural and Forest Meteorology, 314, 108773.
- Abbaszadeh, P., Moradkhani, H., **Gavahi, K**., Kumar, S., Hain, C., Zhan, X., ... & Karimiziarani, S. (2021). High-resolution SMAP satellite soil moisture product: Exploring the opportunities. Bulletin of the American Meteorological Society (link).

  ⬥ **Conference Presentations**
- **Gavahi, K.**, Abbaszadeh, P., & Moradkhani, H. (2020, December). A New Deep Learning Method for Crop Yield Forecasting. In AGU Fall Meeting.
- **Gavahi, K.**, Abbaszadeh, P., & Moradkhani, H. (2021, December). A multi-dimensional pattern recognition approach using deep learning for precipitation data fusion. In AGU Fall Meeting.
- **Gavahi, K.**, & Moradkhani, H. (2022, December). Deep learning-based uncertainty characterization of precipitation forcing in a hydrologic data assimilation framework. In AGU Fall Meeting.

Honors and Awards

- Gold medal in national math Olympiad of Iran, 2008.
- Winner of the Graduate Council Fellowship from the Graduate School of the University of Alabama for fall and spring of the 2022-2023 academic year.
- Best presentation award from the American Geophysical Union Precipitation Committee at the AGU 2021 fall meeting.
- Graduate Research Studentship, System Design Engineering Department, University of Waterloo, Canada.
- Top student among 95 graduate students of department of civil and environmental engineering, Amirkabir University of Technology.
- Member of Iran's National Elites Foundation.
- Ranked among top **0.03%** between more 400,000 participants in nationwide university entrance exam for undergraduate studies (B.S. program).