ATHER ABBAS

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Research Objective

I work at the intersection of water sciences and machine learning. I am interested in application of data-driven approaches to solve problems related to water resources with special focus on surface water quality, catchment dynamics and water treatment.

Qualification

- **Doctor of Philosophy (PhD) Environmental Engineering** — *Jun. 2018- Mar. 2022*
  Thesis: Artificial intelligence for modeling of surface water resources: Application from streamflow to water quality
  Ulsan National Institute of Science and Technology, Ulsan, South Korea
- **Master of Science (MS) Hydrogeology and Environmental Science** — *Sep. 2013-Feb. 2017*
  Thesis: Estimation of hydraulic Aquifer parameters by integral transform methods applied to aquifer and river stream head responses (Leine River)
  George August University of Goettingen, Germany
- **Bachelor of Science (BE) Applied Geology** — *Sep. 2008-Mar. 2013*
  Thesis: Hydrogeological investigation of Munara area (Pakistan) and surroundings
  University of the Punjab, Lahore, Pakistan

Experience

- **PostDoc researcher** — *Sep 2022 - Present*
  School of Urban and Environmental Engineering,
  Ulsan National Institute of Science and Technology, Ulsan, South Korea.
  Responsibilities
  - Water quality modelling using deep learning
  - Modelling of waste water treatment using Machine Learning
- **Researcher** — *Sep 2017-Aug 2018*
  School of Urban and Environmental Engineering,
  Ulsan National Institute of Science and Technology, Ulsan, South Korea.
  Responsibilities
  - Surface and ground water modeling using HSPF and heat equation
- **Internee** — *Oct 2016- Aug 2017*
  G.E.O.S Ingineurgesellschaft mbH
  Schwarze Kiefern 2
  09633 Halsbrücke Freiberg, Germany.
  Responsibilities
  - Numerical modeling of magma emplacement in MATLAB.
  - Modeling of reactive groundwater transport using PhreeqC and COMSOL
  - numerical modeling of groundwater flow, temperature distribution in crust using MATLAB
- **Jr. GIS Professional** — *Jun. 2013- Sep. 2013*
  The Urban Unit,
  Office No. 503, Shaheen complex, Edgerton Road, Lahore, Pakistan.
  Responsibilities
  - Preparation of land-use maps using GIS
  - Preparation of flood inundation maps using GIS

Research Interests

- Water treatment modeling
- Surface water modeling
- Supervised and reinforcement learning
- Automated machine learning for tabular data

Technical Skills

- Programming: MATLAB, Python, FORTRAN
- Operating System: Microsoft Windows, Ubuntu
- Software: HSPF, SWAT, MODFLOW, ArcMap, QGIS, LaTEX
- Machine Learning Frameworks: Keras, TensorFlow, PyTorch, Scikit-learn

Open-source projects

- **AI4Water**
  Framework for data-driven modeling of tabular data with focus on hydrology
  https://ai4water.readthedocs.io
- **AutoTab**
  https://autotab.readthedocs.io
- **SeqMetrics**
  https://SeqMetrics.readthedocs.io
- **easy_mpl**
  https://easy-mpl.readthedocs.io

Publications

Journal Publications

***** Co-first author

1. **Abbas, A.**, Boithias, L., Pachepsky, Y., Kim, K., Chun, J. A., & Cho, K. H. (2022). AI4Water v1. 0: an open-source python package for modeling hydrological time series using data-driven methods. **Geoscientific Model Development**, 15(7), 3021-3039 **(IF = 6.9).**
2. Jaffari, Z. H., **Abbas, A**., Lam, S-M., Sanghun, P., Chon, K., Kim, E-S., & Cho, K. H. (2022). Machine learning approaches to predict the photocatalytic performance of bismuch ferrite-based materials in the removal of malachite green. Journal of Hazardous Materials, (Accepted) (**IF = 14.3**)
3. **Abbas, A.,** Baek, S., and Cho, K. H. Deep learning-based algorithms for long-term prediction of chlorophyll-a in catchment streams. **Journal of Cleaner Production (IF = 11)**.
4. Kwon, D. H., Hong, S. M., **Abbas, A.,** Pyo, J., Lee, H. K., Baek, S. S., & Cho, K. H. (2023). Inland harmful algal blooms (HABs) modeling using internet of things (IoT) system and deep learning. Environmental Engineering Research, 28(1). https://doi.org/10.4491/eer.2021.280 (**IF=2.5**)
5. Lee, J., **Abbas, A.,** McCarty, Gregory W., Zhang. X., Lee. S., Cho. KH., (2022) Estimation of base and surface flow using deep neural networks and a hydrologic model in two watersheds of the Chesapeake Bay. **Journal of Hydrology**. (Accepted) (**IF=6.2**)
6. Son, M., Yoon, N., Jeong, K., **Abass, A.**, Logan, B. E., & Cho, K. H. (2021). Deep learning for pH prediction in water desalination using membrane capacitive deionization. **Desalination**, 516, 115233. **(IF = 11.2)**
7. **Abbas, A**., Baek, S., Silvera, N., Soulileuth, B., Pachepsky, Y., Ribolzi, O., ... & Cho, K. H. (2021). In-stream Escherichia coli modeling using high-temporal-resolution data with deep learning and process-based models. **Hydrology and Earth System Sciences**, 25(12), 6185-6202 **(IF = 6.6)**
8. Yoon, N., Kim, J., Lim, J. L., **Abbas, A.**, Jeong, K., & Cho, K. H. (2021). Dual-stage attention-based LSTM for simulating performance of brackish water treatment plant. **Desalination**, 512, 115107. **(IF = 11.2)**.
9. Jang, J., **Abbas, A.*,** Kim, M., Shin, J., Kim, Y. M., & Cho, K. H. (2021). Prediction of antibiotic-resistance genes occurrence at a recreational beach with deep learning models. **Water Research**, 196, 117001 **(IF = 13.4)**
10. Yun, D., **Abbas, A**., Jeon, J., Ligaray, M., Baek, S. S., & Cho, K. H. (2021). Developing a deep learning model for the simulation of micro-pollutants in a watershed. **Journal of Cleaner Production**, 300, 126858. **(IF = 11).**
11. Jeong, K., **Abbas, A.*,** Shin, J., Son, M., Kim, Y. M., & Cho, K. H. (2021). Prediction of biogas production in anaerobic co-digestion of organic wastes using deep learning models. **Water Research**, 205, 117697. **(IF = 13.4)**
12. **Abbas, A.,** Baek, S., Kim, M., Ligaray, M., Ribolzi, O., Silvera, N., ... & Cho, K. H. (2020). Surface and sub-surface flow estimation at high temporal resolution using deep neural networks. **Journal of Hydrology**, 590, 125370. **(IF = 6.7).**

Language Proficiency

- **English**
- **German**
- **Persian**

References

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