

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**
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
Jun. 2018- Mar. 2022
- Master of Science (MS) Hydrogeology and Environmental Science**
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
Sep. 2013-Feb. 2017
- Bachelor of Science (BE) Applied Geology**
Thesis: Hydrogeological investigation of Munara area (Pakistan) and surroundings
University of the Punjab, Lahore, Pakistan
Sep. 2008-Mar. 2013

Experience

- PostDoc researcher**
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*Sep 2022 - Present*
- Researcher**
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*Sep 2017-Aug 2018*
- Internee**
G.E.O.S Ingenieurgesellschaft 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*Oct 2016- Aug 2017*
- Jr. GIS Professional**
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*Jun. 2013- Sep. 2013*

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 bismuth 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, K. H., (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., **Abbas, 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**).
13. Umer, M., Umer, S., Zafari, M., Ha, M., Anand, R., Hajibabaei, A., **Abbas, A.**, ... & Kim, K. S. (2022). Machine learning assisted high-throughput screening of transition metal single atom based superb hydrogen evolution electrocatalysts. **Journal of Materials Chemistry A**, 10(12), 6679-6689. (**IF = 14.5**).

Language Proficiency

- English
- German
- Persian

References

- **Kyung Hwa Cho**

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Ulsan national institute of science and technology, Ulsan,
South Korea.

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- **Moon Son**

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technology, University of Science and Technology, Seoul,
South Korea,

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