Hee Won Son

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Education

Stanford University   Stanford, CA
M.S. in Civil and Environmental Engineering, Class of 2023   Sep 2021 – Present
- Concentration: Environmental Data, Statistics, and Modeling
- Coursework: *Programming Abstraction and Lab, Deep Learning, Design and Analysis of Algorithms*

Ewha Woman's University   Seoul, South Korea
B.A. in Environmental Science and Technology   Sep 2016 – Feb 2020
- Concentration: Hydrology, Water Resource, and Quality Modeling

Experience

Personal Responsive Webpage, *Stanford University*   Jul 2022 -Aug 2022
- Constructed personal website using HTML, CSS, and JavaScript. Adapted for iPhone, iPad, and other small devices.
- Utilized Tailwind to make website responsive, well-designed, and user-friendly.   *https://www.heewon.info*

Machine Learning Models, Chlorophyll-a Concentration Prediction, *Stanford University*   May 2022 – Jun 2022
- Forecasted Chlorophyll-a concentration in water with 16 potential impacting factors, using data from 2013 to 2021.
- Utilized DNN, RF, and XGBoost with TensorFlow, and prediction accuracy was R^2 of 0.68, 0.71, 0.66, respectively.

Transformer Model, Earthquake Prediction in Japan, *Stanford University*   Mar 2022 – May 2022
- Predicted magnitude of earthquake in Japan after historical earthquake, 2013. Preprocessed data based on fault zones, and maximum magnitude was taken each day. Established and shared model pipeline to facilitate experiments by three people.
- Utilized transformer with TensorFlow, prediction accuracy was R^2 of 0.70.

Trend and Change Point Detection, Climate Change Detection, *Stanford University*   Jan 2022 – Mar 2022
- Detected change of trend or change point with p-values under 0.025 using two-sided Mann-Kendall and Cramer von Mises Method of SciPy. Stats for 12 locations based on moderate/wet/dry weathers.
- Distinguished meaningful signs of climate change in five locations, especially in wet locations.

Machine Learning Models, Water Quality Prediction, *Ewha Womans University*   Feb 2022 – Jul 2022
- Predicted concentration of total phosphorus in Euiam Lake, South Korea using RF, XGBoost, DNN, and LSTM from TensorFlow.
- Prediction accuracy were R^2 of 0.7643, 0.8124, 0.7666, and 0.8529 respectively. Prediction in summer and autumn with LSTM model outperformed result of spring. Early attempt to predict phosphorus concentration with machine learning.
- Determined management priority using Gradient Tape and result from LSTM model. Primary factors of TP concentration in Euiam Lake were TP concentration from upper water impoundment among 40 potential affecting factors

Publication

Lee, H. W., Kim, M., **Son, H. W.**, Min, B., & Choi, J. H. (2022). Machine-learning-based water quality management of river with serial impoundments in the Republic of Korea. *Journal of Hydrology: Regional Studies*, *41*, 101069

Son, H.W., Shim, S. H., Oh, H., & Choi, J. H. (2021). An Assessment of Heavy Metal Contamination in the Nakdong River Around the Weir. *Water, 13(5)*, 684

Kang, S. K., **Son, H. W.**, & Kim, D. S. (2019). A Study on the Effect of Temperature on the Precipitation Treatment of Zinc-containing Wastewater by Thermodynamic Estimation. *Journal of Korean Society of Water Science and Technology, 27(5)*, 41-50

Accomplishment and Recognition

Research Assistantship: Tracking and predicting source of pollutants in a stormwater detention pond   *Stanford University*
Best Bachelor's Thesis Award: Most remarkable undergraduate thesis nominated by faculties   *Ewha Womans University*
Best Paper Award: Awarded for remarkable paper and poster, Korea Environmental Dredging Society.   *Ewha Womans University*
Deans List: Honored to undergraduate students who proved their remarkable academic ability.   *Ewah Womans University*

Skills

Programming: Python (Tensorflow, Keras, PyTorch, Pandas, Numpy, SciKit-Learn), C++, R, Matlab
Other: HTML, CSS, JavaScript, Git, Latex, Graphic Information System Mapping
Language: Korean (native), English (fluent), Japanese (fluent), Chinese (intermediate)