UNDERGRADUATE SUMMER RESEARCH PROGRAM PROPOSAL

- Project title: Big Data Analysis for Understanding Environmental Impact of Human Activities

- Faculty Advisor: Xinghui Zhao

- Project description

    The wildfire that swept through parts of Maui in August 2023 are now the deadliest in modern U.S. history, yet another evidence showing that the world has entered a critical state of climate crisis. Our days of discussing global warming and climate change are over and we need to move to action (Carrington, 2019). Human activities introduce an array of factors that impact ecosystems and their components, leading to an urgent need to transform human activities to ensure long-term sustainability. However, degradation of the natural environment and the climate crisis are exceedingly complex phenomena requiring the most advanced and innovative solutions. ***In this project, we will develop a novel causal AI framework which can shed light on the root causes of environmental issues.*** Using water quality issues as a case study, the proposed research will lead to a better understanding on the short-term and long-term impacts of human activities on water quality, and establish a foundation for developing effective mitigation strategies.

- Deliverables

    1. A comprehensive analysis on current sensing and data mining technologies in the area of water pollution detection;
    2. A survey on open-source datasets that are available for the study;
    3. Data collection and initial analysis of data collected in Salmon Creek area;
    4. Potential algorithms in causality analysis that can be used to identify root cause of the water pollution;
    5. All source code developed during the project;
    6. A final report and poster.

- Time requirements
    200 hours; Flexible Mon-Fri, 8am-5pm, May 16 thru Aug 5, 200 hours in total.

- Constraints
    None.

- Required skills and knowledge

    1) Basic knowledge about data analytics, machine learning and remote sensing.
    2) Proficient in Python.

- Preferred qualifications
    Prior experiences with machine learning libraries (e.g. scikit-learn, TensorFlow, PyTorch) are preferred.