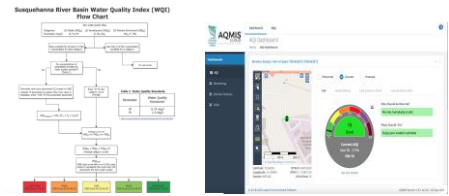


Abstract

Currently, many environmental modeling tools function as information silos with little to no correspondence with other environmental domains and features. Current tools lack multi-faceted functionality and the ability to scale from local principalities. The potentially adverse environmental effects that these scores have on surrounding communities is often ignored and poorly emphasized. There is a need for a new framework that incorporates novel deep learning methods to integrate individual environmental domain indices via an ensemble learner to predict environmental quality as a dynamic quantity. Incorporating water, air, land, sociodemographic data from an array of publicly available environmental resources can be used to generate environmental quality integrity indices, forecast environmental integrity scores and comparing its relationship to health risks in a specific location. In addition, prioritizing translational accessibility and availability of this method would ensure that community stakeholders and risk assessors have an effective way to select problem sites for monitoring affected communities.

Current Methods



Susquehanna River Basin Water Quality Index

AQMIS AQI Forecasting Dashboard



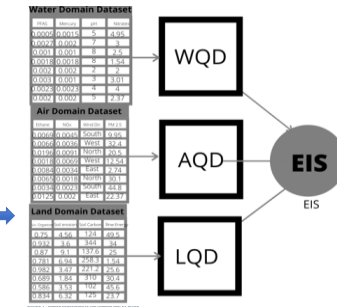
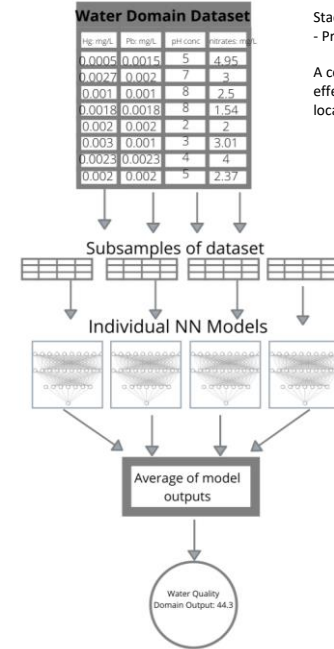
Fitzroy River Basin EHI Report Card

Fitzroy River Basin Ecological Health Index

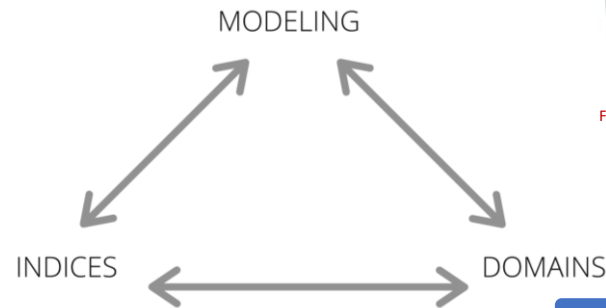
Experimental Approach

Stacking Aggregation of Neural Networks
- Predict domain integrity scores

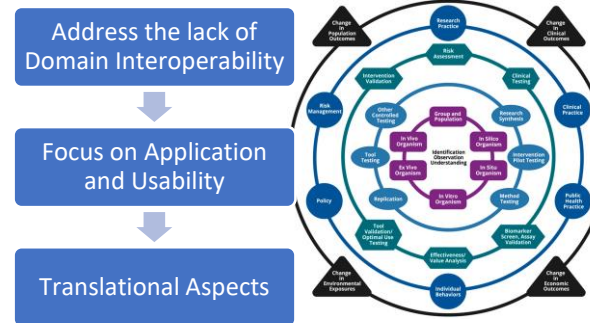
A cohesive framework that incorporates the combinatorial effects of different environmental domain scores on a location



WQD: Water Quality Domain, AQD: Air Quality Domain, LQD: Land Quality Domain, EIS: Environmental Integrity Score



Areas of Focus



NIEHS Translational Research Framework

Translational Use case

- Provides users with detailed queries of each domain's indicator values for further analysis
- Assists risk assessors, community stakeholders and policy makers in decision-making based of the conditions of environmental domains in at-risk communities/locations
- Assist Risk Assessors in targeting potential National Priorities List sites
- Assist Human Health Risk Assessors on determining specific health risks in a selected area based on correlated EIS scores and human health outcomes.

Acknowledgements

Funding: LSAMP BD: North Carolina State University Preparing Researchers of the Future (PROF) NC-LSAMP
GRANT# 123455
Genomics Department, NC State University, NC-LSAMP at NCSU

References

[1] Fink et al. *Ecological indicators* 2017.[2] Berry et al. *Susquehanna River Basic Commission* 2020 [3] AQMIS Cloud, *Environmental Management Authority* 2020. [4] NIEHS, *Translational Research Framework* 2020.