CIVE 6111 Graduate Seminar

Introducing HyRiver: Hydroclimate data retriever, with an application to urban hydrology

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Zoom Link: https://uh-edu-cougarnet.zoom.us/j/99551058803

Abstract
In recent years, there has been a growing interest in the hydrologic and other communities toward publishing transparent and reproducible research. We are at the early stage of this paradigm shift. The community is still searching for actionable strategies and tools for adopting such practices. One of the main challenges stems from the fact that, in most hydrological studies, big geospatiotemporal data are usually the starting point for devising algorithms, developing frameworks, and detecting emerging patterns. Accessing, subsetting, and post-processing such big data are usually technically involving and resource-heavy tasks that often are not included in the materials that researchers make public. Instead, they only publish the processed data, which thus impacts the transparency and extensibility of such studies. To address these challenges and to make such data analyses more equitable, we develop a stack of seven open-source Python packages, Hydroclimate Data Retriever (HyRiver in short). This software stack relies on various web service protocols to access many high-quality big datasets published by multiple entities such as US Geological Survey and Multi-Resolution Land Characteristics (MRLC) Consortium. HyRiver allows researchers to carry out some of the most common GIS operations via web services without worrying about underlying technical skills or web service protocols. Researchers can easily subset and process big geospatiotemporal data for their regions of interest and publish their code. More importantly, other researchers can reproduce their studies transparently and extend them to different areas with minimum effort. This modern approach to big data analysis opens up new avenues for conducting and sharing transparent, reproducible, and extensible studies. Also, it empowers educators with user-friendly tools to integrate a wide range of real geospatiotemporal data into their teaching. We present an application of HyRiver for devising an algorithm that uses ubiquitous above-ground data to estimate below-ground urban stormwater network.

Bio
Taher Chegini is a forth-year PhD candidate at the Civil Engineering Department at University of Houston. He is part of the Wonders of Water lab under supervision of Dr. Hongyi Li. Taher's research interests are large-scale urban hydrological modeling and big geospatial data analysis.