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Transfer learning applications in hydrologic modeling

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Early work in the field of Machine Learning (ML) for hydrologic prediction is showing significant potential. Indeed, it has provided important and measurable advances toward prediction in ungauged basins (PUB). At the same time, it has motivated a new research targeting important ML topics such as uncertainty attribution and physical constrains. It has also brought into question how to best harness the wide variety of climatic and hydrologic data available today. In this work, we present initial results employing transfer learning to combine information about meteorology, streamflow, surface fluxes (FluxNet), and snow (SNOTEL) into a state of the art ML-based hydrologic model. Specifically, we will present early work demonstrating how relatively simple implementations of transfer learning can be used to enhance predictions of streamflow by transferring learning from flux and snow station observations to the watershed scale. Our work is shown to extend recently published results from Kratzert et al. (2018) using the CAMELS data set (Newman et al. 2014) for streamflow prediction in North America.

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