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Non-Parametric Bayesian Networks for Hydrological Studies

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Non-Parametric Bayesian Networks (NPBNs) are graphical tools for statistical inference when new information become available. They have been widely used for reliability analysis and risk assessment. However, few hydrological applications can be found in the literature. Consequently, we explore the potential of NPBNs for maximum river discharge estimation by investigating a number of catchments with contrasting climate across the United States. Different networks schematizing river discharge generation processes at the catchment scale are built and analysed. Hydro-meteorological forcings and catchment's attributes are retrieved from Catchment Attributes for Large-Sample Studies (CAMELS). We highlight the benefits but also the challenges encountered in the application of NPBNs for river discharge estimation. Finally, we provide insights on how to overcome some of the difficulties met.