SESSION 1.8 - ENVIRONMENTAL MONITORING AND PREDICTION

Invited speech - **EXTRACTING INFORMATION FROM A NEURAL NETWORK: FROM STATISTICS TO PHYSICAL PROCESSES. APPLICATION IN HYDRO(GÉO)LOGY**

Neural networks are generally used to perform black box modelling because no physical assumption is available on the system to model, or because they can accelerate the calculation time. For these reasons, neural networks are more and more used in hydrology or hydrogeology. Indeed, hydrosystems are heterogeneous, quite impossible to observe accurately, and thus difficult to model. Nevertheless, due to the supply of fresh water, or their ability to reduce or generate flooding, more in-depth knowledge of their behavior proves critical. In this context, this conference proposes addressing this challenging issue of extracting information from a neural network allowing then to "open the black box". This method is called "KnoX" as Knowledge eXtraction" and is presented herein so as to better understand the hydrodynamic behavior of complex hydrosystems. This method operates in three steps: first propose a "postulated model" describing the conceptual presupposed behavior of the system, (ii) second, build a specific architecture based on the multilayer perceptron implementing this conceptual vision, and (iii) perform the training and extract the knowledge from the parameters.

This methodology has been successfully applied to the difficult case of the Lez karst basin, near Montpellier (France) yielding improved knowledge on basin behavior (water resources and flooding) and a revised delimitation of its feeding basin.

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