Daily River Flow Prediction Coupled with Data Processing Techniques: A
Comparative Study between Constructive Fuzzy Systems and
Autoregressive Models

Daily river flow forecast is an essential step for real-time hydro-power reservoir operation. The purpose of the flow forecast is to assist in the decision-making process in order to ensure optimal and reliable operational policy. The paper presents, in a region where meteorological and hydrological data are insufficient, inaccessible and sometimes unreliable, a data-driven model based on Constructive Fuzzy Systems. The model is capable of exploiting the available data with high prediction efficiency was compared to an Autoregressive method. A case study was applied to Litani River in the Bekaa Valley - Lebanon using 4 years of rainfall, temperature, and river flow daily measurements. A reference Auto-Regressive (AR) model, a classical Constructive Fuzzy System Modeling (C-FSM) and the Constructive Fuzzy System Modeling coupled with Moving Average (C-FSM_MA) filter are trained. Upon testing, the last two models have shown primarily competitive performance and accuracy with the ability to preserve the day-to-day variability up to 12 days ahead. In fact, for the longest lead period, the models AR, C-FSM and C-FSM_MA were able of explaining respectively 75%, 79.5% and 84.3% of the actual river flow variation. These results indicate that Moving Average (MA) filter provides a supportive pre-processing tool in the process of streamflow forecasting.