Post-processing Numerical Weather Forecasts of Precipitation Using Neural Networks

Raul Passerini and Jorge A. Ramirez[1]
Civil Engineering Department, Colorado State University

Abstract. Numerical weather prediction (NWP) models have been developed to forecast hydrologic variables, such as precipitation. The resolution of these models is constrained by computing resources, imperfect knowledge of the underlying physical processes, uncertainty in the initial conditions, etc. Statistical post-processing, or downscaling, is often used to improve the accuracy of forecasts at specific locations. Korean Water Corporation uses the RDAPS NWP model, which produces sixteen 3-hs forecasts twice a day. RDAPS' forecasts of precipitation were verified against corresponding observations recorded by 452 rain gages. For example, during the rainy season in South Korea (June, July, and August), biases show an average of 3 mm/3-hs with a standard deviation of 5 mm/3-hs. The goal of this study is to improve the accuracy of forecasts and correct the biases embedded in RDAPS NWP model forecasts of precipitation by means of artificial neural networks. Neural networks are being developed for each one of the 171 locations at which RDAPS forecasts precipitation in continental South Korea. This presentation shows promising results obtained for a case study site, located in the Geum basin, South Korea. For instance, Kuipers Skill Scores improved from 0.40 to 0.53, mean bias was reduced from 3 to 2 mm/3-hs, while the accumulated bias for the rainy season reduced from 1220 to 453 mm. Therefore, the study indicates that artificial neural networks are a powerful technique that can be applied to improve the output of NWP models.

[1] Water Resources, Hydrologic and Environmental Sciences Division
Civil Engineering Department
Colorado State University
Fort Collins, CO 80523-1372
Tel: (970) 491-7621
e-mail: ramirez@engr.colostate.edu