

Comparison of adaptive methods using multivariate regression splines (MARS) and artificial neural networks backpropagation (ANNB) for the forecast of rain and temperatures in the Mantaro river basin

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Abstract. The Mantaro river basin is an area that is exposed to high climatic variability due to the geography and factors that are not completely known. The agriculture is very important for people who live at and around it. The quality and productivity of the products are related to rainfall and air temperature, commonly farmers sow when their ancestral knowledge indicate it, in many cases the crops were blighted because they have not enough rain or have too low or high temperatures. That is why the farmers need reliable forecasts of precipitation and temperature. This investigation try to do forecast timely and reliable based on global index around the world as predictors. To accomplish this challenge, this investigation used two methods to determine three-month forecasts, using multivariate adaptive regression splines and artificial neural networks backpropagation. Twelve MARS model were estimated for each response variable, each one represent a month. Instead, only one ANNB model was estimated with the same variables because the neural networks need a lot of data. At Huayao; precipitation showed a predictive relative error (PRE) equal to 1.04 for MARS while 2.15 for ANNB; minimum temperature showed a PRE = 0.45 for MARS and PRE = 0.67 for ANNB; maximum temperature showed a PRE = 7.34 for MARS and PRE = 1.41 for ANNB, a high value of PRE for MARS may be due to an unusual value in predictor set at validation stage. At Jauja; the precipitation showed a PRE = 0.62 for MARS and PRE = 1.18 for ANNB; minimum temperature showed a PRE = 0.27 for MARS and PRE = 1.20 for ANNB and; maximum temperature showed a PRE = 1.51 for MARS and PRE = 3.32 for ANNB. At Viques, precipitation showed a PRE = 0.66 for MARS and PRE = 3.00 for ANNB. At lower value of PRE, better are the results thus forecasts are more accurate. Then, the validation results showed that MARS models were more accurate than ANNB.