A Neural Network Architecture for Statistical Downscaling Technique : Case Study in Indramayu Districts

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ABSTRACT

Some facts indicate that one factor that contributes significantly to the variability of agricultural sector production is the climatic conditions. Many techniques have been developed to predict the climate variables. These techniques support the analysis of climatic effects on a particular region. There are two main obstacles that arise in this case, the first is the limitation of historical climate data with a sufficiently long series. Second is the study of the impact of climate change required a future climate projections with a certain scenario. GCM (General Circular Model) provides a solution to this problem and has been widely known. However, the resolution is coarse, that is about 2x2 degrees, or about 200x200 km, thus unable to capture the local variability is needed in the analysis of a smaller coverage area, such as district level. Therefore there is a gap between the GCM with observations on the value of a climate station. In this case, the GCM is only able to capture the pattern of average, whereas variability is mainly influenced by local factors not accommodated. In this research, downscaling using artificial neural networks linking the GCM data with observational data to predict the intensity of rainfall by taking a case study in Indramayu district.

The study involved three types of data, ie GCM (with the A1B scenario, the model ECHAM5 and consists of 24 members), data, SST (Sea Surface Temperature) and rainfall data from 17 stations in Indramayu with the period from 1979 to 2002. Downscaling techniques will be applied to estimate the total rainfall on SOND month (September, October, November, and December). In general there are three stages in this research, namely SST and GCM domain selection is done by using canonical correlation analysis, neural network modeling to predict the total rainfall SOND, and performance evaluation using a standardized anomaly index (SAI) as suggested by Katz and Glantz in Robertson, 2009.

Keywords : Statistical downscaling, canonical correlation, neural network, standardized anomali index.