

# APPLICATION OF NEURAL NETWORK FOR RICE CROP YIELD PREDICTION USING MULTI-TEMPORAL MODIS DATA IN THE MEKONG DELTA, VIETNAM

Chi-Farn Chen<sup>1,2</sup>, Le Thi Phuong<sup>1</sup>, Nguyen Thanh Son<sup>1</sup>, Va-Khin Lau<sup>2</sup>, Cheng-Ru Chen<sup>2</sup>

<sup>1</sup>Center for Space and Remote Sensing Research, National Central University

<sup>2</sup>Department of Civil Engineering, National Central University

No.300, Jhongda Rd., Jhongli City, Taoyuan 32001, Taiwan

Email: [cfchen@csrsr.ncu.edu.tw](mailto:cfchen@csrsr.ncu.edu.tw), [ltphuongrs@gmail.com](mailto:ltphuongrs@gmail.com), [ntsonagu@gmail.com](mailto:ntsonagu@gmail.com),  
[khinlau@yahoo.com](mailto:khinlau@yahoo.com), [ccrunclu@gmail.com](mailto:ccrunclu@gmail.com)

**Abstract:** The Mekong Delta is the rice bowl of Vietnam. It produces approximately half of the country's rice production. This region plays an important role in the economy of this country for food supply and rice export. The impacts of climate change have significantly damaged to crops, particularly rice production. Therefore, prediction of rice crop yields is important to provide useful information for agricultural planners. The main objective of this study was to test the applicability of multi-temporal Moderate Resolution Imaging Spectroradiometer (MODIS) data for rice crop yield prediction using Neural Network (NN) in the Mekong Delta, Vietnam. The data were processed for 2007 through four main steps: (1) Constructing time-series MODIS vegetation indices, including Normalized different vegetation index (NDVI), Perpendicular vegetation index (PVI), Green vegetation index (GVI), and Soil adjusted vegetation index (SAVI), (2) Noise filtering of the time-series data with the wavelet transform, (3) Rice crop yield prediction using NN. The back-propagation neural network (BPNN) method was used to develop a rice predictive model. This model used the four aforementioned vegetation indices as input parameters and crop yield statistics at the district level as output parameter, and (4) Model verification using the Root Mean Square Error (RMSE) and standard error of prediction (SEP). The results were compared with statistical data to test the accuracy prediction of BPNN model. This study demonstrates the validity of BPNN for predicting rice crop yields in the Mekong Delta (Vietnam) prior to the harvesting period.

**Keyword:** Rice crop yield prediction, MODIS, Neural Network, Mekong Delta.