Saran Suwaanachtakul 2014: Rice Cultivation and Harvest Date Estimation Using MODIS NDVI Time-Series Data. Master of Engineering (Information and Communication Technology for Embedded Systems), Major Field: Information and Communication Technology for Embedded Systems, Department of Electrical Engineering. Thesis Advisor: Assistant Professor Teerasit Kasetkasem, Ph.D. 43 pages.

Rice cultivation and harvest dates are very useful information since they are the key factors in rice monitoring, yield estimation and damage assessment. This paper proposes a new approach to estimate rice cultivation and harvest dates by using the eight-day composite normalized difference vegetation index (NDVI) derived from the Moderate Resolution Imaging Spectroradiometer (MODIS) data. However, the NDVI time-series data suffered from cloud contamination. Using the filter to reconstruct to the cloud-free NDVI data can introduce the artifact that may result in incorrect estimation of cultivation harvest dates. As a result, we employ the hidden Markov models to characterize the rice growth states and atmospheric conditions. Here, we divide the rice growth states into four states, nothing, growing, mature, and harvest in which two atmospheric conditions, namely, the clear and cloudy skies can occur. The optimum growth states and atmospheric conditions are determined using the Viterbi algorithm (Viterbi, 1967). In the experiment, we compared with the ground truth data with the estimated cultivation and harvest dates, and found average error around 14 to 17 days for rain-fed rice and around 17 to 19 days for irrigated rice.

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