Sea Level Prediction by using Long Short-Term Memory, Study Case in Cilacap, Indonesia

Nenden Zulfah Nur Habibah[1], Didit Adytia

[1,2,3]Fakultas Informatika, Universitas Telkom, Bandung
[1]zulfahnh@students.telkomuniversity.ac.id, [2]adytia@telkomuniversity.ac.id

Abstract

Sea level prediction is important for scheduling of naval navigation in shallow harbour, design engineering of coastal structure, operational activities in offshore and coastal in general. The prediction is usually approached by using conventional method, i.e. the tidal harmonic analysis, in which the sea level is approximated by as a superposition of harmonic tidal components. As result, the harmonic analysis method cannot accommodate non-harmonic tidal components, such as sea level anomaly. In this paper, we propose a deep learning approach for sea level prediction, i.e. the so-called Long Short Term Memory or LSTM. Compared to the traditional artificial neural network, the LSTM model has a forget gate section which results in the LSTM is smarter than the traditional Artificial Neural Network. To test the performance of the model, we use one-year sea level data at Cilacap, Indonesia. As training data, we use only two months to train the model, to predict 7, 15, 30, 45, and 60 days ahead. The LSTM results show higher accuracy than the tidal harmonic analysis, i.e. with correlation coefficient value above 0.97, and can accommodate the non-tidal harmonic data such as sea level anomaly.

Keywords: Long Short-Term Memory, Sea Level, tidal harmonic analysis, tidal.