

INTRODUCTION

Tides are a natural phenomenon of the sea surface alternate rising and falling that are influenced by the gravitational force of the moon and sun. Tidal influences significantly the sea level. The tidal level prediction has become a critical matter in the field of oceanography, such as the disposal and movements of sediments, tracers and pollutants, off-shore constructions in engineering, and environmental observations [1]. Besides that, the tidal prediction is necessary for ship navigation that entering or leaving a harbor. Especially for coastal cities, the sea level prediction is needed for early warning system for flooding by sea level rise. Rising of sea level may cause a flooding around coastal areas. An example is in Semarang city in Indonesia. Development of tidal level prediction has been discussed since the last several decades. In 2002, Lee proposed an Artificial Neural Network (ANN) for tide-forecasting. The variant of ANN models that they use was the Backpropagation Neural Network (BPN), for predicting data from three ports are located in Taiwan, namely Keelung, Hsinchu, and Kaohsiung [4]. In 2003, Lee applied the BPN that is combined with the equation of harmonic analysis for the long-term prediction of a tidal level [1]. The Genetics Algorithm (GA) has also been used by Remya in 2011 for forecasting tidal currents from tidal levels [5]. Not only for tidal prediction, the Artificial Neural Network has been widely applied to obtain a prediction system for forecasting natural phenomena [6]. The ANN is an efficient technique for predictions or forecasting a real time data for short-term durations [6]. The purpose of this paper is to predict sea level by using Artificial Neural Network model, especially to provide shortterm sea level prediction. In this paper we compare the classical harmonic analysis method for tidal prediction with the Nonlinear Auto Regressive (NAR) Artificial Neural Network for predicting sea level. As a test case, we use sea level data, that is measured by using a tidal gauge, in Tanjung Emas Harbor in Semarang City, Indonesia. Comparison of two methods will be analyzed. The content of this paper is as follows. In Section II, literature review regarding previous methods are discussed. It is then followed by an exposure of the proposed method and its implementation in Section III. Section IV provides results and discussions regarding the implementation of the method. Finally, we conclude the paper in Section V.