1. Introduction

Wave height is a one significant wave parameter that must be predicted when designing coastal and offshore structures. Not only that, for daily operations in port, offshore platform, as well as naval navigation, prediction of wave height is necessary[2]. For construction and operation in nearshore areas, wave prediction is also required, especially for sediment transport estimation. The wave condition is strongly affected by wind pressure on the sea surface, therefore, the wave prediction can be derived from wind information [1], [3]

Several approaches have been proposed for wave prediction. In general, these approaches can be categorized into three approaches. The first approach is a traditional approach by using semi-empilical relation between wind and wave such asthe SMB method [4], Coastal Engineering Manual [6], and Shore Protection Manual [5]. In this simplified method, the method can be computationally cheap and quick, since wave height is approximated from the wind speed and duration data, and fetch length

More advanced approaches are by performing numerical simulation using the third-generation wave model, in which the wave spectrum evolution is simulated by taking into account effects of nonlinearity, breaking, refraction, diffraction, dissipation by bottom roughness. Among these models are SWAN model [7], and the WAM model [8]. This second approach requires high computational cost, especially for simulating a complex geometry and bathymetry which requires high resolution numerical grid. The third approach is via soft computing approach where relation between wind and wave information is learned by using soft computing approach. Among these approaches, the Artificial Neural Network (ANN) is the most favorite tool to obtain nonlinear relation between wind and wave [1], [9]. The prediction with ANN can be quite time consuming, since one needs to obtain best fit parameters for the ANN such as number of hidden layers, neurons, which in general can be found by trial and error [10]. For that reason, there is a need to find an cheap but yet accurate method for obtaining wave prediction.

In this paper, we propose a variant of ANN with single pass associative memory-forward, so called General Regression Neural Network (GRNN). In some cases such as regression, classification, approximation and fitting problems GRNN provides accurate and relatively fast solutions [12]. Liu et al.2014 uses the GRNN to predict coeffient of sound absorbtion for a type of absorber structure. The GRNN is optimized interm of spread parameter to give best prediction [19]. Chenet al. 2009 [17] applies the GRNN to design a model for controller and simulation in ultrasonic motors. They use the GRNN to obtain relation between parameters on ultrasonic motor, which can replace traditional design of controller and software simulation.

In this study, wave height prediction is produced by using numerical simulation using SWAN model [7] by using wind data from ECMWF ERA-5 [11]. The obtained data set, i.e. wind and wave data, are then used for training data for the GRNN model. To test the proposed method, we choose as a study case in Jakarta Bay, Indonesia. Not only representing a complex geometry and bathymetry, the Jakarta Bay is the busiest port in Indonesia.