Sea level Rise Prediction in Strait of Hormuz

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Abstract

Increase of water level in oceans and seas especially within the recent decade was an obvious subject and considering the phenomena of change of climate and warmth of the earth which caused to melting of ice in the poles, this phenomenon will be intensified. (IPCC, 2010) Considering that the coastal area due to suitable economic, social and tourist conditions are widely used for human gatherings, therefore, changes in the level of oceans and seas will effect on the living cycle of human and includes all activities of the human including shipping, trade, tourism, fishery etc… This subject is of great importance in Persian Gulf and Oman sea regions due to oil production and expert aspect. In this research we have studied the changes in the water level of sea adjoining to Shahid Rajaei port of Iran and prediction of increase in the sea level adjoining to this port issuing intelligence model. The results show the suitable capability of this model in predicting the changes in the sea level.
Keyword: Sea-level change; Strait of Hormuz; Support Vector Machine

1. Introduction

About 350 million people throughout the world are habitants of coasts of oceans and seas. Considering the basic role of oceans and seas in commercial transactions, number of installations and harbors are constructed adjoining to free waters. Therefore, change in sea level was always important for the human and always playing vital role in major planning (Pfeffer et al., 2008).
In the recent years, presentation of instant development of intelligent system and naturally this science in the engineering fields. Principally, basic application of intelligent system in discussed issue which effects lot of parameters in a specific phenomena and a completely irrational relation among them (Houghton et al., 2001).
The basis of intelligent methods is issuing a hidden science in data, effort for the extraction of inherent relations among them and its extension in other situations. The expert methods includes artificial neural networks (Nerouni analysis), fuzzy logic (fuzzy conclusions), genetic algorithm and support vector method, is one of the most dynamic and modern research aspects at present (Maguire et al., 1998).
The purpose of this article is to use support vector using parameters effective in predicting the changes in sea level adjoining to Shahid Rejaie port.

2. Methodology

2.1. Support Vector Machine

The method of support vector machine is based on theory of statistical learning. The quantity of parameter Z is situation X_o is estimated as follows:

$$\hat{Z} = \langle W_{sv}, X_o \rangle + b \tag{1}$$

Which $\langle \dots \rangle$ shows the internal coefficient among vectors W_{SV}, X_0, that W_{SV} weight vector, X_0 support vector, $\hat{Z}$ the predicted quantity and b the bias quantity. For facilitating we will shows X_0 with X. The quantities of weight vector and by pass are obtained by minimizing the error function ε- insensitive which is defined with the following solution:

$$\Gamma = \left|Z(x) - \hat{Z}(x)\right|_{\varepsilon} = \begin{cases} 0 \quad if \quad \left|Z(x) - \hat{Z}(x)\right| \le \varepsilon \\ \left|Z(x) - \hat{Z}(x)\right| - \varepsilon \qquad Otherwise \end{cases} \tag{2}$$