Earthquake Identification to Predict Tsunami in Andalas Island, Indonesia Using Back Propagation Method and Fuzzy TOPSIS Decision Seconder

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Abstract : Earthquakes are natural hazard that can trigger the most dangerous hazard, tsunami. 26 December 2004, a giant earthquake occurred in north-west Andalas Island. It made giant tsunami which crushed Sumatra, Bangladesh, India, Sri Lanka, Malaysia and Singapore. More than twenty thousand people dead. The occurrence of earthquake and tsunami can not be avoided. But this hazard can be mitigated by earthquake forecasting. Early preparation is the key factor to reduce its damages and consequences. We aim to investigate quantitatively on pattern of earthquake. Then, we can know the trend. We study about earthquake which has happened in Andalas island, Indonesia one last decade. Andalas is island which has high seismicity, more than a thousand event occur in a year. It is because Andalas island is in tectonic subduction zone of Hindia sea plate and Eurasia plate. A tsunami forecasting is needed to mitigation action. Thus, a Tsunami Forecasting Method is presented in this work. Neutral Network has used widely in many research to estimate earthquake and it is convinced that by using Backpropagation Method, earthquake can be predicted. At first, ANN is trained to predict Tsunami 26 December 2004 by using earthquake data before it. Then after we get trained ANN, we apply to predict the next earthquake. Not all earthquake will trigger Tsunami, there are some characteristics of earthquake that can cause Tsunami. Wrong decision can cause other problem in the society. Then, we need a method to reduce possibility of wrong decision. Fuzzy TOPSIS is a statistical method that is widely used to be decision seconder referring to given parameters. Fuzzy TOPSIS method can make the best decision whether it cause Tsunami or not. This work combines earthquake prediction using neural network method and using Fuzzy TOPSIS to determine the decision that the earthquake triggers Tsunami wave or not. Neural Network model is capable to capture non-linear relationship and Fuzzy TOPSIS is capable to determine the best decision better than other statistical method in tsunami prediction.

Keywords : earthquake, fuzzy TOPSIS, neural network, tsunami

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