Prediction on Emergency Evacuation Orders Using Naïve Bayes Classification and Deep Learning

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Abstract
Emergency response to chemical accidents is proceeded in order of prevention, mitigation, preparedness, response and recovery. One of the methods of response is emergency evacuation orders. In order to minimize the loss of life, it is important to issue prompt and precise evacuation orders when chemical accidents such as toxic gas emissions occur near populated areas.
This paper presents a method and results for predicting emergency evacuation orders using naïve bayes classification, one of the statistical analysis methods, and Deep-learning, one of the artificial neural network analysis methods. The study was conducted using 61,563 useful data extracted from 115,569 accidents that occurred between 1996 and 2014 in ATSDR’s National Toxic Substance Incidents Program(NTSIP) dataset. Rapidminer 7.5, a big data analysis program, was employed for big-data analysis. Through the analysis, it was predicted whether emergency evacuation orders were issued or not with high accuracy.
This study demonstrates that the technique can be used to identify the factors which affect the actual evacuation orders in the past and eventually provide a systematical decision-making process for rapid and accurate orders in the future accidents. In addition, as a result of the analysis, the accuracy of the method using Deep-learning has been proven higher than that of using Naïve bayes classification.

Key words: Emergency evacuation order, naïve bayes classification, deep learning, big-data analysis, NTSIP dataset