



Real-time Flood Disaster Prediction System by Applying Machine Learning Technique

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This study focuses on the development of a machine learning based algorithm for real-time urban flood analysis and to predict the flood zone accurately in urban watershed. The optimal input data is selected with consideration of the correlations between rainfall and inundation data. Then, uncertainty analysis and classification for flood characteristics are conducted.

To predict the realistic inundation area, a two-step approach to predict urban flooding is necessary. The Neuro-Fuzzy model for the prediction of representative flood volume is established by applying the coverage ratio, CN, impermeability ratio, and permeability ratio as topographical parameters. The prediction of the flood volume is performed with Seoul metropolitan area which suffered from severe flood damage in 2010 and 2011. The prediction model for inundation map is constructed by two components, the representative flood volume and the linear/nonlinear relationship between each computational grid. The results of inundation map prediction is estimated by making the connection of the representative flood volume and the correlation between the grids which in depicted from 2D flood analysis.

It is possible to establish flood prevention measures within a short lead time by applying the classification-based flood forecast model. Furthermore, the preliminary emergency alerts could be performed to residents within flooded areas in advance. Flood disasters risk was also analyzed for the minimization of property and human life loss in short lead time based on rainfall-inundation database.

Keywords: Urban flood prediction; Rainfall-Inundation database; Machine learning

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