Geophysical Research Abstracts
Vol. 21, EGU2019-7021, 2019
EGU General Assembly 2019

Application of Artificial Intelligence to Disaster Prevention and Early Warning of Urban Flooding

Sheng-Hsueh Yang (1), Deng-Lin Chang (2), Sheau-Ling Hsieh (1), Hui-Jung Wang (1), Shiang-Jen Wu (3), Chih-Tsung Hsu (3), Keh-Chia Yeh (1,2)

(1) Disaster Prevention and Water Environment Research Center,National Chiao Tung Universtiy, Hsinchu, Taiwan (shyang1977@gmail.com), (2) Department of Civil Engineering, National Chiao Tung Universtiy, Hsinchu, Taiwan, (3) National Center for High-Performance Computing, Hsinchu, Taiwan

The main cause of urban flooding is heavy rain. When the heavy rain exceeds the load of the river, drainage and sewer systems, the risk of urban flooding is relatively increased. The heavy rains and inundation in urban areas are often a few cases. In addition, there are uneven rainfalls in space and time. It is difficult to effectively control the inundation areas, and the disaster prevention unit often has insufficient early warning preparation time. Therefore, in urban flooding and disaster prevention, it is necessary to be able to obtain more time for early warning of disaster prevention, and to accurately understand the flooded area. Artificial intelligence methods can provide new options and utilization. In this paper, using the prepared hydrological, hydraulic, and inundation models, combined with the 6000 hydrological uncertainty analysis of the two-dimensional spatial rainfall data, to carry out the numerical simulation and storage of the urban inundation results data to form a big data database of heavy rain and urban flooding scenarios. After the big data database is used, the AI-CNNs deep learning method is used to analyze and store the rainfall characteristic parameters in the two-dimensional space to the AI-CNNs analysis results through the training and learning processes such as parameter training, pooling and ReLU. In the database, fast image calculation, query and feature comparison are provided. Finally, the actual case description of Taiwan in Taoyuan City and Nantunxi River Basin shows that after receiving the two-dimensional real-time and forecast rainfall data through the flood early warning system (FEWS) platform, the AI-CNNs urban flooding forecast is carried out, and the flooding result is converted into KML file. Display and use on the map platform, and then through the IoT (internet of things) equipment and CCTV real-time image data such as the surface water level sensor and image to predict the area where the city may be flooded, and provide early warning use.