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以集水區地文特徵為基礎的類神經網路洪水推估研究

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摘　　要　現階段利用類神經網路進行降雨逕流模擬的方式，僅能產生單一集水區適用的流量推估模式，無法進一步預測未設流量站集水區的洪水特性，也無法評估土地利用變遷所可能造成的水文衝擊。本研究提出一個新的解決方案，將集水區地文特徵參數導入類神經網路的學習機制內，使模式能夠同時考量地文與水文因子來進行洪水特徵的推估，以突破類神經網路模式現有的應用限制。本研究使用國內 61 個集水區 292 場水文事件進行實証研究，透過特徵化度量的過程，每個集水區及其發生的水文事件被轉換成一系列特徵參數，並進一步組成特徵化案例庫；地理資訊系統在此過程中扮演了地文特徵度量的角色。三層結構的倒傳遞類神經網路以 49 個集水區 243 個案例進行學習，並使用其他集水區案例進行模式驗證。結果顯示本研究提出的解決方案確實具有可行性，模式雛型對洪峰流量與洪峰時間推估的正確性，可以達到單位流量歷線模式的水準。

關鍵詞：洪水、集水區、模式、類神經網路、地理資訊系統。

Flood Estimation Using Neural Networks Based on Physiographic Features of Watersheds

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ABSTRACT　The current models constructed by using neural networks can neither predict the peak flow and the peak time of flood in ungauged watersheds, nor evaluate the hydrological impacts of land use changes. This study offers a solution to resolve the limitations of the previous construction methods that established the current models. It is suggested that physiographic features, which are ignored in current neural network models, can be and should be put into the neural network learning mechanism. This, together with hydrological features, would enable the neural network models to remedy the limitations mentioned above. Model prototypes of flood estimation are derived from the data of 292 rainfall-runoff events collected from 61 watersheds in various parts of Taiwan. Data from 243 events obtained from 49 watersheds has been used to train the three-layer structure of the back-propagation neural network, and the others for purposes of verification. All of the events were characterized as parameters, both hydrological and physiographic, which resulted in a characterizing case-base. In measuring the physiographic features of watersheds, geographic information systems were applied.

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