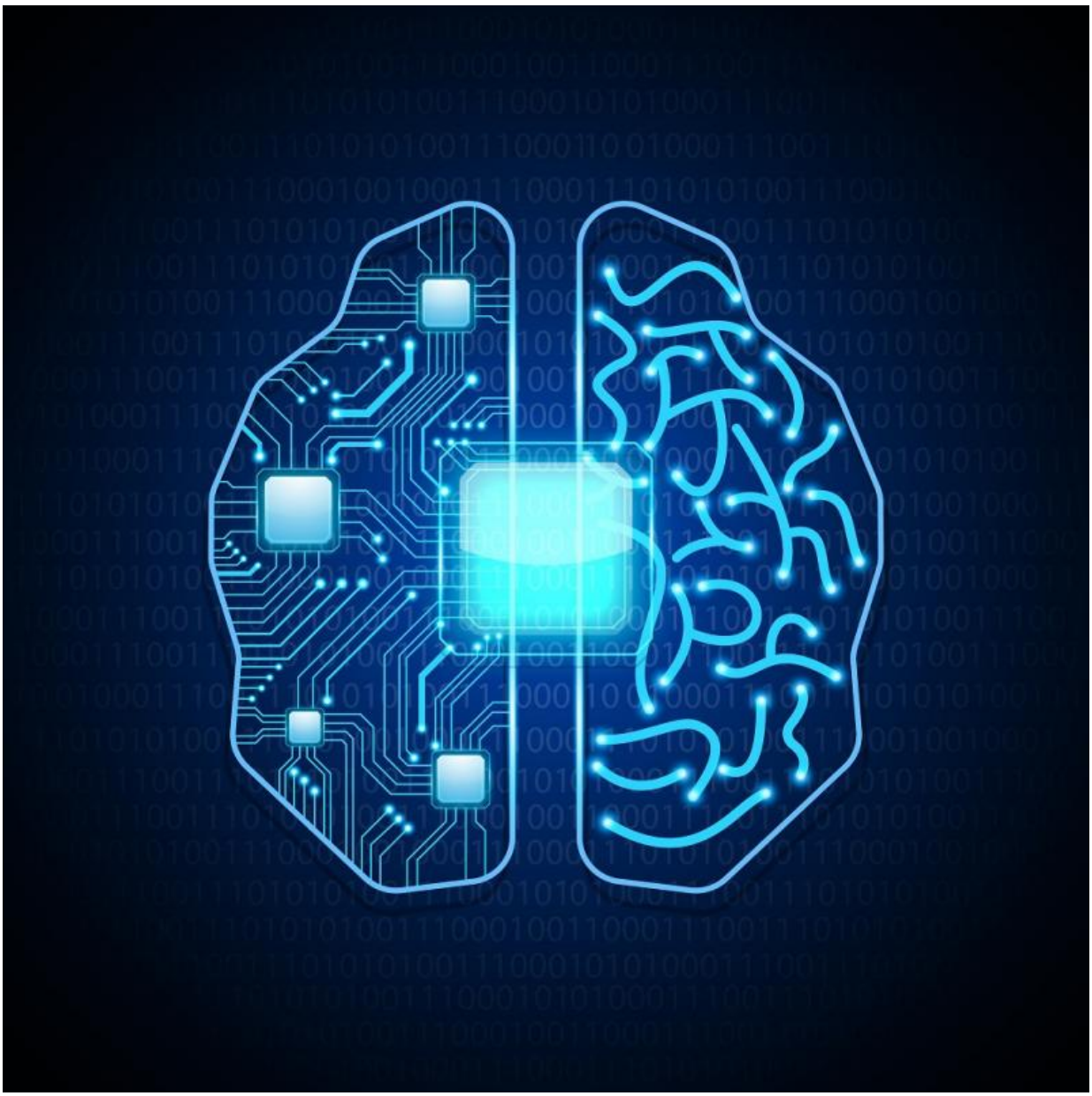
Computer model to help water resource managers reduce damage in cases of extreme flooding

May 10 2017



"The obtained results could help water resource managers to operate the reservoir properly in the case of extreme events such as flooding and drought." Credit: Sarawuth Pamoon / 123rf

Artificial neural networks (ANNs) are a biologically-inspired method of computing that can receive large amounts of data, find patterns, learn from them and then develop predictions for future events. They have been proposed as a useful tool to process the complex relationships between large amounts of data related to the transformation of rainfall into runoff. This relationship is one of the most difficult hydrological problems faced by water resource managers.

Researchers at Universiti Putra Malaysia 'taught' an ANN to predict daily runoff for the Bertam River into the Ringlet Reservoir 200 kilometres north of Kuala Lumpur. They collected daily rainfall and stream flow data from the Bertam River catchment area over a tenyear period, from 2003 to 2012, and estimated daily water evaporation using temperature data collected from the nearest station to the reservoir. Seventy per cent of this data was input into the model to train it while the remaining 30% of the data was used to test the model's accuracy using statistical evaluation measurements. The ANN was developed to map the relationship between rainfall and runoff. The more factors used, the more accurate the results. The ANN was able to predict river stream flow into the reservoir with 76% accuracy.

"The results indicate that the artificial neural network is a powerful tool in modelling rainfall runoff," report the researchers in a *Pertanika Journal of Science & Technology* study. "The obtained results could help water resource managers to operate the reservoir properly in the case of

extreme events such as flooding and drought," they add.

The ANN's predictive power could be improved by including additional inputs such as deforestation, agricultural activities and land use, the researchers say.

Provided by Universiti Putra Malaysia (UPM)