The Rainmaker

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Our neural networks can localise climatechange.org data to a specific city to predict future rainfall.

Climate change has dramatically accelerated in the last fifty years and it's nearly impossible to slow its momentum. Extreme weather conditions like heat waves, prolonged drought, and heavy rainfall have and will become more frequent and severe.

The impact of heavy rainfall in South East Asian cities is yet to be investigated, especially with regards to frequency, duration and magnitude. Images of floods across Asian cities are already common. If the rainfall reaches an intensity higher than historical extremes, it becomes critical to renovate or alter the city's infrastructure. An immediate change would be the drainage system to allow the rain water to flow away. Therefore it is important to be able to predict future rainfall so that governments and city planners can plan efficient mitigation and adaptation strategies.

The most common method for predicting the impact of future climate change is through Global Circulation Models, but their calculations are usually over 100-300 km, making it too coarse to be applied to allocations of 5 km or less. Spatial downscaling techniques can refine the resolution of these models to a relevant scale. We have combined two very complex algorithms, Cuckoo search optimisation neural network and Bat neural network, to predict future rainfall in a specific place. In this research we focused on three periods of predicted rainfall in Kuching, namely in 2020, 2050 and 2080.

Our models show that the intensity of rainfall will increase substantially by 12% in 2080 as compared to 1970. These Intensity-Duration-Frequency curves are derived from the neural networks and are essential tools for hydrological engineers to design and construct water infrastructure for the future.