

A Neural Network Model to Simulate Urban Air Temperatures in Toulouse, France

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Abstract : Air temperatures are generally higher in cities than in their rural surroundings. The overheating of cities is a direct consequence of increasing urbanization, characterized by the artificial filling of soils, the release of anthropogenic heat, and the complexity of urban geometry. This phenomenon, referred to as urban heat island (UHI), is more prevalent during heat waves, which have increased in frequency and intensity in recent years. In the context of global warming and urban population growth, helping urban planners implement UHI mitigation and adaptation strategies is critical. In practice, the study of UHI requires air temperature information at the street canyon level, which is difficult to obtain. Many urban air temperature simulation models have been proposed (mostly based on physics or statistics), all of which require a variety of input parameters related to urban morphology, land use, material properties, or meteorological conditions. In this paper, we build and evaluate a neural network model based on Urban Weather Generator (UWG) model simulations and data from meteorological stations that simulate air temperature over Toulouse, France, on days favourable to UHI.

Keywords : air temperature, neural network model, urban heat island, urban weather generator

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