A study of the urban Heat Island effect in Cyprus using Artificial Neural Networks

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The intensification of urbanization evidenced in Cyprus during the last 30 years has caused a rapid growth of the size of the Cyprus' main cities which has affected the local climate. The contrast of energy absorption from developed urban areas and surrounding rural areas results in a differentiation of the local climate, as evidenced from climatological records, known as the Heat Island effect. The direct effect on increasing the maximum and minimum temperature in urban environments affects also extreme weather events (e.g. the frequency of occurrence and intensity of thunderstorms).

It is not feasible to study the Heat Island effect with the traditional observational methods: even a dense network of temperature sensors is not sufficient to provide the necessary detail to identify the effect. However, available tools to investigate this phenomenon comprise high-resolution skin surface temperatures detected from polar orbiting satellites. Regarding the usage of satellite information, there is a trade-off between the spatial scale and image availability. The MODIS satellite passes twice a day over Cyprus, roughly at the same time, and provides skin surface images at $1km^2$ resolution.

This research focuses on the identification and mapping of the hotspots in urban areas and the creation of a neural network model able to connect the skin temperature fields from the satellite, air temperature from climatological networks and numerical weather prediction models and to offer this site-specific information to public through mobile technologies.