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ORIGINAL ARTICLE



Comparison and evaluation of machine learning approaches for estimating heat index map in Türkiye

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Abstract

Heat index (HI) is a temperature that the human body feels or perceives, as opposed to the physical air temperature measured by a thermometer. The goal of this study was to create a monthly average HI map in the external environment for Türkiye using a mathematical model developed by AccuWeather, an artificial neural network (ANN), and an adaptive neuro-fuzzy inference system (ANFIS) approach. In creating Türkiye's HI map, measurable parameters such as hourly dry bulb temperature, relative humidity, wind speed, and atmospheric pressure data from 81 measuring stations were used. According to the simulations, due to the lack of measurable data, HI, which cannot be computed in each location, can be efficiently predicted using geographical inputs to ANN and ANFIS methods. The outcomes demonstrated that predicted HI values with the developed ANN and ANFIS models are in good agreement with the actual HI calculated values using the AccuWeather method for all cities, but the accuracy of the machine learning models varies depending on the city's measured data. Although MAE and RMSE values for generated ANN and ANFIS machine learning models are within acceptable ranges, ANN outperforms ANFIS for all cities tested during the estimation of HI values. ANN and ANFIS models are capable of correctly predicting HI values when the month of the year, latitude, longitude, and altitude values are provided. This eliminates the need for excessive testing and saves time, labor, and financial resources.

Keywords Adaptive neuro-fuzzy interference system · Artificial neural network · Heat index estimation · Machine learning · Real-feel temperature

KONFERANS

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RÖPORTAJ

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**SON AKADEMİK YAYINLAR****1) Prof. Dr. Beşir ŞAHİN**

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