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# ENGINEERING FACULTY

## e - Newsletter

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## ARTICLE

The article titled "Comparison and evaluation of machine learning approaches for estimating heat index map in Turkey" by Prof. Dr. Beşir Şahin, a faculty member in the Department of Aerospace Engineering at the Faculty of Engineering, has been published in the journal "Neural Computing and Applications." (Q1)

Neural Computing and Applications (2023) 35:15721–15742  
<https://doi.org/10.1007/s00521-023-08578-x>

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 inference system · Artificial neural network · Heat index estimation · Machine learning · Real-feel temperature

## CONFERENCE

Assoc. Prof. Dr. İlham HUSEYINOV from the Department of Software Engineering has participated in the conference titled "International Conference on Artificial Intelligence of Things," which took place on the 15th and 16th of August.





## INTERVIEW

Assist. Prof. Dr. Tevfik Denizhan MÜFTÜOĞLU has given an interview to Al-Arabia television regarding urgent measures against the potential major earthquake in Istanbul.



## EXPERT OBSERVER

Assist. Prof. Dr. Hasan Volkan ORAL has participated in the H2020 NICE (Innovative and Enhanced Nature-Based Solutions for Sustainable Urban Water Cycle) project as an expert observer.





## LATEST ACADEMIC PUBLICATIONS

### 1) Prof. Dr. Beşir ŞAHİN

Tumse, S., Bilgili, M., Sekertekin, A. et al. Comparison and evaluation of machine learning approaches for estimating heat index map in Türkiye. *Neural Comput & Applic* 35, 15721–15742 (2023). <https://doi.org/10.1007/s00521-023-08578-x>

### 2) Prof. Dr. Murtaza FARSADI

Eddin N., Farsadi M., Design of Highly Efficient PV System in the UAE, *International Journal of Electronics, Mechanical and Mechatronics Engineering*, 13(1), 2023

Boshrouei S.S., Farsadi M., Analysis of 400-kW Grid-Connected PV Farm Under Different Load Condition, *International Journal of Electronics, Mechanical and Mechatronics Engineering*, 13(1), 2023

Orah M.A., Farsadi M., Industrial Load Application in Jordan By Using Homer Software, *International Izmir Congress on Life, Engineering and Applied Sciences*

Alzoubi H., Farsadi M, DC-DC Converter Control in MVAC Grid-Tied PV System, 3rd International Graduate Studies Congress(IGSCONG 23)

### 3) Prof. Dr. Zafer ASLAN – Assist. Prof. Dr. Elif ÖZEL AY

Büyükbayram, O. A. , Özel Ay, E. , Aslan, Z. & Özdemir, G. (2023). EVALUATION OF SPACE AND SUN AWARENESS WITH BODY MUSIC - SOUND SIGNAL . *Eurasian Journal of Social and Economic Research (EJSER)*, 10 (3) , 495-510

### 4) Assist. Prof. Dr. Hasan Volkan ORAL

Derya Y. Koseoglu-Imer, Hasan Volkan Oral, Cristina Sousa Coutinho Calheiros, Pawel Krzeminski, Serkan Güçlü, Sofia Almeida Pereira, Joanna Surmacz-Górska, Elzbieta Plaza, Petros Samaras, Pablo Martin Binder, Eric D. van Hullebusch, Ariola Devolli, Current challenges and future perspectives for the full circular economy of water in European countries, *Journal of Environmental Management*, Volume 345, 2023, 118627, ISSN 0301-4797, <https://doi.org/10.1016/j.jenvman.2023.118627>.



IV. BASKENT INTERNATIONAL CONFERENCE ON MULTIDISCIPLINARY STUDIES'da Within The Context of Environmental Sustainability, an Example Of Nature-Based Solutions And Circularity in an Urban Ecosystem: Maltepe Park (Oral Presentation)

The fieldwork of the TUBITAK 121 Y 570 project ([nbs.aydin.edu.tr](http://nbs.aydin.edu.tr)) was conducted in the Izmir K.Menderes Basin on August 14-15, 2023.