



A comprehensive review of artificial intelligence-based methods for predicting pan evaporation rate

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Abstract

This comprehensive study reviews the latest and most popular artificial intelligence (AI) techniques utilised for estimating pan evaporation (Ep), an essential parameter for water resource management and irrigation planning. Through an extensive evaluation of 76 papers published between 2006 and 2022, this study analyses the input data categories, time steps, properties, and capabilities of different AI models used for estimating Ep across various regions. The reviewed papers offer partial and comprehensive observations, providing valuable insights for researchers looking to model Ep in similar studies. Furthermore, this study proposes innovative theories and approaches to enhance the efficacy of Ep modelling in the relevant analysis domain. While hybrid AI techniques have gained popularity due to their perceived superiority over standalone deep learning and machine learning approaches, they often pose significant operational and computational challenges for Ep forecasting. As such, the study strongly recommends the use of transformer neural networks for Ep estimation, given their unique architecture and promising performance across various fields. Overall, this study presents a comprehensive and up-to-date overview of the latest AI-based techniques for estimating Ep and highlights the most promising approaches for future research.

Keywords Artificial intelligence · Machine learning · Deep learning · Pan evaporation · Transformer neural network

1 Introduction

Accurately forecasting pan evaporation is critical for properly handling water resources (Ghorbani et al. 2018a, b; Wang et al. 2017a, b, c). Pan evaporation (Ep) is an important determinant of earth's atmosphere evaporation rates that is broadly employed in the water

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