

IAF SYMPOSIUM ON INTEGRATED APPLICATIONS (B5)
Integrated Applications End-to-End Solutions (2)

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SUPERVISED MACHINE LEARNING APPLICATIONS ON METEORS AND METEORITES

Abstract

As part of the industrial revolution 4.0 and advents in space exploration, Artificial Intelligence is being integrated with numerous space-related technologies. In this paper, we present supervised machine learning algorithms developed to detect and recognize meteors and meteorites. The United Arab Emirates (UAE) Meteor Monitoring Network (MMN) system observes meteors from sunset to sunrise daily. The system records meteors in addition to objects giving off light or movement. This, in turn, results in false data and consumes time during manual filtration. The dataset is structured on the available data, exceeding thousands of observations. A supervised model is trained on this dataset and is finally tested on images captured from the UAEMMN stations. The model is structured using an object detection algorithm that lies on top of a Convolutional Neural Network (CNN). Similarly, another CNN supervised model identifies meteorites and distinguishes them from rocks. The dataset comprises images of meteorites from the meteorite collection present at the Sharjah Academy for Astronomy, Space Sciences, and Technology (SAASST) and pictures of rocks. The study revealed that both models proved to be reliable algorithms for meteor and meteorites detection, reaching an accuracy above 85%.