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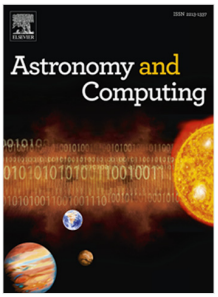

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A CNN and LSTM-Based Approach to Classifying Transient Radio Frequency Interference

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Abstract

Transient radio frequency interference (RFI) is detrimental to radio astronomy. It is typically broadband, intermittent and particularly difficult to classify by source. RFI of this type can be generated by devices like mechanical relays, fluorescent lights or AC machines. Such sources may be present in the vicinity of a radio telescope array, especially if other new instruments are under construction nearby. One mitigating approach is to deploy independent RFI monitoring stations at radio telescope arrays. Once the sources of RFI signals are identified, they may be removed or replaced where possible. For the first time in the open literature, we demonstrate an approach to classifying the sources of transient RFI (in time domain data) using deep learning techniques. Our proposed model includes a pre-trained CNN followed by a bidirectional LSTM layer. Applied to a previously obtained dataset of experimentally recorded transient RFI signals, our approach offers good results. It shows potential for development into a tool for identifying the sources of transient RFI signals recorded by RFI monitoring stations.

Keywords:
transient radio frequency interference, convolutional neural networks, bidirectional long short-term memory (LSTM)

1. Introduction

Radio astronomy continues to face the problem of radio frequency interference (RFI). As instruments become more sensitive, so the impact of existing RFI sources becomes more significant. New technologies that make

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