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Convolutional Neural Networks for Exoplanet Detection in Photometric Light Curves From Massive Data Surveys

Wednesday, November 29, 2023 3:15 PM (7 minutes)

Amidst the era of astronomical surveys that collect massive datasets, neural networks have emerged as powerful tools to address the challenge of exploring and mining these enormous volumes of information from our sky. Among the obstacles in the study of these surveys is the identification of exoplanetary signatures in the photometric light curves. In this presentation, we will discuss how convolutional neural networks can significantly facilitate the detection of exoplanets, focusing on two exoplanetary detection methods: (1) planetary transits and (2) gravitational microlensing. We will elaborate on (1) their proven success in detecting planetary transit signals within the Transiting Exoplanet Survey Satellite data and (2) our ongoing project to identify gravitational microlensing events using the nine-year Microlensing Observations in Astrophysics dataset. Our strategy proposes using only raw photometric light curves as input for our neural network pipeline, which, after training, can detect the desired signal in a light curve in milliseconds. Looking towards future space missions, we will discuss the role of neural networks as an alternative pipeline to accelerate the identification of potential exoplanet candidates in the Nancy Grace Roman Space Telescope data.

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