HUNTER WETZEL, Department of Computer Science, Shepherd University, Shepherdstown, WV. Machine Learning Identification of Exoplanet Transit Signals in Kepler Light Curve Data.

The discovery of exoplanets has expanded rapidly over the past two decades due to large astronomical datasets produced by space missions such as NASA's Kepler telescope. The Kepler mission continuously monitored the brightness of more than 150,000 stars, generating extensive collections of stellar light-curve data used to identify potential planetary transits. Detecting these transits involves identifying small, periodic decreases in stellar brightness that occur when a planet passes in front of its host star. However, analyzing large volumes of light-curve data can be computationally intensive and time-consuming when performed using traditional analysis methods. This project investigates the use of machine-learning techniques to assist in the automated detection of exoplanet transit events within Kepler light-curve datasets. A neural-network model will be developed to analyze astronomical time-series brightness data and identify patterns consistent with planetary transits. Training data will be obtained from publicly available datasets within the NASA Exoplanet Archive, including confirmed exoplanet signals, stellar variability, and non-transit observations. The model will be trained to recognize characteristic transit features such as periodic brightness dips, transit depth, and duration patterns. By applying machine-learning methods to astronomical time-series data, this research aims to evaluate whether automated models can improve the efficiency and accuracy of exoplanet candidate identification. This work highlights the growing role of artificial-intelligence methods in modern astrophysics and demonstrates how computational approaches can support the analysis of increasingly large astronomical datasets.