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Search for variable stars in Kepler database

Variable stars are stars whose brightness varies with time when observed from Earth. The change in brightness may be due to changes in star's luminosity, and obstructions in the amount of light that reaches Earth. Studying variable stars helps understand stellar evolution and properties. The project aims to search for and classify variable stars using photometric time-series data from the Kepler database. By applying Fourier analysis, it seeks to identify variability periods and classify stars based on their frequency spectra. The ultimate goal is to determine their physical properties, including luminosities, absolute magnitudes, and distances, contributing to a deeper understanding of stellar variability and its implications for stellar astrophysics. The data utilized in this paper is from K2 database (Mikulski Archive Space Telescope) which was published by the Nainital-Cape survey stars. A total of eight stars were retrieved from the K2 database (Mikulski Archive for Space Telescopes). Each star was analyzed to determine the underlying cause of its variability and to identify potential associations with known variable stars. Light curves were examined for distinct variability patterns, and Fourier analysis was performed to extract amplitude and frequency values, allowing for precise determination of each star's variation period. Additionally, the spectral classification of each star from the literature was utilized to correlate observed variability with previously identified variable stars. The calculated periods facilitated distinguishing between variability due to stellar pulsation or rotation, based on whether the periods exceeded the typical pulsation period for each star's spectral type. Noise reduction, including prewhitening, was applied to all data sets to extract other frequencies of significant amplitudes. Results confirmed that the observed variability across the sample could be attributed to either pulsation or rotational phenomena. This research successfully achieved its objective of identifying and categorizing variable stars using photometric data from the Kepler database. Among the eight stars analyzed, three variable stars were identified and classified as Delta Scuti, Cepheids, and RV Tauri types. These findings contribute to the growing catalog of known variable stars and provide a foundation for future studies on their physical and evolutionary properties.

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