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REVOLUTIONIZING SPECTRAL ANALYSIS OF STARS USING MACHINE LEARNING TECHNIQUES FOR IMPROVED CLASSIFICATION AND IDENTIFICATION

Abstract

The study of stars has fascinated humanity for centuries. With the advancements in technology, our understanding of stars and their properties has increased exponentially. Spectral analysis of stars is a crucial tool for astronomers, allowing them to determine various characteristics of stars, such as their temperature, chemical composition, and motion. Traditional spectral analysis methods have been time-consuming and labor-intensive. However, recent advancements in machine learning techniques have opened up new possibilities for automating and improving the spectral analysis process.

Our study aims to apply machine learning techniques to spectral analysis, specifically in the classification and identification of different types of stars. We will be utilizing the Hipparcos Star Catalog, a massive database that contains information on over 100,000 stars. By using two machine learning models, XGboost and Support Vector Machines, we compared their performance to select the best model for star classification. Additionally, we employed Deep Neural Networks, which are known for their advancements in Computer Vision and many other fields, to compare total performance. Initial results are 95.57

Our study is innovative and unique, as we are applying machine learning techniques to spectral analysis, paving the way for future studies in this area. Our work's originality lies in the automation and improvement of star classification, enabling astronomers to study stars' properties efficiently.

Exoplanet detection is a rapidly growing area of research, and the identification of host stars is crucial for characterizing planets. Our study will have significant implications in this field, as the accurate classification of stars will aid in the identification of potentially habitable planets. In addition, our work will contribute to the development of machine learning techniques, which have the potential to revolutionize the way we study the universe.

Spectral analysis has a wide range of applications in astronomy, space exploration, and identifying potentially habitable planets and mineral resources in space. Our research contributes to the continued development of spectral analysis, making it faster, more accurate, and more accessible to astronomers.

In conclusion, our study's innovative approach to spectral analysis of stars using machine learning techniques will have significant implications in the field of exoplanet detection and contribute to the advancement of machine learning in astronomy. We anticipate that our work will be of great interest to the astronomical community and pave the way for future studies in this area.