IAF SYMPOSIUM ON ONGOING AND NEAR FUTURE SPACE ASTRONOMY AND SOLAR-SYSTEM SCIENCE MISSIONS (A7)
Interactive Presentations - IAF SYMPOSIUM ON FUTURE SPACE ASTRONOMY AND SPACE PHYSICS (IP)

Author: Mr. Abhay Bhandarkar
Ramaiah Institute of Technology, India

Mr. Amogh Kalasapura
Ramaiah Institute of Technology, India
Ms. M Nanditha Prabhu
Ramaiah Institute of Technology, India
Mr. Thomas Vadakkeveettil Philip
Ramaiah Institute of Technology, India
Mr. Vishwachetan D
Ramaiah Institute of Technology, India
Mr. Ilaqquan Rajesh
Ramaiah Institute of Technology, India
Mr. Ronit Kumar Manjhi
Ramaiah Institute of Technology, India
Mr. Shreesha T P
Ramaiah Institute of Technology, India

REDSHIFT-POWERED CLASSIFICATION: LEVERAGING MACHINE LEARNING TO UNRAVEL THE SECRETS OF ASTRONOMICAL OBJECTS

Abstract

Our universe is home to a great number of celestial objects, each retaining the key to unlocking the secrets and techniques of our cosmic origins. Identifying and classifying these items appropriately is critical for advancing our knowledge of stellar evolution, galaxy formation, and the massive-scale shape of the universe. This paper explores the potential of machine getting to know (ML) for automatic astronomical item classification with the usage of redshift statistics. Redshift, a measure of the observed shift in an object's light spectrum due of its relative movement toward or far from Earth, holds precious data approximately an object's distance and type. Traditionally, type relies on painstaking spectroscopic analysis carried out by astronomers. However, with the increasing volume of statistics from astronomical surveys, this method will become increasingly more time-consuming. This paper proposes an ML-based approach for identification of celestial bodies – in particular galaxies, stars, and quasars (quasi-stellar objects) – the usage of their redshift measurements. We discover diverse supervised algorithms, which includes Support Vector Machines (SVMs) and Random Forests, to train and validate the fashions on large datasets containing categorized astronomical objects with recognized redshifts. The performance of the model is evaluated the usage of metrics like accuracy and precision. This lets us evaluate the model's potential to effectively identify the different kinds of celestial bodies and helps reduce misclassifications. The advantages of the usage of ML for astronomical object classification are several. Furthermore, their scalability makes them best for analyzing records from massive-scale astronomical surveys. Machine learning algorithms additionally have the capacity to obtain higher class accuracy than traditional techniques, specifically with huge and diverse datasets. This paper also highlights the potential of ML as a effective

tool for astronomical object class, paving the manner for a more efficient and automated approach to exploring the vast and numerous celestial landscape. Further research and development on this paves the way for advancing our understanding of the cosmos with the accurate detection of astronomical bodies.