Contribution ID: **29** Type: **not specified**

Data Science in Relativistic Astrophysics, 2-Classification of astronomical objects and determining their redshift using spectroscopic optical data of SDSS

Thursday, November 4, 2021 4:55 PM (45 minutes)

Classification of astronomical objects and determining their redshift using spectroscopic optical data of SDSS

Quasi-stellar radio source (Quasars) or quasi stellar objects (QSO) are high-luminosity active galactic nuclei (AGN) which are believed to be powered by accretion disks around supermassive black holes (SMBHs) with masses in the range of 1 million to 1 billion solar mass. Thanks to their high luminosity, quasars have been found to spread from redshift z~0 all the way back to z~7 when the universe was forming its first structures, namely the epoch of reionization. Therefore, study the high-redshift quasars can be taken into account as a powerful tool to study the cosmic history and structure formation in the early universe. Owing to their existence at redshifts ranging from z=0 to z~ 7, quasars provide a new possible standard candle, like type Ia supernovae, which can infer new cosmological constraints to study the evolution of the universe.

In this part, after introducing the methods to process and prepare the spectroscopic optical data of SDSS, we represent the architecture of a 1-dimensional convolutional neural network (CNN) to estimate the redshift of quasars in Sloan Digital Sky Survey IV (SDSS-IV) catalog from DR16 quasar-only (DR16Q) of eBOSS. We show how this CNN can be easily extended in order to classify stars, galaxies and quasars as well as prediction of their redshift. The CNN takes the flux of the quasars as an 1−dimensional array and their redshift as labels. Therefore, This CNN extract the spectroscopic features of SDSS data and predicts the redshift of quasars. We finally represent a similar CNN, but less efficient, which is already used by SDSS website to classify the quasars, stars and galaxies, as well as predict the redshift.

In this session, participants will learn how to process the SDSS spectral data in order to implement them in 1-dimensional CNN and observe the preliminary results.

Presenter: Prof. MORADI, Rahim (ICRANet-Italy)