MACHINE LEARNING FOR ASTROPHYSICS
2ND EDITION CATANIA, 8-12 JULY, 2024

Contribution ID: **277** Type: **Oral Presentation**

Using Deep Learning for spectral classification, redshift predictions and anomaly detection.

Thursday, 11 July 2024 11:30 (20 minutes)

We present the Galaxy Spectra Network/GaSNet-II, a supervised multi-network deep learning tool for spectra classification and redshift prediction. GaSNet-II can be trained to identify a customized number of classes and optimize the redshift predictions. Redshift errors are determined via an ensemble/pseudo-Montecarlo test obtained by randomizing the weights of the network-of-networks structure. GaSNet-II achieves 92.4% average classification accuracy over the 13 classes and mean redshift errors of approximately 0.23% for galaxies and 2.1% for quasars.

We also utilize a generative network to reconstruct the input spectrum (GaSNet-III). By comparing the input and reconstructed spectra, the redshift and type of the input can be determined. Additionally, the outlier/anomaly spectrum can be detected. We demonstrate that the majority of galaxy and quasar spectra can be reconstructed resulting in a high-accuracy redshift (3 x 10^-4 for galaxy and 3 x 10^-3 for QSO).

Presenter: ZHONG, Fucheng

Session Classification: Miscellaneous