X36a Estimating Galaxy Spectra from Photometry via Latent Representationn

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In this study, we present a novel approach for estimating high-dimensional galaxy spectra from limited photometric data. In our recent presentation at the ASJ meeting, we presented the results of a Variational Autoencoder (VAE) trained with galaxy spectra. We demonstrated the effectiveness of VAE latent variables in accurately reconstructing the full spectra and extracting valuable information about the physical properties and morphologies of galaxies. Specifically, we showed that by predicting these latent variables solely from photometric data, we can reliably estimate the complete galaxy spectra.

However, predicting the latent variables from band data poses a challenge due to the complex underlying structure of galaxy spectra captured by VAE latent variables. To overcome this problem, we propose a new semi-supervised VAE model that assigns physical meaning to the latent space. This approach enables us to predict the latent variables from band data.

Traditionally, obtaining galaxy spectra requires expensive and time-consuming spectroscopic observations. However, our proposed method offers an alternative solution by harnessing the power of generative models and latent representations. In this report, we introduce the new model we have developed and demonstrate its ability to accurately obtain full spectra from band data.