conferenceseries.com

International Congress on AI AND MACHINE LEARNING

August 02, 2021 | Webinar

Classification of multiwavelength transients with machine learning

Kimeel Sooknunan
Imperial College London, UK

With the advent of powerful telescopes such as the Square Kilometer Array and the Vera C. Rubin Observatory, we are enteringan era of multiwavelength transient astronomy that will lead to a dramatic increase in data volume. Machine learning techniquesare well suited to address this data challenge and rapidly classify newly detected transients. We will present a multiwavelength classification algorithm consisting of three steps: (1) interpolation and augmentation of the data using Gaussian processes; (2) feature extraction using wavelets; (3) classification with random forests. Augmentation provides improved performance attest time by balancing the classes and adding diversity into the training set. In the first application of machine learning to the classification of real radio transient data, we apply our technique to the Green Bank Interferometer and other radio light curves. We will show that we are able to accurately classify most of the eleven classes of radio variables and transients after just eight hours ofobservations, achieving an overall test accuracy of 78%. We present our investigation of the impact of the small sample size of 82 publicly available light curves and use data augmentation techniques to mitigate the effect. We also show that on a significantly largersimulated representative training set that the algorithm achieves an overall accuracy of 97%, illustrating that the method is likelyto provide excellent performance on future surveys. Finally, we demonstrate the effectiveness of simultaneous multiwavelength observations by showing how incorporating just one optical data point into the analysis improves the accuracy of the worstperforming class by 19%.

Biography

Kimeel is currently completing his PhD at Imperial College London. He completed his Masters at the University of Cape Town in 2019. He currently works on the application of Machine Learning techniques to prolems in Astrophysics.

k.sooknunan19@imperial.ac.uk