

Antonio Vanzanella (NCBJ) "Detection of Slow-moving objects with LSST"

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We aim at detecting Solar System slow-moving objects (SMOs) in LSST images using a Three-Dimensional Convolutional Neural Network (3D-CNN). Since no preexisting dataset is available, we created a dataset containing samples able to condense exhaustively the characteristics of the SMOs. We used small (15x15 pixel) cut-outs of LSST DP0.2's simulated images in which we painted a simulated SMO. This simulated object is modeled on Trans-Neptunian objects from the Jet Propulsion Laboratory Catalog but re-scaled to large distances. We further populated the dataset and increased its dimension, using data augmentation techniques, and obtained over 5000 samples. During the training process, regularization and normalization techniques are applied to prevent overfitting. We evaluated the network performance on a new test set of 200 samples and achieved an accuracy of 90%. In this talk, we will present the model and discuss the details of how the pipeline works. Moreover, we will show how the network's performance varies as a function of the apparent speed of the SMOs.

Session Classification : Stellar astrophysics & transients