TESS Data for Asteroseismology (T'DA) Stellar Variability Classification Pipeline

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The TESS Data for Asteroseismology (T'DA) Stellar Variability Classification Pipeline aims to classify the millions of stars observed by TESS according to their variability type. The pipeline consists of a supervised framework with an unsupervised component added on top. The overall strategy in the supervised classification is to train multiple distinct classifiers with different feature sets on the same data and then pass these results on to a meta-classifier, which combines the predictions from this ensemble of models and assigns a final classification. This way the metaclassifier accounts for the relative strengths of each individual classifier. After having been provided a general labelling by the supervised pipeline, we run a hierarchical density-based clustering algorithm to unravel any remaining substructure still present in each variability class. The benefit of using this hybrid approach is that we can optimally take advantage of the existing knowledge on stellar variability while at the same time leaving room for new insights coming from the unsupervised classification. The latter allows us to identify new variability classes, subclasses and potential misclassifications. We currently validated our method on Kepler data and will apply it to TESS in the coming months.