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Zone 1 Abstract

Using Physics to Classify Musical Instruments with a Hybrid Neural Network

Classifying audio signals by source with machine learning has become a topic of much research in the past few years. Standard implementations often involve the production of a spectrogram or feature vector and passing the resulting predictors to a neural network for training. In order for a classifier model to perform well, features must be chosen as to represent the physical properties of soundwaves in a compact and non-redundant way. In this study, we explore principles from physics and music, and how known properties of sound have been used to develop (the start of) a powerful set of features for classifying musical instruments. How do I convey the idea "of Work in Progress" here? We also explore how the choice of features influences the architecture of the neural network and allows for the creation of a Hybrid Neural Network (which shows preliminary evidence of superior performance over it's non-hybrid counter parts). Is that Last sentence in blue too bold? How do I convey the idea "of Work in Progress" here? We finish with a practical demonstration in using this classifier model to match waveforms from a chaotic music synthesizer to real-world musical instruments. Training data was provided by Philharmonia Symphony Orchestra and University of Iowa's Electronic Music Studios.