1163-M5-1379   **Landon H. Buell*** (`lhb1007@wildcats.unh.edu`), Durham, NH 03824, and **Kevin M. Short** (`kevin.short@unh.edu`), Dept. of Mathematics & Statistics, University of New Hampshire, Durham, NH 03824. *Musical Instrument Classification Using a Hybrid Neural Network.*

Classifying audio signals with machine learning has become an important topic of research in the past few years. Models often involve the input of a 2-D spectrogram or 1-D feature vector into a unimodal network such as a Convolutional Neural Network (CNN) or Multilayer Perceptron (MLP). In this study, we explore automatic classification of musical instruments using a new hybrid neural-network architecture that combines the CNN and MLP models and provides superior performance over models that rely solely on one or the other. This hybrid network uses two branches, one being a CNN to process an image-like 2-D spectrogram, and the other being an MLP to process a 1-D feature vector. Within the model, a hidden layer combines activations from the two branches by concatenating them into a single 1-D dense layer, thus any predictions are a product of both branches. We describe in detail the creation of the spectrogram and features, as well as how they influence the chosen network architecture. We finish with a practical demonstration that uses this classifier model to match waveforms from a chaotic music synthesizer to real-world musical instruments. Training data is from studio recordings of the Philharmonia Symphony Orchestra and University of Iowa's Electronic Music Studios. (Received September 15, 2020)