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MIR - Assignment 3 – Analysis

Response to Analysis Questions 4 and 5

The theme of this implementation and analysis was focused around a discussion of timbre—a physical sound property that can describe so much yet is difficult to concretely define. In this discussion, instrument classification was implemented using Mel-Frequency Cepstrum Coefficients (MFCCs), where the presented algorithm distinguished between two instrument classes in two separate cases. Training data for each instrument class was fed into the system and tested with corresponding test data. The training data for each class was around 1 minute long and included two distinct samples per class, while the testing data for each class was around 20 seconds for each class. **In classifying piano versus trumpet signals, the overall accuracy of the system was 86.97%. The per class accuracies for piano and trumpet were 75.53% and 99.19% respectively.** The slight inaccuracy in this case can be attributed to the samples in the piano training data being drastically different from the testing data. The piano training data has very percussive qualities and then switches to a very low frequency range, while the testing data sounds like a jazz style piece, with less percussive elements and occupying mid-range frequencies. Further, the trumpet training and testing data sound very similar in style.

A second round of testing was computed to distinguish between trombone and trumpet signals, with an overall accuracy of 98.48%. At first glance this result was surprising since it suggests that the system was more accurate in distinguishing between very similar instruments (trombone versus trumpet), than it was at distinguishing between different instruments (piano versus trumpet), in terms of the anatomies and sonic qualities of the instruments. **Finally, the per class accuracies for trombone and trumpet were 100% and 97.08% respectively.**