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Assignment 3

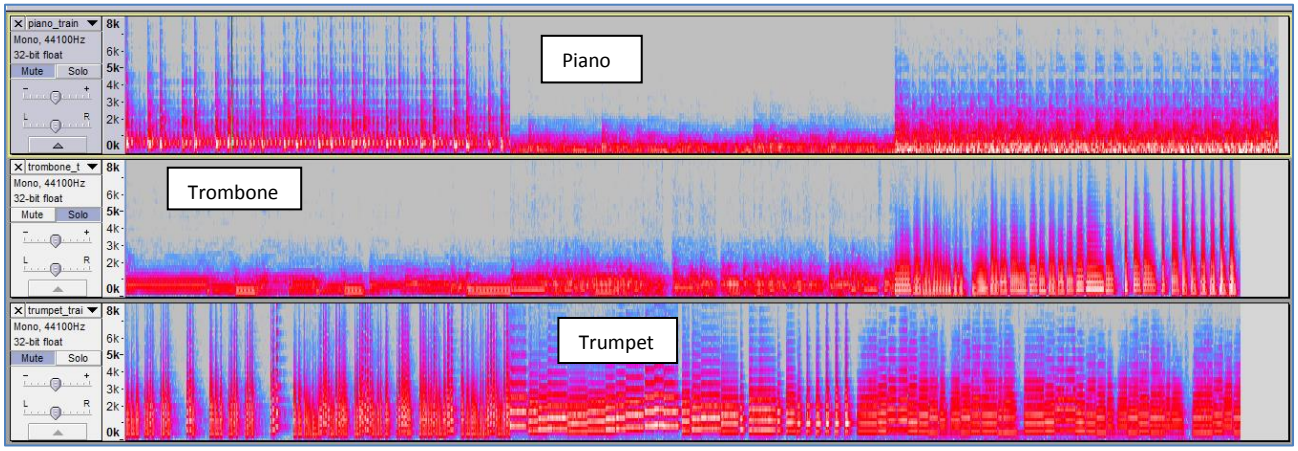
1. We have computed features of Piano file and Trumpet file by calling our function ‘create_set’ – which calls ‘compute_mfccs’ function to computes feature of each frame of the audio file; which is then concatenated with feature file containing all the features from all audio files.
2. Similarly, we have computed test feature values and its labels.
3. Using ‘predict_labels’ function we figured out test labels of test_features based on the given training feature value and corresponding labels by implementing nearest neighbor classifier.
4.
    a. Over all accuracy = 84.45%
    b. Accuracy for Piano Class detection = 69.94%
    c. Accuracy for Trumpet Class detection = 99.94%

    Thus, we can conclude almost all the Trumpet features were correctly classified and very few were classified as Piano. However, most of the Piano features were misclassified with Trumpet class.

5. Similarly, we compute the accuracy for Trombone and Trumpet classification and found below results:
    a. Over all accuracy = 98.42%
    b. Accuracy for Piano Class detection = 99.46%
    c. Accuracy for Trumpet Class detection = 97.46%

    Thus, our classifier classifies Trombone notes and Trumpet notes clearly with a great accuracy. There are very few misclassified frames for both the classes.

    As the MFCC’s represent spectral information along the time frames and thus by looking at the spectrum of train data of all the three instrument we can justify that classification of Trombone and Trumpet is much easier than the classification of Piano and Trumpet.



As we know piano has a wide range of frequency options from low to high thus when a high frequency key is played with Piano and Trumpet MFCCs it will give high correlation with Trumpet as it has all the high frequency notes.

Where as for Trombone and Trumpet which as a definite separation between its frequency range. Thus its classification give high accuracy when compared using nearest neighbor classifier.