Report

Step 1

After retraining, the classifier accuracy is: 95.5899%. Before retraining, it was 95.6%.

Step 2

Our accuracies were:

- 2 second window: 94.6589
- 3 second window: 95.4380
- 4 second window: 95.5211

Step 3

After adapting to use all 12 features, our model accuracy went up to 95.8538% for the 1 second window, which was the best of the windows we tested. This did improve the accuracy.

Step 4

Interestingly, this process yielded better results on feature set with length 4 (we were curious and tested it anyway) than on that of window length 1. Following the assignment instructions, we found that the best classifier with window length 1 found with Sequential Feature Selection had accuracy 96.4568%. The features selected were the mean of x, mean of y, RMS of y, standard deviation of z, median of z, and rms of z. This is an improvement of the accuracy from part 3 by about 0.6%. The pattern of accuracy increase as features were selected was: 88.58, 90.99, 95.18, 95.89, 96.27, 96.4568.

Step 5

For the random forest classifier, the highest accuracy found was 96.6830%. The features selected were the mean of x, standard deviation of y, median of y, mean of z, and standard deviation of z. This was the best of the three classifiers and was an improvement on the previous two. The accuracy increase over each iteration was as follows: 81.00, 91.63, 95.67, 96.16, 96.6830.

For the SVM classifier, our results were surprisingly poor, having only a 94.0444% accuracy. The features selected were the mean of x, standard deviation of x, RMS of x, mean of y, standard deviation of z, and RMS of z. As features are selected, the accuracy increases in the pattern 88.62, 89.67, 93.86, 93.97, 94.01, 94.0444.