C:\Users\whitn\Anaconda2\envs\ml4qs2\python.exe C:/Users/whitn/OneDrive/Documenten/Groupwork\_TommyErik/ML4QS/ML4QS-master/PythonCode/crowdsignals\_ch7\_classification\_gym\_WALKINGRUNNINGblockprediction.py

C:/Users/whitn/OneDrive/Documenten/Groupwork\_TommyErik/ML4QS/ML4QS-master/PythonCode/crowdsignals\_ch7\_classification\_gym\_WALKINGRUNNINGblockprediction.py:45: FutureWarning: to\_datetime is deprecated. Use pd.to\_datetime(...)

dataset.index = dataset.index.to\_datetime()

Training set length is: 265

Test set length is: 261

#basic features: 9

#PCA features: 4

#time features: 26

#frequency features: 189

#cluster features: 3

The best parameters for NN with the initial set features in repeat number 0 are:

C:\Users\whitn\Anaconda2\envs\ml4qs2\lib\site-packages\sklearn\neural\_network\multilayer\_perceptron.py:563: ConvergenceWarning: Stochastic Optimizer: Maximum iterations reached and the optimization hasn't converged yet.

% (), ConvergenceWarning)

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (25,)}

The best parameters for RF with the initial set features in repeat number 0 are:

{'n\_estimators': 10, 'criterion': 'gini', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_x & 0.291601979133

mag\_phone\_y & 0.223790133342

mag\_phone\_z & 0.163346124195

acc\_phone\_z & 0.103218451157

acc\_phone\_y & 0.0791887212512

acc\_phone\_x & 0.0679343684328

gyr\_phone\_z & 0.0395179742598

gyr\_phone\_x & 0.0218477800309

gyr\_phone\_y & 0.0095544681979

The best parameters for SVM with the initial set features in repeat number 0 are:

{'kernel': 'rbf', 'C': 10, 'gamma': 0.001}

The best parameters for NN with the initial set features in repeat number 1 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (25,)}

The best parameters for RF with the initial set features in repeat number 1 are:

{'n\_estimators': 10, 'criterion': 'entropy', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_x & 0.307523127411

mag\_phone\_y & 0.234595635554

mag\_phone\_z & 0.218800623069

acc\_phone\_y & 0.0698006118954

acc\_phone\_x & 0.0643541369932

acc\_phone\_z & 0.0505751758589

gyr\_phone\_z & 0.0189681715383

gyr\_phone\_x & 0.0188408240756

gyr\_phone\_y & 0.0165416936048

The best parameters for SVM with the initial set features in repeat number 1 are:

{'kernel': 'rbf', 'C': 10, 'gamma': 0.001}

The best parameters for NN with the initial set features in repeat number 2 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (10,)}

The best parameters for RF with the initial set features in repeat number 2 are:

{'n\_estimators': 50, 'criterion': 'gini', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_x & 0.264332321345

mag\_phone\_y & 0.221396905888

mag\_phone\_z & 0.150894190721

acc\_phone\_x & 0.108706498835

acc\_phone\_y & 0.0935067991213

acc\_phone\_z & 0.0849656250569

gyr\_phone\_z & 0.0384408044328

gyr\_phone\_x & 0.0213728806699

gyr\_phone\_y & 0.01638397393

The best parameters for SVM with the initial set features in repeat number 2 are:

{'kernel': 'rbf', 'C': 10, 'gamma': 0.001}

The best parameters for NN with the initial set features in repeat number 3 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (25,)}

The best parameters for RF with the initial set features in repeat number 3 are:

{'n\_estimators': 100, 'criterion': 'entropy', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_x & 0.260129217876

mag\_phone\_y & 0.215898741503

mag\_phone\_z & 0.182748259845

acc\_phone\_x & 0.119574735553

acc\_phone\_y & 0.10135698625

acc\_phone\_z & 0.0709374129325

gyr\_phone\_z & 0.0198115434726

gyr\_phone\_x & 0.0153997616503

gyr\_phone\_y & 0.0141433409189

The best parameters for SVM with the initial set features in repeat number 3 are:

{'kernel': 'rbf', 'C': 10, 'gamma': 0.001}

The best parameters for NN with the initial set features in repeat number 4 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the initial set features in repeat number 4 are:

{'n\_estimators': 10, 'criterion': 'entropy', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_x & 0.317692054066

mag\_phone\_z & 0.263239851798

mag\_phone\_y & 0.197472043288

acc\_phone\_y & 0.0724390878578

acc\_phone\_x & 0.0636322939972

acc\_phone\_z & 0.0388646583129

gyr\_phone\_z & 0.0265132061576

gyr\_phone\_x & 0.0112157543338

gyr\_phone\_y & 0.00893105018783

The best parameters for SVM with the initial set features in repeat number 4 are:

{'kernel': 'rbf', 'C': 10, 'gamma': 0.001}

The best parameters for KNN with the initial set features are:

{'n\_neighbors': 1}

The best parameters for DT with the initial set features are:

{'criterion': 'entropy', 'min\_samples\_leaf': 2}

Feature importance decision tree:

mag\_phone\_x & 0.369958604686

mag\_phone\_y & 0.327952210186

mag\_phone\_z & 0.180753740957

acc\_phone\_x & 0.0415521679243

gyr\_phone\_z & 0.0362077863551

acc\_phone\_y & 0.0249431470232

acc\_phone\_z & 0.0186323428689

gyr\_phone\_x & 0.0

gyr\_phone\_y & 0.0

initial set & 0.9389 \emph{( 0.9094 - 0.9683 )} & 0.7211 \emph{( 0.6656 - 0.7766 )} & 0.9925 \emph{( 0.9818 - 1.0031 )} & 0.7686 \emph{( 0.7164 - 0.8208 )} & 0.9811 \emph{( 0.9644 - 0.9978 )} & 0.7739 \emph{( 0.7222 - 0.8257 )} & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.7893 \emph{( 0.7388 - 0.8398 )} & 0.9887 \emph{( 0.9757 - 1.0017 )} & 0.7318 \emph{( 0.6770 - 0.7866 )} & 0.9358 \emph{( 0.9057 - 0.9660 )} & 0.7280 \emph{( 0.6729 - 0.7831 )} \\\hline

The best parameters for NN with the Chapter 3 features in repeat number 0 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Chapter 3 features in repeat number 0 are:

{'n\_estimators': 50, 'criterion': 'entropy', 'min\_samples\_leaf': 2}

Feature importance random forest:

pca\_1 & 0.219226402155

pca\_2 & 0.153995632923

mag\_phone\_x & 0.129450596303

mag\_phone\_z & 0.118968238027

mag\_phone\_y & 0.0928293788137

pca\_3 & 0.086148361951

acc\_phone\_x & 0.0758944642897

acc\_phone\_y & 0.0524185074191

acc\_phone\_z & 0.0246884845063

gyr\_phone\_z & 0.0195962555661

pca\_4 & 0.010177854666

gyr\_phone\_x & 0.00972538035381

gyr\_phone\_y & 0.00688044302702

The best parameters for SVM with the Chapter 3 features in repeat number 0 are:

{'kernel': 'rbf', 'C': 10, 'gamma': 0.001}

The best parameters for NN with the Chapter 3 features in repeat number 1 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (25,)}

The best parameters for RF with the Chapter 3 features in repeat number 1 are:

{'n\_estimators': 100, 'criterion': 'gini', 'min\_samples\_leaf': 2}

Feature importance random forest:

pca\_1 & 0.172580442803

mag\_phone\_x & 0.169147464537

pca\_2 & 0.116421406232

mag\_phone\_y & 0.113613487617

pca\_3 & 0.097106031327

mag\_phone\_z & 0.0831769472529

acc\_phone\_y & 0.0700164741378

acc\_phone\_x & 0.0672734718683

acc\_phone\_z & 0.0464176441987

gyr\_phone\_z & 0.0233414870217

pca\_4 & 0.0172084840907

gyr\_phone\_x & 0.0121163292155

gyr\_phone\_y & 0.0115803296985

The best parameters for SVM with the Chapter 3 features in repeat number 1 are:

{'kernel': 'rbf', 'C': 10, 'gamma': 0.001}

The best parameters for NN with the Chapter 3 features in repeat number 2 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (25,)}

The best parameters for RF with the Chapter 3 features in repeat number 2 are:

{'n\_estimators': 100, 'criterion': 'entropy', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_x & 0.169714959377

pca\_1 & 0.149652135204

pca\_2 & 0.142041300014

mag\_phone\_y & 0.12684223752

pca\_3 & 0.112621423796

mag\_phone\_z & 0.103051819477

acc\_phone\_x & 0.0619680462395

acc\_phone\_y & 0.0518010050022

acc\_phone\_z & 0.0382600295565

pca\_4 & 0.0138365170586

gyr\_phone\_z & 0.0135061928776

gyr\_phone\_x & 0.00841504522643

gyr\_phone\_y & 0.00828928865072

The best parameters for SVM with the Chapter 3 features in repeat number 2 are:

{'kernel': 'rbf', 'C': 10, 'gamma': 0.001}

The best parameters for NN with the Chapter 3 features in repeat number 3 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (25,)}

The best parameters for RF with the Chapter 3 features in repeat number 3 are:

{'n\_estimators': 10, 'criterion': 'gini', 'min\_samples\_leaf': 2}

Feature importance random forest:

pca\_1 & 0.206445291193

pca\_2 & 0.149067905164

mag\_phone\_x & 0.129404158171

pca\_3 & 0.123363666842

mag\_phone\_z & 0.113835037292

mag\_phone\_y & 0.0772663184613

acc\_phone\_y & 0.0613062488433

acc\_phone\_z & 0.0352062913765

pca\_4 & 0.0304415632405

acc\_phone\_x & 0.027259399949

gyr\_phone\_z & 0.0199193629904

gyr\_phone\_y & 0.0179361396536

gyr\_phone\_x & 0.00854861682425

The best parameters for SVM with the Chapter 3 features in repeat number 3 are:

{'kernel': 'rbf', 'C': 10, 'gamma': 0.001}

The best parameters for NN with the Chapter 3 features in repeat number 4 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (25,)}

The best parameters for RF with the Chapter 3 features in repeat number 4 are:

{'n\_estimators': 50, 'criterion': 'gini', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_x & 0.172252515147

pca\_1 & 0.151162355597

mag\_phone\_y & 0.148752898903

pca\_3 & 0.112357400632

pca\_2 & 0.0977798522784

acc\_phone\_x & 0.0811246807701

mag\_phone\_z & 0.0773917728363

acc\_phone\_y & 0.0538225393154

acc\_phone\_z & 0.0390320487838

gyr\_phone\_z & 0.0197682785587

gyr\_phone\_y & 0.0182078353911

pca\_4 & 0.0172867279706

gyr\_phone\_x & 0.0110610938173

The best parameters for SVM with the Chapter 3 features in repeat number 4 are:

{'kernel': 'rbf', 'C': 10, 'gamma': 0.001}

The best parameters for KNN with the Chapter 3 features are:

{'n\_neighbors': 1}

The best parameters for DT with the Chapter 3 features are:

{'criterion': 'entropy', 'min\_samples\_leaf': 2}

Feature importance decision tree:

pca\_1 & 0.358648773025

mag\_phone\_y & 0.202373480635

mag\_phone\_z & 0.14127188581

mag\_phone\_x & 0.137676963235

acc\_phone\_x & 0.0398189565213

pca\_3 & 0.0390101182485

gyr\_phone\_z & 0.0361132901154

acc\_phone\_y & 0.0283882161503

acc\_phone\_z & 0.0150735490335

pca\_4 & 0.00162476722511

pca\_2 & 0.0

gyr\_phone\_y & 0.0

gyr\_phone\_x & 0.0

Chapter 3 & 0.9426 \emph{( 0.9141 - 0.9712 )} & 0.7211 \emph{( 0.6656 - 0.7766 )} & 0.9970 \emph{( 0.9902 - 1.0037 )} & 0.7839 \emph{( 0.7330 - 0.8349 )} & 0.9811 \emph{( 0.9644 - 0.9978 )} & 0.7739 \emph{( 0.7222 - 0.8257 )} & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.7893 \emph{( 0.7388 - 0.8398 )} & 0.9925 \emph{( 0.9818 - 1.0031 )} & 0.8008 \emph{( 0.7513 - 0.8502 )} & 0.9208 \emph{( 0.8876 - 0.9539 )} & 0.7165 \emph{( 0.6607 - 0.7723 )} \\\hline

The best parameters for NN with the Chapter 4 features in repeat number 0 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Chapter 4 features in repeat number 0 are:

{'n\_estimators': 100, 'criterion': 'gini', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0561726760568

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0465712610233

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0443121916265

pca\_1\_temp\_mean\_ws\_100 & 0.0399849733091

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0398040698623

pca\_2\_temp\_mean\_ws\_100 & 0.0393281609989

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0389884112238

mag\_phone\_x & 0.035300604271

mag\_phone\_y & 0.0333279956553

pca\_1 & 0.0286010590841

acc\_phone\_x\_pse & 0.0283691843747

mag\_phone\_x\_pse & 0.0261975765099

pca\_3\_temp\_mean\_ws\_100 & 0.0256501825267

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.0254769154641

pca\_2 & 0.0238864095626

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0226856390292

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0226824627292

pca\_3 & 0.0214019800356

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0181642703424

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0181389556699

pca\_4\_temp\_std\_ws\_100 & 0.0173113953259

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.016812963189

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0166899431778

acc\_phone\_y\_max\_freq & 0.0154376916096

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0136321454413

mag\_phone\_y\_pse & 0.0132804631822

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0129429781474

mag\_phone\_z\_pse & 0.0129188569068

pca\_2\_temp\_std\_ws\_100 & 0.0129072307678

mag\_phone\_z\_temp\_std\_ws\_100 & 0.0128257509801

pca\_1\_temp\_std\_ws\_100 & 0.0125446967203

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0124479484803

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0123569401585

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0103259323797

mag\_phone\_z & 0.0101923016105

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0100747069551

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.00812813541746

acc\_phone\_z\_pse & 0.00797086086226

mag\_phone\_z\_max\_freq & 0.00776697699192

pca\_3\_temp\_std\_ws\_100 & 0.00763594331775

acc\_phone\_y\_pse & 0.0075217970369

acc\_phone\_x & 0.00747012725231

mag\_phone\_y\_max\_freq & 0.00732987056465

acc\_phone\_y & 0.00642485293027

mag\_phone\_x\_temp\_std\_ws\_100 & 0.00620652519819

pca\_4\_temp\_mean\_ws\_100 & 0.00592529877931

acc\_phone\_x\_max\_freq & 0.00372700717656

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00352142767494

acc\_phone\_z & 0.00327607199121

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0031678538944

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00285311365207

gyr\_phone\_z\_max\_freq & 0.0026330016894

gyr\_phone\_z\_pse & 0.00223227065135

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00222784014676

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00203722368075

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.00191469451359

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00186865215772

mag\_phone\_y\_temp\_std\_ws\_100 & 0.00171241854191

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00170376873702

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0016347069032

mag\_phone\_y\_freq\_weighted & 0.00160513695192

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00143360229027

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00137797238291

mag\_phone\_x\_max\_freq & 0.00136052716047

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00131061880807

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00123446338523

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.00112051201887

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00111712124363

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00111620218622

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00103840179366

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00100894530241

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000998344736907

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000908537611011

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000904619892884

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000900716757896

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000839401198022

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000801743799332

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.000799466395172

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000764930955481

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000724460200962

acc\_phone\_z\_max\_freq & 0.00072048924584

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000710958318278

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000708024525325

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.000697574338583

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000690257463252

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000667213196484

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000647836267067

gyr\_phone\_x\_max\_freq & 0.00062309273874

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000583793548118

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000560924209646

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000554314943627

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000529773999044

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000526516873036

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000525503344298

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000497386520753

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000470617253499

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000443698665027

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000428693093789

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000423473960696

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000411065801191

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000388673762144

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000379295138762

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000362757074432

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000361939160036

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000352277811998

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000348173663814

gyr\_phone\_z & 0.000348049539827

gyr\_phone\_y\_max\_freq & 0.000347266501454

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000345487024314

acc\_phone\_x\_freq\_weighted & 0.000344020932639

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000335873740129

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.00033228928588

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000331585501332

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00032929232889

acc\_phone\_y\_freq\_weighted & 0.000316585930871

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000312765950959

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000311947988676

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000296773787387

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000290570524763

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000287618469621

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000286624132652

gyr\_phone\_y & 0.000267649039047

gyr\_phone\_z\_freq\_weighted & 0.00024243798943

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000240780674549

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000215100257957

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000205883232471

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000196923867337

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000190937267456

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000187704953872

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000187041441843

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000182678924343

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000178206169968

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000176294979878

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000171895505704

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000160398327946

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000146168844904

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000125690160807

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000123934017333

gyr\_phone\_y\_pse & 0.000111769031451

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000109819945611

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000109060454473

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000108390440307

mag\_phone\_x\_freq\_weighted & 0.000107835392893

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000105451770624

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000103424566689

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 9.655485549e-05

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 8.40906625773e-05

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 8.08579081903e-05

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 7.94947003533e-05

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 7.94325882702e-05

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 7.89831062769e-05

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 7.87635116299e-05

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 7.41814843015e-05

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 7.31480657934e-05

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 6.10864440905e-05

acc\_phone\_z\_freq\_weighted & 5.78001509776e-05

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 5.65741924723e-05

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 5.62342413245e-05

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 4.22662558585e-05

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 4.16596797183e-05

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 4.11618515067e-05

mag\_phone\_z\_freq\_weighted & 4.06350725144e-05

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 4.0611673774e-05

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 4.01454933275e-05

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 3.9658125343e-05

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 3.96084739714e-05

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 3.95514661854e-05

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 3.94399233228e-05

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 3.90324716497e-05

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 3.88109956816e-05

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 3.62840499851e-05

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 3.00271377339e-05

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 2.81502052461e-05

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 2.76337514121e-05

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 2.55276824838e-05

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 2.29507439505e-05

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_pse & 0.0

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

pca\_4 & 0.0

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_x & 0.0

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_weighted & 0.0

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_weighted & 0.0

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

The best parameters for SVM with the Chapter 4 features in repeat number 0 are:

{'kernel': 'poly', 'C': 1, 'gamma': 0.001}

The best parameters for NN with the Chapter 4 features in repeat number 1 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Chapter 4 features in repeat number 1 are:

{'n\_estimators': 100, 'criterion': 'entropy', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0635355797418

pca\_1\_temp\_mean\_ws\_100 & 0.0614171760807

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0396256831405

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.03855359503

pca\_3\_temp\_mean\_ws\_100 & 0.0385062103764

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0365173880927

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0362081759515

pca\_2\_temp\_mean\_ws\_100 & 0.0355818744804

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0346654366337

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0343186117764

pca\_1 & 0.0330812217299

mag\_phone\_y & 0.033031708146

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0278613541977

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0274933874473

mag\_phone\_x\_pse & 0.0264935810533

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0228669498376

acc\_phone\_y\_temp\_std\_ws\_100 & 0.019808255902

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0181187994821

mag\_phone\_x & 0.0175743043192

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0174051794413

pca\_2 & 0.0173318064225

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0163963211964

acc\_phone\_y\_max\_freq & 0.0148220436763

mag\_phone\_z\_max\_freq & 0.0140507986391

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.0136590428248

mag\_phone\_z & 0.0132483435086

pca\_4\_temp\_mean\_ws\_100 & 0.0126840654997

pca\_2\_temp\_std\_ws\_100 & 0.0126116359993

pca\_4\_temp\_std\_ws\_100 & 0.01224703992

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0120684086447

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0117540834627

pca\_3 & 0.0114331260631

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0113147786551

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0105698380162

mag\_phone\_y\_pse & 0.0100039663063

mag\_phone\_z\_temp\_std\_ws\_100 & 0.00974807929544

acc\_phone\_z\_pse & 0.00934808059605

mag\_phone\_z\_pse & 0.00867054219545

acc\_phone\_x\_pse & 0.00810961934171

acc\_phone\_x & 0.00803585460623

mag\_phone\_x\_max\_freq & 0.00744089206838

pca\_1\_temp\_std\_ws\_100 & 0.0073575293181

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.00710976689936

pca\_3\_temp\_std\_ws\_100 & 0.00644247779239

acc\_phone\_y\_pse & 0.00452206075725

acc\_phone\_x\_max\_freq & 0.00368311915051

mag\_phone\_y\_temp\_std\_ws\_100 & 0.00344754663399

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00293532389408

mag\_phone\_y\_max\_freq & 0.00287994911463

acc\_phone\_y & 0.00279550833829

acc\_phone\_z & 0.00262862990882

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00252133691218

acc\_phone\_z\_max\_freq & 0.00184007102711

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00175692979488

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00145472862717

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.00132805045325

gyr\_phone\_z\_max\_freq & 0.00110259917646

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0010920531428

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00108946034652

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00102079797245

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.00101921399388

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00101115160084

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00100782546042

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000954989436307

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000928716621602

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000824967419236

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00082285333379

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000786476930137

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000759361398315

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00075651084547

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000737960114694

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000662453983885

gyr\_phone\_x\_max\_freq & 0.000652635521871

mag\_phone\_x\_freq\_weighted & 0.000636406723203

gyr\_phone\_x\_pse & 0.000610251005519

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000597269269859

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000525219176847

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000520679267886

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000500793274461

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000486796118531

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.00047795880755

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000477383169453

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.000473106257211

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000466157730757

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00045577112837

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000444098669243

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000432602135466

gyr\_phone\_z\_freq\_weighted & 0.000426111690003

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000413974713909

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000411749639487

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000406609176546

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00039345260468

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000392544263374

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000388997643202

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000372945431557

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000370161991556

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000369740672981

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00036967634747

gyr\_phone\_z & 0.000356555166558

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000356454240893

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000352144218122

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000345709088993

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000325484205626

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000317511030619

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000317481152346

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000312615493611

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000294794797145

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000286012237767

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000264832159535

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000252951389927

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000252840811954

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000247966182084

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000247308912719

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000237080391854

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000229074200901

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000227289222935

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000222952266853

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000222469969464

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000221962540822

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000219630437406

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000212711523691

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.000207793655659

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000198728474855

pca\_4 & 0.000198406370366

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000192190458959

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00018633380119

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000181151574759

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000178053633584

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000176669178385

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000171934936458

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000171013278934

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000169067654448

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.00016480666777

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000163892599967

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000156202143458

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000145662623324

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000144515282954

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000142780121738

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000141060424598

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000138959454351

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000134560704151

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000131873978005

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.00012863524687

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000123882509311

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000115406691924

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000115009222906

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000114118735998

gyr\_phone\_y\_pse & 0.000111985871967

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000110269340382

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000109502407757

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000104375998986

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 9.3856688008e-05

gyr\_phone\_z\_pse & 9.33258796672e-05

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 8.78883222154e-05

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 8.08726636635e-05

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 8.02315787752e-05

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 6.39754040321e-05

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 6.36372202169e-05

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 6.35026971407e-05

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 6.24612206696e-05

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 6.01244603257e-05

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 5.94356913026e-05

gyr\_phone\_y & 5.9173282415e-05

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 5.79069929352e-05

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 5.47090122927e-05

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 5.34578460666e-05

gyr\_phone\_y\_max\_freq & 5.31679639238e-05

gyr\_phone\_x & 5.25899974308e-05

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 5.16613767377e-05

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 4.91352493042e-05

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 4.68457938211e-05

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 4.26059618294e-05

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 4.25282953208e-05

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 3.84373588268e-05

acc\_phone\_x\_freq\_weighted & 3.79671517476e-05

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 3.5144722475e-05

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 2.55162074946e-05

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 2.13138604623e-05

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 1.68013346591e-05

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 1.63972135002e-05

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 1.63012384167e-05

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_weighted & 0.0

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_weighted & 0.0

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_weighted & 0.0

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_weighted & 0.0

mag\_phone\_z\_freq\_weighted & 0.0

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_weighted & 0.0

The best parameters for SVM with the Chapter 4 features in repeat number 1 are:

{'kernel': 'poly', 'C': 1, 'gamma': 0.001}

The best parameters for NN with the Chapter 4 features in repeat number 2 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100, 10)}

The best parameters for RF with the Chapter 4 features in repeat number 2 are:

{'n\_estimators': 50, 'criterion': 'entropy', 'min\_samples\_leaf': 10}

Feature importance random forest:

pca\_3\_temp\_mean\_ws\_100 & 0.0636700217571

pca\_2\_temp\_mean\_ws\_100 & 0.0585612867249

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0549034682772

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0547122864993

pca\_1\_temp\_mean\_ws\_100 & 0.0393145010907

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0360268910471

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0309654214061

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0295825891339

mag\_phone\_y & 0.0290338574093

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0288928305949

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0256869239412

mag\_phone\_z & 0.0251639370934

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0234399148936

pca\_2 & 0.0223632619788

pca\_1 & 0.0218830441502

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0216720245486

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0211876761278

mag\_phone\_x & 0.0211665573369

acc\_phone\_y\_max\_freq & 0.0209768256483

mag\_phone\_x\_pse & 0.0199090025811

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0194442622339

mag\_phone\_z\_max\_freq & 0.0192899774668

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0190159674493

acc\_phone\_z\_pse & 0.017816530303

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0155679836083

pca\_4\_temp\_std\_ws\_100 & 0.015219651535

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0149613268617

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.0146696242674

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0144600393539

pca\_2\_temp\_std\_ws\_100 & 0.0133786865996

pca\_4\_temp\_mean\_ws\_100 & 0.0129106475793

mag\_phone\_y\_pse & 0.0125128912969

acc\_phone\_x\_pse & 0.0122542536383

mag\_phone\_x\_max\_freq & 0.0121379237308

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0120354788018

mag\_phone\_y\_max\_freq & 0.0116088713858

acc\_phone\_x & 0.0100386362566

pca\_3\_temp\_std\_ws\_100 & 0.00924919165056

acc\_phone\_z\_temp\_std\_ws\_100 & 0.00739931151101

acc\_phone\_y\_pse & 0.00694129415141

acc\_phone\_x\_max\_freq & 0.00677382062834

acc\_phone\_z & 0.00612213994533

mag\_phone\_z\_temp\_std\_ws\_100 & 0.00611587298793

pca\_3 & 0.00503156173612

acc\_phone\_y & 0.00465503022693

pca\_1\_temp\_std\_ws\_100 & 0.00434651337883

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.00392939756939

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00378815587484

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00296590579944

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00294066881919

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.00293679282815

mag\_phone\_z\_pse & 0.00279826623228

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00220322567901

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00218942285403

gyr\_phone\_z\_pse & 0.00191117087702

mag\_phone\_x\_freq\_weighted & 0.00169101364465

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00137180887999

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00125946877128

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000992748605602

mag\_phone\_y\_temp\_std\_ws\_100 & 0.000950653643095

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000780304821247

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000755632849843

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000745957654382

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000732539579388

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000704300016641

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000682480591434

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000594369920754

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000550703294144

mag\_phone\_y\_freq\_weighted & 0.000547103780227

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0005355274719

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.00051115874095

acc\_phone\_y\_freq\_weighted & 0.000461367867812

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000435621250702

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000408577056335

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000406181271587

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000405888351639

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000385334246818

gyr\_phone\_z & 0.000384583549665

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.00038078925946

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000338072842296

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000319805157199

gyr\_phone\_y\_pse & 0.000299640417205

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000265320096323

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000252734995348

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000235499684505

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000234757624307

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000230585671692

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000220190922168

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.000215075410109

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000191834106752

acc\_phone\_z\_max\_freq & 0.000181292684348

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000169297758329

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000161408279768

gyr\_phone\_x\_pse & 0.000157499952628

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00015430793608

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000121546599626

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000111244003431

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000105756506937

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000101832257026

gyr\_phone\_x\_max\_freq & 9.2993296682e-05

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 8.46873576218e-05

gyr\_phone\_y\_freq\_weighted & 5.74108088336e-05

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 5.72578237444e-05

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 5.20325202404e-05

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 5.02836463882e-05

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 4.87677184094e-05

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 4.54653482623e-05

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 3.64660956758e-05

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_weighted & 0.0

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

pca\_4 & 0.0

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_max\_freq & 0.0

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_y & 0.0

gyr\_phone\_x & 0.0

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_weighted & 0.0

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_max\_freq & 0.0

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_weighted & 0.0

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_weighted & 0.0

acc\_phone\_z\_freq\_weighted & 0.0

The best parameters for SVM with the Chapter 4 features in repeat number 2 are:

{'kernel': 'poly', 'C': 1, 'gamma': 0.001}

The best parameters for NN with the Chapter 4 features in repeat number 3 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Chapter 4 features in repeat number 3 are:

{'n\_estimators': 100, 'criterion': 'gini', 'min\_samples\_leaf': 10}

Feature importance random forest:

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0522074773806

pca\_2\_temp\_mean\_ws\_100 & 0.0469415657993

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0468865241219

mag\_phone\_x\_pse & 0.0381557580981

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0379070755316

mag\_phone\_x & 0.0369104317373

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0355975734757

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0353696517751

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0330453004229

pca\_1\_temp\_mean\_ws\_100 & 0.0329025840852

pca\_3\_temp\_mean\_ws\_100 & 0.0310734684203

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.0284447262401

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0268051787093

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0261847631973

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0259471691531

pca\_1 & 0.0235144493892

pca\_3 & 0.0219704923416

mag\_phone\_z\_temp\_std\_ws\_100 & 0.0216545239028

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0204809917211

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0197721326686

pca\_2 & 0.0183183319893

mag\_phone\_y & 0.0176983549053

acc\_phone\_y\_max\_freq & 0.0171420502279

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0165806443755

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0162281664738

pca\_2\_temp\_std\_ws\_100 & 0.0158144748758

mag\_phone\_z\_max\_freq & 0.0153159053686

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0143433910744

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0133451365066

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0131270870847

pca\_3\_temp\_std\_ws\_100 & 0.0114756864416

mag\_phone\_y\_max\_freq & 0.0110758975704

acc\_phone\_x\_pse & 0.0109092612994

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0108668405119

mag\_phone\_y\_pse & 0.010814453914

mag\_phone\_z & 0.0101361651983

mag\_phone\_z\_pse & 0.0100788755105

acc\_phone\_y & 0.0091499985823

pca\_1\_temp\_std\_ws\_100 & 0.00874018725914

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.00793153688263

acc\_phone\_x\_max\_freq & 0.00733499114841

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.00686045528569

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.00596466795642

pca\_4\_temp\_std\_ws\_100 & 0.00559183744519

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00522825843931

acc\_phone\_z\_pse & 0.00521643653909

acc\_phone\_y\_pse & 0.00468256111988

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00418323321178

acc\_phone\_z & 0.003895487619

pca\_4\_temp\_mean\_ws\_100 & 0.00348961728514

gyr\_phone\_z\_max\_freq & 0.00342625617327

mag\_phone\_y\_temp\_std\_ws\_100 & 0.00301739458696

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00294178555219

acc\_phone\_x & 0.00278729134041

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00245265755345

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0023824617582

mag\_phone\_x\_max\_freq & 0.00216697296623

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0018529615421

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00182945101645

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00180631742101

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00172399184585

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.00138923768526

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00128405619551

mag\_phone\_x\_freq\_weighted & 0.00126047726235

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00113811267974

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00112962520387

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.000990209736071

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000969512808436

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00091218160725

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000908743898587

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000877445596831

gyr\_phone\_x\_freq\_weighted & 0.000844950031334

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0006872627496

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000553365491368

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000467088162222

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000465748665753

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000465682914918

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000424843675759

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000390520501314

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000384663322835

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000346690037387

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000343700625507

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000339445861393

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000294596184121

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000272500853058

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000258163997582

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000238768541615

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000236859289381

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000220318475886

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000216744040031

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000179104168784

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000177958317739

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000164357290665

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000130070753797

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000110415274404

acc\_phone\_z\_max\_freq & 0.000101622299868

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 8.39484823198e-05

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 8.37912027181e-05

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 7.76716747499e-05

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 7.34973756754e-05

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 7.10354820068e-05

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 6.68379662195e-05

acc\_phone\_z\_freq\_weighted & 6.57280187991e-05

gyr\_phone\_z & 5.19351852674e-05

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 4.39302802836e-05

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 3.65538666875e-05

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 3.37416485689e-05

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 3.26032263289e-05

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 2.96286020699e-05

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 2.79488232521e-05

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 2.41581366174e-05

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 2.38387255761e-05

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 2.14502198165e-05

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 2.11836640747e-05

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 2.0330344879e-05

mag\_phone\_z\_freq\_weighted & 2.01898535205e-05

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 1.95826588684e-05

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 1.86288805854e-05

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 1.76105419925e-05

gyr\_phone\_y & 1.72234196349e-05

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 1.61150075292e-05

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 1.21008205903e-05

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 6.76758062981e-06

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 6.54965710033e-06

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 6.52250389841e-06

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 6.46118763451e-06

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 6.31837928315e-06

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 6.2230626481e-06

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 6.22214810975e-06

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 6.11193652939e-06

gyr\_phone\_y\_temp\_mean\_ws\_100 & 6.03545632465e-06

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 5.87721751395e-06

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 5.78817225402e-06

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 5.62565961238e-06

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 5.50710516334e-06

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 5.30642724247e-06

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 5.17566594738e-06

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 4.97338501669e-06

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 4.87362537072e-06

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 4.85312282014e-06

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 4.63849420926e-06

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 4.48887463937e-06

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_max\_freq & 0.0

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_pse & 0.0

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_pse & 0.0

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_pse & 0.0

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_weighted & 0.0

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

pca\_4 & 0.0

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_weighted & 0.0

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_x & 0.0

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_weighted & 0.0

gyr\_phone\_y\_max\_freq & 0.0

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_weighted & 0.0

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_weighted & 0.0

The best parameters for SVM with the Chapter 4 features in repeat number 3 are:

{'kernel': 'poly', 'C': 1, 'gamma': 0.001}

The best parameters for NN with the Chapter 4 features in repeat number 4 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Chapter 4 features in repeat number 4 are:

{'n\_estimators': 50, 'criterion': 'gini', 'min\_samples\_leaf': 10}

Feature importance random forest:

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0446065087367

mag\_phone\_x & 0.0420270262759

pca\_3\_temp\_mean\_ws\_100 & 0.0393815754063

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0387916780529

mag\_phone\_y & 0.0377050657239

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.035730213203

pca\_1 & 0.0357114352658

pca\_1\_temp\_mean\_ws\_100 & 0.0347568649614

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0314186813301

pca\_3 & 0.0298352347939

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0292550726161

pca\_2 & 0.0283015047431

pca\_2\_temp\_mean\_ws\_100 & 0.028055695755

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0275976000504

acc\_phone\_y\_temp\_std\_ws\_100 & 0.026806894558

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0256294873767

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0243981926857

mag\_phone\_x\_pse & 0.0238540799643

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.0215434512068

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0214013821123

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0208704413902

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0206453889003

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.0201253095687

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0201200686754

mag\_phone\_z\_temp\_std\_ws\_100 & 0.0195714384625

pca\_2\_temp\_std\_ws\_100 & 0.0169110515992

mag\_phone\_z\_pse & 0.0165357327738

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.016399783319

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0149222107387

acc\_phone\_x\_pse & 0.0144015579111

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0136046092773

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0134042206418

acc\_phone\_z\_pse & 0.0133259741557

pca\_4\_temp\_std\_ws\_100 & 0.013177570674

acc\_phone\_y\_max\_freq & 0.0126881450441

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0122286143067

pca\_1\_temp\_std\_ws\_100 & 0.00999943107805

mag\_phone\_y\_pse & 0.00972002567557

pca\_3\_temp\_std\_ws\_100 & 0.00881895424113

mag\_phone\_z & 0.00730593706829

mag\_phone\_y\_max\_freq & 0.00671676395988

mag\_phone\_z\_max\_freq & 0.00616599378331

acc\_phone\_y\_pse & 0.00594681896867

acc\_phone\_x & 0.00549166904814

acc\_phone\_x\_max\_freq & 0.0039576159628

gyr\_phone\_z\_max\_freq & 0.00340697051146

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00291432966769

acc\_phone\_y & 0.00290316567369

acc\_phone\_z & 0.00280405758608

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00262029559894

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00262014688735

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00249113212721

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.00235099676525

mag\_phone\_x\_max\_freq & 0.0021192557706

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00183451428864

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00166839158132

mag\_phone\_x\_freq\_weighted & 0.00165279918274

gyr\_phone\_x\_pse & 0.00155653870178

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00154501343097

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00122563609179

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00116502129838

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.00097351781116

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000915215871287

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000851248035513

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00084772958267

acc\_phone\_z\_max\_freq & 0.000846524297186

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000838782617813

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000837114968962

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000793613339981

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00077533293431

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000743270490806

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000735737255322

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000700333747345

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000688359612178

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000540647940984

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000476091054297

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.000440847452106

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000434649513637

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000413418873085

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000386516995787

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000206363039362

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000197832783491

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000191813397674

gyr\_phone\_z\_freq\_weighted & 0.000175404112812

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000165714671445

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000130554920673

gyr\_phone\_z & 0.000115377516363

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000104556949674

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 9.6494087722e-05

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 8.52032231705e-05

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 8.41521052909e-05

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 8.18771125636e-05

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 8.07154784614e-05

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 5.25294859987e-05

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 4.70015717943e-05

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 4.58785096094e-05

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 4.45986426083e-05

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 3.6591319076e-05

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 1.28507733388e-05

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 1.23123685457e-05

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 1.1758715184e-05

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 1.05877185154e-05

gyr\_phone\_z\_pse & 1.04478318074e-05

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 1.00066582347e-05

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 9.18740574242e-06

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_max\_freq & 0.0

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_pse & 0.0

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.0

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_weighted & 0.0

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

pca\_4 & 0.0

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_weighted & 0.0

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

pca\_4\_temp\_mean\_ws\_100 & 0.0

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_y & 0.0

gyr\_phone\_x & 0.0

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_weighted & 0.0

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_weighted & 0.0

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_max\_freq & 0.0

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_weighted & 0.0

mag\_phone\_z\_freq\_weighted & 0.0

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_weighted & 0.0

The best parameters for SVM with the Chapter 4 features in repeat number 4 are:

{'kernel': 'poly', 'C': 1, 'gamma': 0.001}

The best parameters for KNN with the Chapter 4 features are:

{'n\_neighbors': 1}

The best parameters for DT with the Chapter 4 features are:

{'criterion': 'gini', 'min\_samples\_leaf': 10}

Feature importance decision tree:

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.301057519352

pca\_1\_temp\_mean\_ws\_100 & 0.18741801059

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.167550286896

pca\_2 & 0.155129770145

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0981027161802

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0844040715098

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.00633762532781

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_max\_freq & 0.0

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_pse & 0.0

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_pse & 0.0

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_max\_freq & 0.0

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_pse & 0.0

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.0

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_pse & 0.0

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_weighted & 0.0

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

pca\_1 & 0.0

pca\_3 & 0.0

pca\_4 & 0.0

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_pse & 0.0

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_weighted & 0.0

gyr\_phone\_z\_max\_freq & 0.0

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_max\_freq & 0.0

mag\_phone\_y\_pse & 0.0

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_max\_freq & 0.0

mag\_phone\_y\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_pse & 0.0

acc\_phone\_y\_max\_freq & 0.0

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.0

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0

pca\_4\_temp\_mean\_ws\_100 & 0.0

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_max\_freq & 0.0

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_pse & 0.0

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x & 0.0

acc\_phone\_y & 0.0

acc\_phone\_z & 0.0

mag\_phone\_x\_pse & 0.0

pca\_2\_temp\_std\_ws\_100 & 0.0

pca\_2\_temp\_mean\_ws\_100 & 0.0

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_y & 0.0

gyr\_phone\_x & 0.0

gyr\_phone\_z & 0.0

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0

pca\_1\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_weighted & 0.0

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

pca\_3\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_y\_freq\_weighted & 0.0

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_max\_freq & 0.0

pca\_4\_temp\_std\_ws\_100 & 0.0

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_max\_freq & 0.0

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.0

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_weighted & 0.0

mag\_phone\_x\_freq\_weighted & 0.0

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

pca\_3\_temp\_mean\_ws\_100 & 0.0

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_weighted & 0.0

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_weighted & 0.0

mag\_phone\_z & 0.0

mag\_phone\_x & 0.0

mag\_phone\_y & 0.0

acc\_phone\_z\_freq\_weighted & 0.0

Chapter 4 & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.7762 \emph{( 0.7247 - 0.8278 )} & 0.9955 \emph{( 0.9872 - 1.0037 )} & 0.9088 \emph{( 0.8732 - 0.9445 )} & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.7969 \emph{( 0.7471 - 0.8467 )} & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.8966 \emph{( 0.8589 - 0.9343 )} & 0.9887 \emph{( 0.9757 - 1.0017 )} & 0.7893 \emph{( 0.7388 - 0.8398 )} & 0.9925 \emph{( 0.9818 - 1.0031 )} & 0.8008 \emph{( 0.7513 - 0.8502 )} \\\hline

The best parameters for NN with the Chapter 5 features in repeat number 0 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Chapter 5 features in repeat number 0 are:

{'n\_estimators': 100, 'criterion': 'gini', 'min\_samples\_leaf': 10}

Feature importance random forest:

pca\_1\_temp\_mean\_ws\_100 & 0.0475097491937

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0422153721955

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0373941134823

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.036764709474

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0362443234102

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0338714885135

pca\_2\_temp\_mean\_ws\_100 & 0.03198564086

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0311280308905

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0309742423335

mag\_phone\_x\_pse & 0.030837273297

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0299830788461

mag\_phone\_y & 0.029931189802

mag\_phone\_x & 0.0262137199873

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0257146368329

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0255911848398

mag\_cluster & 0.0233081043033

pca\_1 & 0.0231006373506

pca\_3\_temp\_mean\_ws\_100 & 0.0228201387557

pca\_2 & 0.0215137214204

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0215025987826

acc\_phone\_x\_pse & 0.0195354466742

acc\_phone\_y\_max\_freq & 0.0188473568574

pca\_4\_temp\_std\_ws\_100 & 0.0186257564683

mag\_phone\_z\_temp\_std\_ws\_100 & 0.0181101366973

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0173218111718

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0171965901501

mag\_phone\_z\_max\_freq & 0.01670506955

mag\_phone\_y\_pse & 0.0164735210036

mag\_phone\_z & 0.0161091034232

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.014933196244

pca\_3\_temp\_std\_ws\_100 & 0.0134685506019

acc\_phone\_z\_pse & 0.012853159066

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0126756895771

pca\_1\_temp\_std\_ws\_100 & 0.0125806090168

pca\_2\_temp\_std\_ws\_100 & 0.0125598670114

pca\_3 & 0.0125156684958

mag\_phone\_z\_pse & 0.0090858758082

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00886773157163

acc\_phone\_z\_temp\_std\_ws\_100 & 0.00841943622935

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.00837955873793

acc\_phone\_y\_pse & 0.00785249988742

acc\_phone\_x\_max\_freq & 0.00712805534912

acc\_phone\_y & 0.00650037272389

acc\_phone\_x\_temp\_std\_ws\_100 & 0.00622889322033

mag\_phone\_y\_max\_freq & 0.00616297388547

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.00571800802308

acc\_phone\_x & 0.00472718840189

mag\_phone\_y\_temp\_std\_ws\_100 & 0.00444890879734

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.00438105738217

pca\_4\_temp\_mean\_ws\_100 & 0.00391973216749

mag\_phone\_x\_max\_freq & 0.00372927811393

acc\_phone\_z & 0.0036480050973

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00330735139894

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00312581927142

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00308191164114

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00238990139701

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00187304064292

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00184023407467

gyr\_phone\_y\_pse & 0.00152926820144

acc\_cluster & 0.00149764238005

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00134174850323

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00113368485272

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.0010690039486

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00101057234363

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000974889677468

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000817836059098

gyr\_phone\_z\_max\_freq & 0.000790951736678

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000762793094402

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000751346609555

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000746955672189

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000744789117302

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000661042855561

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000630373930953

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000619170964301

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.00056588649999

gyr\_phone\_z\_pse & 0.000550070831155

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000537337036981

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000535913258475

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000518398299208

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000506739994468

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000505912704238

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000456017273448

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000455272951533

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000437140576286

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000417664460345

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00035671557536

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000333743531573

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000295637738911

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000293235307409

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000292066373973

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000250019719824

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000220345065087

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000204474009523

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000188891729926

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000184928073762

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000183606045569

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000179469600342

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000177873539648

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000176436237702

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000166636206241

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000148282135665

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000136007282227

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0001359203344

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000120133876208

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000116229599512

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000112083991504

gyr\_phone\_x\_freq\_weighted & 9.31817399937e-05

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 9.16883227975e-05

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 7.79997235883e-05

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 7.59984633239e-05

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 7.5947068203e-05

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 6.27210917988e-05

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 6.03521663931e-05

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 5.45545269079e-05

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 5.2261036736e-05

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 5.01573957861e-05

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 4.50248763571e-05

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 4.27941109786e-05

acc\_phone\_z\_freq\_weighted & 4.21637839502e-05

acc\_phone\_x\_freq\_weighted & 4.12115302693e-05

acc\_phone\_z\_max\_freq & 3.86115502604e-05

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 3.31761255806e-05

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 3.23006811122e-05

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 2.44049590626e-05

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 2.34028485473e-05

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 2.02999736405e-05

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 1.86854495391e-05

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 1.85369069364e-05

gyr\_phone\_x\_max\_freq & 1.83840094876e-05

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 1.80536814949e-05

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 1.76705086334e-05

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 1.5887164608e-05

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 7.16545831512e-06

gyr\_phone\_y & 7.05754308032e-06

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 6.79178933796e-06

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 6.62346685892e-06

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 6.45964136378e-06

mag\_phone\_z\_freq\_weighted & 6.37942766012e-06

gyr\_phone\_x\_pse & 6.14932309892e-06

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 5.84994093393e-06

gyr\_phone\_z\_freq\_weighted & 5.69978610648e-06

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 5.67355295214e-06

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 5.50906440321e-06

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 4.48147260831e-06

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 4.23459013683e-06

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 3.97503687073e-06

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

pca\_4 & 0.0

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_weighted & 0.0

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_x & 0.0

gyr\_phone\_z & 0.0

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_weighted & 0.0

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_max\_freq & 0.0

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_weighted & 0.0

mag\_phone\_x\_freq\_weighted & 0.0

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_cluster & 0.0

The best parameters for SVM with the Chapter 5 features in repeat number 0 are:

{'kernel': 'poly', 'C': 1, 'gamma': 0.001}

The best parameters for NN with the Chapter 5 features in repeat number 1 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Chapter 5 features in repeat number 1 are:

{'n\_estimators': 10, 'criterion': 'gini', 'min\_samples\_leaf': 2}

Feature importance random forest:

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0861911870362

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0709959561655

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0568440183602

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0482770131874

pca\_1\_temp\_mean\_ws\_100 & 0.0436671554615

pca\_3\_temp\_mean\_ws\_100 & 0.0400214916435

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0373641036185

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.036835290598

pca\_2\_temp\_std\_ws\_100 & 0.0334198785449

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.0330315284363

mag\_phone\_z\_max\_freq & 0.0322074428499

pca\_2\_temp\_mean\_ws\_100 & 0.0303722533977

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0283083190382

mag\_phone\_y\_pse & 0.0261834470825

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0241115383387

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0232382883592

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0206707315323

pca\_4\_temp\_std\_ws\_100 & 0.0201996434895

mag\_phone\_x & 0.0200916804455

mag\_phone\_y & 0.0194397077225

pca\_2 & 0.0182334063252

mag\_cluster & 0.0173288889761

acc\_phone\_x\_pse & 0.017156614134

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0147132728898

mag\_phone\_z\_pse & 0.0139938229948

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0139039898083

mag\_phone\_z\_temp\_std\_ws\_100 & 0.0134225640374

mag\_phone\_z & 0.0121363440519

pca\_1 & 0.0120617685545

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0115760047048

pca\_4\_temp\_mean\_ws\_100 & 0.011381940551

acc\_phone\_x & 0.0113323263365

acc\_phone\_y\_pse & 0.0109180374995

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0104365658925

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00872828238889

acc\_phone\_y\_temp\_std\_ws\_100 & 0.00782993910029

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00526509990917

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00498875599522

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00469740583114

pca\_3\_temp\_std\_ws\_100 & 0.00455715430314

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.00445327290106

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00440972655744

pca\_3 & 0.00438567681195

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.00414615354137

pca\_1\_temp\_std\_ws\_100 & 0.00276510028739

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.0024806054172

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00242764299813

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0023915280308

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0023481978689

acc\_phone\_y\_max\_freq & 0.00230443131998

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00174639549387

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00159341998247

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.00158682040861

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00153014825116

acc\_phone\_z\_temp\_std\_ws\_100 & 0.00152174829917

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000941499292672

mag\_phone\_x\_pse & 0.000902732041878

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000423074018567

acc\_phone\_z & 0.000422782386726

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000417500127668

acc\_phone\_z\_max\_freq & 0.000401663915928

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000267020454774

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_max\_freq & 0.0

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_pse & 0.0

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_pse & 0.0

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_max\_freq & 0.0

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_pse & 0.0

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.0

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_weighted & 0.0

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

pca\_4 & 0.0

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_weighted & 0.0

gyr\_phone\_z\_max\_freq & 0.0

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_max\_freq & 0.0

mag\_phone\_y\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_max\_freq & 0.0

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_pse & 0.0

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_y & 0.0

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_y & 0.0

gyr\_phone\_x & 0.0

gyr\_phone\_z & 0.0

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_cluster & 0.0

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_weighted & 0.0

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_weighted & 0.0

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_max\_freq & 0.0

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.0

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_weighted & 0.0

mag\_phone\_x\_freq\_weighted & 0.0

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_weighted & 0.0

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_weighted & 0.0

gyr\_cluster & 0.0

acc\_phone\_z\_freq\_weighted & 0.0

The best parameters for SVM with the Chapter 5 features in repeat number 1 are:

{'kernel': 'poly', 'C': 1, 'gamma': 0.001}

The best parameters for NN with the Chapter 5 features in repeat number 2 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Chapter 5 features in repeat number 2 are:

{'n\_estimators': 50, 'criterion': 'gini', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0509629391286

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0423991620465

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0402885332691

pca\_3\_temp\_mean\_ws\_100 & 0.0355915942355

mag\_phone\_x & 0.0347555933913

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0336712583133

mag\_cluster & 0.0334758271908

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0324113454987

pca\_1 & 0.030118647128

pca\_1\_temp\_mean\_ws\_100 & 0.0297429295202

pca\_2\_temp\_mean\_ws\_100 & 0.0297282478064

mag\_phone\_z\_temp\_std\_ws\_100 & 0.0296768870213

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.028604376017

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0266755879089

pca\_2 & 0.0240292115518

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0220968812983

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.020839188303

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0205127604365

mag\_phone\_y & 0.0199910696934

pca\_4\_temp\_std\_ws\_100 & 0.0195081491516

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.0191151370725

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0186405703153

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0180183385928

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0176170542872

mag\_phone\_y\_pse & 0.0174352742801

pca\_3 & 0.0166923313655

pca\_3\_temp\_std\_ws\_100 & 0.0157688705215

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0156870863181

mag\_phone\_x\_pse & 0.0140216545865

pca\_1\_temp\_std\_ws\_100 & 0.0122339782945

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0112532864471

mag\_phone\_y\_max\_freq & 0.0111311918623

acc\_phone\_y\_pse & 0.0110801300969

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0102004585058

mag\_phone\_z\_max\_freq & 0.0101560477916

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00936504601242

mag\_phone\_x\_max\_freq & 0.00915500751236

pca\_2\_temp\_std\_ws\_100 & 0.00875468201787

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00856131166796

acc\_phone\_x & 0.00827856633332

acc\_phone\_y & 0.00787648972182

acc\_phone\_y\_temp\_std\_ws\_100 & 0.00784360159445

mag\_phone\_y\_temp\_std\_ws\_100 & 0.00756268699873

mag\_phone\_z\_pse & 0.00750044691158

acc\_phone\_x\_max\_freq & 0.00670013050325

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00620240054983

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.00526249566478

pca\_4\_temp\_mean\_ws\_100 & 0.00456452961559

mag\_phone\_z & 0.00432219303575

acc\_phone\_x\_pse & 0.00405840694664

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00335059063724

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0033031909537

acc\_phone\_z\_pse & 0.00308218464392

gyr\_phone\_z\_max\_freq & 0.00307412715079

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00306568882219

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.00277752547927

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00263250062515

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00236019183141

mag\_phone\_x\_freq\_weighted & 0.00204632914137

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0020392958918

acc\_phone\_z & 0.00202700394419

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00199574655677

acc\_phone\_y\_max\_freq & 0.00190927193139

acc\_cluster & 0.00181451926652

gyr\_phone\_z\_pse & 0.00164632918034

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00139967887772

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00130976234414

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0011281933847

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00112640417437

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00108266035794

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00100610045473

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.00092349764835

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000842656807408

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000725679454678

gyr\_phone\_y\_pse & 0.000708071653402

acc\_phone\_z\_max\_freq & 0.000685874732111

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000682186072099

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000666473016731

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000656544193755

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000650158438153

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000634453219968

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.000625265089956

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000596910080607

pca\_4 & 0.000583111611094

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000581402140035

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000570745907018

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000527336777154

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00050490147054

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000499434731454

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000485822983426

gyr\_phone\_x\_freq\_weighted & 0.000463388581042

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000460892386509

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000449805300702

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000446538339198

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000426534141248

acc\_phone\_y\_freq\_weighted & 0.000423514430514

gyr\_phone\_x\_pse & 0.000414168486403

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000396983294123

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000387318880765

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000385286922868

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00038200129709

mag\_phone\_z\_freq\_weighted & 0.000372205532363

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000359623752131

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000339316815948

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000337427173326

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000332674957736

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000329047706324

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000324599283772

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000311404907798

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000295516567857

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00028525455942

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000282718143986

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000275620726115

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000251658012492

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000244614687707

acc\_phone\_x\_freq\_weighted & 0.000240429597791

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00023771213285

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000212911972951

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000211055194758

gyr\_phone\_y\_freq\_weighted & 0.000208277917407

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000205793274831

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000203029318742

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000198792243352

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000194609679078

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000179685381069

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000169215283626

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000162505824102

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000160070370559

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000159797379595

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000149285682095

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000147910414693

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000132162410319

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000124876506787

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 9.57456417668e-05

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 8.60260886993e-05

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 8.52267302383e-05

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 8.51980452675e-05

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 8.48737424225e-05

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 8.34611968021e-05

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 8.23557996565e-05

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 8.16993464052e-05

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 8.1675173213e-05

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 7.95539110337e-05

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 7.84796140944e-05

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 6.36771767382e-05

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 6.03986883228e-05

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 5.6194917324e-05

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 5.37640358255e-05

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 5.36057449176e-05

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 4.44126634749e-05

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_max\_freq & 0.0

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_y & 0.0

gyr\_phone\_x & 0.0

gyr\_phone\_z & 0.0

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_max\_freq & 0.0

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_weighted & 0.0

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_weighted & 0.0

gyr\_cluster & 0.0

acc\_phone\_z\_freq\_weighted & 0.0

The best parameters for SVM with the Chapter 5 features in repeat number 2 are:

{'kernel': 'poly', 'C': 1, 'gamma': 0.001}

The best parameters for NN with the Chapter 5 features in repeat number 3 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Chapter 5 features in repeat number 3 are:

{'n\_estimators': 100, 'criterion': 'entropy', 'min\_samples\_leaf': 2}

Feature importance random forest:

pca\_1\_temp\_mean\_ws\_100 & 0.0563454729244

pca\_3\_temp\_mean\_ws\_100 & 0.0469151184568

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0436183916919

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0405089905381

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0384719598233

pca\_1 & 0.0381378807611

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0369216213089

mag\_phone\_y & 0.0349670763344

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.034266688996

mag\_cluster & 0.0290494368412

pca\_2\_temp\_mean\_ws\_100 & 0.0265319484732

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0259629237115

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0238148503096

mag\_phone\_x\_pse & 0.0237944687285

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0228926109535

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0221026181725

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0220065965231

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.020233600643

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0188912397878

acc\_phone\_y\_max\_freq & 0.0180302360764

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0170982970753

pca\_2 & 0.0168575686615

pca\_4\_temp\_std\_ws\_100 & 0.0159308119211

acc\_phone\_x\_pse & 0.0152902274968

pca\_3 & 0.0152643276833

mag\_phone\_z & 0.0152223905327

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0150282754272

mag\_phone\_z\_max\_freq & 0.0135212110817

acc\_phone\_x & 0.0135058520998

pca\_2\_temp\_std\_ws\_100 & 0.0134166555396

mag\_phone\_z\_pse & 0.01259205686

mag\_phone\_x\_max\_freq & 0.0114322277535

mag\_phone\_z\_temp\_std\_ws\_100 & 0.010697147059

acc\_phone\_z\_pse & 0.0106746484901

mag\_phone\_y\_max\_freq & 0.0104670278598

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.00988764270373

acc\_phone\_x\_max\_freq & 0.00985302383094

mag\_phone\_x & 0.00958211750354

acc\_phone\_y & 0.00936150695856

mag\_phone\_y\_pse & 0.00926400744725

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00868650930874

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.00834804114485

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.00772299835715

mag\_phone\_x\_temp\_std\_ws\_100 & 0.00756499046166

pca\_4\_temp\_mean\_ws\_100 & 0.00749321546242

acc\_phone\_y\_pse & 0.00734892707934

pca\_3\_temp\_std\_ws\_100 & 0.00586137387551

pca\_1\_temp\_std\_ws\_100 & 0.00481428646971

acc\_phone\_z & 0.00474444460658

acc\_cluster & 0.00379782054264

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.00376522632462

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00241096354897

mag\_phone\_y\_temp\_std\_ws\_100 & 0.00222589264238

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.00173877455081

mag\_phone\_y\_freq\_weighted & 0.00158088098929

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00133562189799

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00123772695514

gyr\_phone\_z\_max\_freq & 0.00101248744037

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000986396301103

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.000951632388419

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000943587351823

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000919991069934

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000875678224128

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000862795608612

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000807042297778

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000803301657003

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000778328732025

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000765487623198

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000722460781872

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000702654194692

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000679606528769

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00067284173557

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.000593420532589

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000584750168746

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000584453086199

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000575043758994

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000560307028804

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000557467059034

gyr\_phone\_y\_pse & 0.000555136724727

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000522489917608

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00049324603427

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000490328796135

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000484724316415

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000483318328314

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.000457438581828

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000439377853644

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00043382343068

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000433275253878

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000430524122048

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000416147048037

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000411719544322

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000408988284731

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000406183262339

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000401774900073

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000397859083656

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000388610448176

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000378790896385

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000377438149327

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000375686393402

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000370984997279

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000363885317795

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000351856595969

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000337237342722

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000336414029296

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000332954826281

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000330995817946

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000327887101624

mag\_phone\_z\_freq\_weighted & 0.000326651370445

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000322877531691

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000317086734303

acc\_phone\_z\_max\_freq & 0.000317065611272

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000284933606098

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000284688735587

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000273217179132

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000267405176751

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000262274720506

gyr\_phone\_z\_pse & 0.00025962393882

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000251640113652

gyr\_phone\_z & 0.000250941935167

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000245744462251

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000244152628929

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000242414627808

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000238416220339

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000233691827936

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000222815512162

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000222722570404

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000217796023521

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000215869690025

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000209455053901

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000204025263198

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000203884970088

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.00020358189768

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000202919400629

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000200207367282

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000194921777539

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000194354151116

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000188773102728

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000186747930346

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000186489422605

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000183562025403

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000182154322034

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000178362020134

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000176297591574

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000174836314595

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000174018590847

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000172161619942

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000171370347584

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000167898302967

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000165271375928

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000162458517453

acc\_phone\_z\_freq\_weighted & 0.000161158960583

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000160887266822

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000156003561145

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000150549259393

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000146529123738

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000128797712927

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000128221342146

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000122015931545

pca\_4 & 0.000121303328045

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000120640258231

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00011920835645

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000117973055047

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000113432762481

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000113362897418

gyr\_phone\_x\_freq\_weighted & 0.000105613011272

acc\_phone\_x\_freq\_weighted & 9.77402336139e-05

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 9.76275125144e-05

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 9.14527621006e-05

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 9.01351890414e-05

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 9.00686122908e-05

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 8.95514241677e-05

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 7.78249544308e-05

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 6.81179526531e-05

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 6.59406985258e-05

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 6.4951153137e-05

gyr\_phone\_x & 6.1761312879e-05

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 6.03741397441e-05

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 5.30872158331e-05

gyr\_phone\_y & 5.22409208851e-05

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 5.13613317884e-05

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 4.80742395168e-05

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 4.54348311138e-05

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 3.99613469851e-05

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 3.87106043795e-05

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 3.68705031354e-05

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 3.62296941478e-05

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 2.84444366413e-05

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 2.77988320603e-05

acc\_phone\_y\_freq\_weighted & 2.50537607852e-05

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 2.14114169095e-05

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 2.10162843777e-05

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_max\_freq & 0.0

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_pse & 0.0

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_weighted & 0.0

gyr\_phone\_y\_max\_freq & 0.0

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_weighted & 0.0

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_weighted & 0.0

gyr\_cluster & 0.0

The best parameters for SVM with the Chapter 5 features in repeat number 3 are:

{'kernel': 'poly', 'C': 1, 'gamma': 0.001}

The best parameters for NN with the Chapter 5 features in repeat number 4 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Chapter 5 features in repeat number 4 are:

{'n\_estimators': 50, 'criterion': 'gini', 'min\_samples\_leaf': 10}

Feature importance random forest:

pca\_1\_temp\_mean\_ws\_100 & 0.0564129013227

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0551201201104

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0534248328129

pca\_3\_temp\_mean\_ws\_100 & 0.0452101616023

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.042441581832

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.041453496486

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0390729250179

mag\_phone\_x & 0.0370069291994

pca\_2\_temp\_mean\_ws\_100 & 0.0341565537604

mag\_phone\_x\_pse & 0.0338591657479

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0326286864269

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0303473329623

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0283243627426

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0254381188748

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.025331180708

pca\_2 & 0.0238676982255

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0232154685407

mag\_phone\_y & 0.0214878270832

acc\_phone\_z\_pse & 0.0161888095082

acc\_phone\_x\_pse & 0.0160092828876

pca\_3 & 0.0155629834694

mag\_phone\_z\_temp\_std\_ws\_100 & 0.0154411814222

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0149175476047

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0148296072314

acc\_phone\_y\_max\_freq & 0.0145449155887

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.014282552212

pca\_1\_temp\_std\_ws\_100 & 0.0136398218489

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0133738444678

pca\_4\_temp\_std\_ws\_100 & 0.0125309288044

acc\_phone\_x & 0.0119300934146

mag\_phone\_y\_pse & 0.0116040987354

pca\_2\_temp\_std\_ws\_100 & 0.0114436874207

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0104588550108

mag\_phone\_z\_max\_freq & 0.0102881407189

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0100533726465

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00948404480381

acc\_phone\_x\_max\_freq & 0.00865679791487

mag\_cluster & 0.0086036232968

gyr\_phone\_z\_max\_freq & 0.00660241677005

acc\_phone\_z & 0.00554849123284

mag\_phone\_z\_pse & 0.00551609954062

mag\_phone\_z & 0.00545131011923

acc\_phone\_y & 0.00536892160789

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0051909064847

mag\_phone\_x\_max\_freq & 0.00517382383109

pca\_1 & 0.0042464415848

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.00410725489498

acc\_phone\_y\_pse & 0.00382934511477

mag\_phone\_y\_max\_freq & 0.003795646573

pca\_4\_temp\_mean\_ws\_100 & 0.00348766615399

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.00327582441551

mag\_phone\_y\_freq\_weighted & 0.00326937150246

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00256522421825

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00196171698424

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00190840026545

mag\_phone\_x\_freq\_weighted & 0.00182495786313

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00165162074565

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00154256100764

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00149617387115

acc\_phone\_z\_max\_freq & 0.00145953604273

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00143949368372

acc\_cluster & 0.00135344725271

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00117682235614

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00105017386002

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000989905845985

gyr\_phone\_y\_max\_freq & 0.000869581108919

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000779377626363

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.000750487910759

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000702938337021

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000700400537289

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000674553206142

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000648678857174

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000648611183822

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000645826558626

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.000561160483409

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00055122408405

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000396857513403

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000381845520082

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000331649938397

gyr\_phone\_z\_pse & 0.000311726083407

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000302447974012

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000225439436759

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000222651223007

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0002145789038

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000211368348338

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000182284247406

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000181670438171

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000171095869561

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00016847970279

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.00015193890586

gyr\_phone\_x\_max\_freq & 0.000143714514548

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.00010971267361

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 9.5789386508e-05

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 8.99304311759e-05

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 8.20496562607e-05

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 7.89743947215e-05

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 7.65843385028e-05

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 4.96876412092e-05

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 4.72537977278e-05

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 4.48267288291e-05

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 4.3036570253e-05

mag\_phone\_z\_freq\_weighted & 4.08897595013e-05

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 4.05669888682e-05

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 3.01608491069e-05

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 2.46462747792e-05

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 1.30202168458e-05

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 1.24601710833e-05

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 1.2097697687e-05

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 1.15246031356e-05

acc\_phone\_z\_freq\_weighted & 1.13924030069e-05

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 1.07713911516e-05

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 9.83401232266e-06

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 7.11521446894e-06

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_pse & 0.0

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_pse & 0.0

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.0

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_weighted & 0.0

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

pca\_4 & 0.0

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_weighted & 0.0

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_temp\_std\_ws\_100 & 0.0

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_y & 0.0

gyr\_phone\_x & 0.0

gyr\_phone\_z & 0.0

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_weighted & 0.0

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

pca\_3\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_y\_freq\_weighted & 0.0

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_weighted & 0.0

gyr\_cluster & 0.0

The best parameters for SVM with the Chapter 5 features in repeat number 4 are:

{'kernel': 'poly', 'C': 1, 'gamma': 0.001}

The best parameters for KNN with the Chapter 5 features are:

{'n\_neighbors': 1}

The best parameters for DT with the Chapter 5 features are:

{'criterion': 'entropy', 'min\_samples\_leaf': 2}

Feature importance decision tree:

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.343720860817

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.166177412807

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.165693428622

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0946293508268

mag\_phone\_z\_pse & 0.0814870596515

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0651646162193

mag\_phone\_x & 0.0622326703517

mag\_phone\_z\_temp\_std\_ws\_100 & 0.0208946007059

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_max\_freq & 0.0

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_pse & 0.0

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0

gyr\_phone\_x\_pse & 0.0

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_max\_freq & 0.0

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_pse & 0.0

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.0

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_weighted & 0.0

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

pca\_1 & 0.0

pca\_2 & 0.0

pca\_3 & 0.0

pca\_4 & 0.0

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_pse & 0.0

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_weighted & 0.0

gyr\_phone\_z\_max\_freq & 0.0

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_max\_freq & 0.0

mag\_phone\_y\_pse & 0.0

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_max\_freq & 0.0

mag\_phone\_y\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_pse & 0.0

acc\_phone\_y\_max\_freq & 0.0

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.0

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0

pca\_4\_temp\_mean\_ws\_100 & 0.0

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_max\_freq & 0.0

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_pse & 0.0

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x & 0.0

acc\_phone\_y & 0.0

acc\_phone\_z & 0.0

mag\_phone\_x\_pse & 0.0

pca\_2\_temp\_std\_ws\_100 & 0.0

pca\_2\_temp\_mean\_ws\_100 & 0.0

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_y & 0.0

gyr\_phone\_x & 0.0

gyr\_phone\_z & 0.0

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0

pca\_1\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0

pca\_1\_temp\_mean\_ws\_100 & 0.0

acc\_cluster & 0.0

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_weighted & 0.0

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_cluster & 0.0

pca\_3\_temp\_std\_ws\_100 & 0.0

gyr\_phone\_y\_freq\_weighted & 0.0

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_max\_freq & 0.0

pca\_4\_temp\_std\_ws\_100 & 0.0

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_max\_freq & 0.0

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.0

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_weighted & 0.0

mag\_phone\_x\_freq\_weighted & 0.0

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

pca\_3\_temp\_mean\_ws\_100 & 0.0

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_weighted & 0.0

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_weighted & 0.0

gyr\_cluster & 0.0

mag\_phone\_z & 0.0

mag\_phone\_y & 0.0

acc\_phone\_z\_freq\_weighted & 0.0

Chapter 5 & 0.9992 \emph{( 0.9959 - 1.0026 )} & 0.7778 \emph{( 0.7263 - 0.8292 )} & 0.9962 \emph{( 0.9887 - 1.0038 )} & 0.9172 \emph{( 0.8831 - 0.9513 )} & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.7969 \emph{( 0.7471 - 0.8467 )} & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.8966 \emph{( 0.8589 - 0.9343 )} & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.8582 \emph{( 0.8151 - 0.9014 )} & 0.9925 \emph{( 0.9818 - 1.0031 )} & 0.8123 \emph{( 0.7639 - 0.8606 )} \\\hline

The best parameters for NN with the Selected features features in repeat number 0 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Selected features features in repeat number 0 are:

{'n\_estimators': 50, 'criterion': 'entropy', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.217781230077

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.15210184218

mag\_phone\_y\_max\_freq & 0.0867713810051

mag\_phone\_z\_pse & 0.0656900450103

mag\_phone\_x\_max\_freq & 0.0608752390065

acc\_phone\_x\_max\_freq & 0.0400198502856

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0254585376012

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0224669673226

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0174333826398

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0152910725132

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0149680697283

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0147169454969

gyr\_phone\_z\_pse & 0.01420473111

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0127121113526

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.012641455716

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0117534141988

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.010776638727

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0107411742225

gyr\_phone\_x & 0.0106239189969

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0103284765869

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00974564130476

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00952791263911

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.00921666160561

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00889316680989

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.00869402937795

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.00840681647107

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00835723437162

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00752127084107

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00748838677477

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00742823449055

gyr\_phone\_y\_max\_freq & 0.0069677075987

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00685582763168

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.00645934782313

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00618574011405

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00602190855458

gyr\_phone\_x\_max\_freq & 0.00546206935303

mag\_phone\_z\_freq\_weighted & 0.005334632321

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00529697712852

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00505929903357

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00458270199367

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00445147152436

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00408957751093

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00387428468796

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00359329940812

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00289022811722

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00281129780686

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00206532472796

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00200268560642

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00196404501692

gyr\_phone\_x\_pse & 0.00139573557821

The best parameters for SVM with the Selected features features in repeat number 0 are:

{'kernel': 'rbf', 'C': 1, 'gamma': 0.0001}

The best parameters for NN with the Selected features features in repeat number 1 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Selected features features in repeat number 1 are:

{'n\_estimators': 100, 'criterion': 'entropy', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.195176040512

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.154552925751

mag\_phone\_z\_pse & 0.0774442563237

mag\_phone\_y\_max\_freq & 0.0773729777251

acc\_phone\_x\_max\_freq & 0.0745499259607

mag\_phone\_x\_max\_freq & 0.0563831698113

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0260219374599

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0181575848848

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0155036986281

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0147193834389

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0145987097781

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0140144641814

gyr\_phone\_z\_pse & 0.0127338191324

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0124874964097

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0121457923032

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0119155917922

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0118005064172

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.011223418473

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0110736244527

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00991233820564

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00948026954284

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00943991232017

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00868878461662

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00836999049098

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00830261814437

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.00826808859817

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00778217541137

gyr\_phone\_x & 0.00778076476455

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00777457775559

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00774991029063

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.00769938183682

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.00745895552599

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00579198174421

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00533757044784

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00526535159295

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00507659365032

gyr\_phone\_x\_max\_freq & 0.00475603438493

gyr\_phone\_x\_pse & 0.00455664569694

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00445522076552

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00444360066022

mag\_phone\_z\_freq\_weighted & 0.00400558649304

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0037237412012

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00349890980149

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00285191275457

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00283852754538

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00277708898485

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00277644039241

gyr\_phone\_y\_max\_freq & 0.00262251619477

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00232493017392

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00231425657665

The best parameters for SVM with the Selected features features in repeat number 1 are:

{'kernel': 'rbf', 'C': 1, 'gamma': 0.0001}

The best parameters for NN with the Selected features features in repeat number 2 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Selected features features in repeat number 2 are:

{'n\_estimators': 100, 'criterion': 'entropy', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.193440787262

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.161329169366

mag\_phone\_z\_pse & 0.0930166221692

acc\_phone\_x\_max\_freq & 0.085866099347

mag\_phone\_y\_max\_freq & 0.0795336940611

mag\_phone\_x\_max\_freq & 0.0409506140965

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0173005376996

gyr\_phone\_z\_pse & 0.0156000168693

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0155255314926

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.015147210939

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0146008881058

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0132667241763

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0131650425267

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0121694684672

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0118668513981

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.011191278662

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0109053151831

gyr\_phone\_x & 0.0105520516371

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0102907332164

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0101234938471

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00941699852238

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00905782928305

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00839120915094

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00832164294852

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00752988056352

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0074289292311

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00717828208818

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00714279917195

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00708621883031

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.00704230203265

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.00698975674505

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00617982957656

gyr\_phone\_x\_max\_freq & 0.00593564531545

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.005625072378

mag\_phone\_z\_freq\_weighted & 0.00529998329497

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00519279307303

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00505263291659

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00446579923884

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00440140074051

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00416886088308

gyr\_phone\_y\_max\_freq & 0.00393382877899

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00393288196189

gyr\_phone\_x\_pse & 0.00388525732415

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00385170369578

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00369654797303

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00324058271345

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00271281842208

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00255635645955

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00232075738362

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00211926878058

The best parameters for SVM with the Selected features features in repeat number 2 are:

{'kernel': 'rbf', 'C': 1, 'gamma': 0.0001}

The best parameters for NN with the Selected features features in repeat number 3 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Selected features features in repeat number 3 are:

{'n\_estimators': 50, 'criterion': 'entropy', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.181094101567

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.156941691001

mag\_phone\_y\_max\_freq & 0.0966993654828

mag\_phone\_z\_pse & 0.0888777844049

mag\_phone\_x\_max\_freq & 0.0605432136915

acc\_phone\_x\_max\_freq & 0.0500187171057

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0231404732872

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0210639467659

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0197078733963

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0186813712637

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0162051051474

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0151570013487

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0144609800311

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0137812073709

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0136690895939

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0118806321531

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0117417747913

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0113296640092

gyr\_phone\_z\_pse & 0.0103901988609

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00918084249242

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00905243951886

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00880254049747

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00856263413589

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.00829211058884

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00793936424948

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00760885670135

mag\_phone\_z\_freq\_weighted & 0.00757438343839

gyr\_phone\_x & 0.00701305885996

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00663536486566

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.00653553645701

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00636130653312

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0063198256914

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00619915939064

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00584682555707

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00573140050537

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00523197941852

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0051654249597

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00407465782227

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00380436340447

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00346032740769

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00333533955197

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00317412537708

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00304896035539

gyr\_phone\_y\_max\_freq & 0.00282897139535

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00260478292618

gyr\_phone\_x\_pse & 0.0025167284075

gyr\_phone\_x\_max\_freq & 0.00244391944763

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00228635698338

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0015192205092

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00146500127868

The best parameters for SVM with the Selected features features in repeat number 3 are:

{'kernel': 'rbf', 'C': 1, 'gamma': 0.0001}

The best parameters for NN with the Selected features features in repeat number 4 are:

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Selected features features in repeat number 4 are:

{'n\_estimators': 100, 'criterion': 'gini', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.184298033857

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.151437563672

mag\_phone\_z\_pse & 0.0875664851484

mag\_phone\_y\_max\_freq & 0.0772940165335

acc\_phone\_x\_max\_freq & 0.0535391966915

mag\_phone\_x\_max\_freq & 0.0339942821188

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0278378276432

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0254501944649

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0219085418566

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0165520086654

gyr\_phone\_z\_pse & 0.0147336347521

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0140348735321

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0136191207178

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0134926293246

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.012823608136

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0124609878222

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0113669911319

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0108577081338

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0106616994943

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0106098166445

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0105689390352

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0103074779036

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0102593719592

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00992862004567

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00977257504669

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.00949667807469

gyr\_phone\_x\_max\_freq & 0.00937545415711

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00833640161902

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00824614143527

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00821031535217

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.00812168848675

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00785072804108

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00760750057458

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00692917570284

gyr\_phone\_x & 0.00689271569665

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00689108706633

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00581961840803

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00559988472677

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00531298518312

mag\_phone\_z\_freq\_weighted & 0.00501368431973

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00487655828968

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00451137788738

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00431560378164

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00383955198851

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00349627530116

gyr\_phone\_y\_max\_freq & 0.00341786328291

gyr\_phone\_x\_pse & 0.00339835988619

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00295720484826

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0025516442094

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00155529734959

The best parameters for SVM with the Selected features features in repeat number 4 are:

{'kernel': 'rbf', 'C': 1, 'gamma': 0.0001}

The best parameters for KNN with the Selected features features are:

{'n\_neighbors': 1}

The best parameters for DT with the Selected features features are:

{'criterion': 'gini', 'min\_samples\_leaf': 2}

Feature importance decision tree:

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.438192630933

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.351825964713

mag\_phone\_y\_max\_freq & 0.121604267809

mag\_phone\_x\_max\_freq & 0.0286136715478

mag\_phone\_z\_pse & 0.0272464470426

gyr\_phone\_z\_pse & 0.0152073192796

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0137613241771

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00354837449857

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_weighted & 0.0

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_max\_freq & 0.0

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_x & 0.0

acc\_phone\_x\_max\_freq & 0.0

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_max\_freq & 0.0

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_pse & 0.0

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

Selected features & 0.9977 \emph{( 0.9919 - 1.0036 )} & 0.6697 \emph{( 0.6115 - 0.7280 )} & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.8038 \emph{( 0.7547 - 0.8530 )} & 0.9887 \emph{( 0.9757 - 1.0017 )} & 0.7433 \emph{( 0.6892 - 0.7974 )} & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.7165 \emph{( 0.6607 - 0.7723 )} & 0.9925 \emph{( 0.9818 - 1.0031 )} & 0.6935 \emph{( 0.6364 - 0.7506 )} & 0.9811 \emph{( 0.9644 - 0.9978 )} & 0.8008 \emph{( 0.7513 - 0.8502 )} \\\hline

Now we move on to studying DT and RF in more detail with only the selectedfeatures:

{'criterion': 'gini', 'min\_samples\_leaf': 2}

Feature importance decision tree:

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.435616413975

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.347892837421

mag\_phone\_y\_max\_freq & 0.120889333429

mag\_phone\_z\_pse & 0.0337802694604

mag\_phone\_x\_max\_freq & 0.0284454463869

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.013680418762

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0117583764566

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00440939117123

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00352751293699

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_weighted & 0.0

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_max\_freq & 0.0

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.0

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_x & 0.0

acc\_phone\_x\_max\_freq & 0.0

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0

gyr\_phone\_z\_pse & 0.0

gyr\_phone\_y\_max\_freq & 0.0

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_pse & 0.0

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0

{'n\_estimators': 100, 'criterion': 'entropy', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.196874275968

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.175862379694

mag\_phone\_z\_pse & 0.0935969124258

acc\_phone\_x\_max\_freq & 0.0735450999408

mag\_phone\_y\_max\_freq & 0.0614353685209

mag\_phone\_x\_max\_freq & 0.0489747769594

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0242096800249

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0183111940068

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0180567719249

gyr\_phone\_z\_pse & 0.0160763962092

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.0124600507418

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0124379519337

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0122928538443

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.012229746106

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0119461740819

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0110205697956

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0106460900844

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00996737205399

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00994738969695

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00957246766638

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.00951117547609

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00945892502873

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.00917733969004

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00888515862627

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00852678075419

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00799544949242

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00794703756257

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0070247253478

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00672880146773

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00659985553287

mag\_phone\_z\_freq\_weighted & 0.00643456479755

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00586703765114

gyr\_phone\_x & 0.00571273652346

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00544657770289

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00523035209689

gyr\_phone\_x\_max\_freq & 0.00502716576585

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00489452849231

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00486660482975

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00462961879969

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00421697246389

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00378051708521

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00342536918244

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00320797454098

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00260700601925

gyr\_phone\_x\_pse & 0.00258462140393

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00254473914744

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00239583877186

gyr\_phone\_y\_max\_freq & 0.00238742512833

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00214225884477

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00127932009386

Process finished with exit code 0