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

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

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

Training set length is: 368

Test set length is: 158

#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': (100, 10)}

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

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

Feature importance random forest:

mag\_phone\_y & 0.253746198422

mag\_phone\_x & 0.240389356996

mag\_phone\_z & 0.225418641332

acc\_phone\_y & 0.127490727019

acc\_phone\_z & 0.0538947190243

acc\_phone\_x & 0.0451669577599

gyr\_phone\_z & 0.0235301728112

gyr\_phone\_x & 0.0181236300604

gyr\_phone\_y & 0.0122395965744

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

{'kernel': 'rbf', 'C': 100, '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': (100,)}

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

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

Feature importance random forest:

mag\_phone\_y & 0.27257350708

mag\_phone\_z & 0.239860334909

mag\_phone\_x & 0.196790698984

acc\_phone\_y & 0.123218810721

acc\_phone\_z & 0.0593576661066

acc\_phone\_x & 0.0467287183759

gyr\_phone\_z & 0.0298893663218

gyr\_phone\_x & 0.0187721887817

gyr\_phone\_y & 0.0128087087198

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

{'kernel': 'rbf', 'C': 100, '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': (100,)}

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

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

Feature importance random forest:

mag\_phone\_x & 0.227098166869

mag\_phone\_z & 0.214990556131

mag\_phone\_y & 0.208784426938

acc\_phone\_y & 0.119253556951

acc\_phone\_z & 0.078675213501

acc\_phone\_x & 0.0585560738557

gyr\_phone\_z & 0.0499426791151

gyr\_phone\_x & 0.0265993767562

gyr\_phone\_y & 0.0160999498827

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

{'kernel': 'rbf', 'C': 100, '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': (100, 10)}

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

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

Feature importance random forest:

mag\_phone\_x & 0.223976476495

mag\_phone\_z & 0.213979643367

mag\_phone\_y & 0.21124850236

acc\_phone\_y & 0.120892204057

acc\_phone\_z & 0.0824432803434

acc\_phone\_x & 0.0603801704308

gyr\_phone\_z & 0.0521623665536

gyr\_phone\_x & 0.0176965520467

gyr\_phone\_y & 0.0172208043458

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

{'kernel': 'rbf', 'C': 100, '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': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100, 10)}

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

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

Feature importance random forest:

mag\_phone\_z & 0.229416535857

mag\_phone\_x & 0.228370673514

mag\_phone\_y & 0.212251455371

acc\_phone\_y & 0.120723038762

acc\_phone\_z & 0.0602423196541

acc\_phone\_x & 0.0567408453921

gyr\_phone\_z & 0.0539297055313

gyr\_phone\_x & 0.0196241304331

gyr\_phone\_y & 0.0187012954849

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

{'kernel': 'rbf', 'C': 100, '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\_y & 0.482591984926

mag\_phone\_x & 0.254183439752

mag\_phone\_z & 0.16321516493

acc\_phone\_y & 0.0386259735979

gyr\_phone\_z & 0.0312933486695

acc\_phone\_x & 0.0201149754357

gyr\_phone\_x & 0.00997511268963

acc\_phone\_z & 0.0

gyr\_phone\_y & 0.0

initial set & 0.9864 \emph{( 0.9743 - 0.9985 )} & 0.9228 \emph{( 0.8803 - 0.9653 )} & 0.9995 \emph{( 0.9970 - 1.0019 )} & 0.9443 \emph{( 0.9078 - 0.9808 )} & 0.9973 \emph{( 0.9919 - 1.0027 )} & 0.9747 \emph{( 0.9497 - 0.9997 )} & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.9557 \emph{( 0.9230 - 0.9884 )} & 0.9837 \emph{( 0.9705 - 0.9969 )} & 0.9241 \emph{( 0.8819 - 0.9662 )} & 0.9049 \emph{( 0.8743 - 0.9355 )} & 0.8987 \emph{( 0.8507 - 0.9467 )} \\\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, 10)}

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:

mag\_phone\_y & 0.184892659155

mag\_phone\_z & 0.161392744107

pca\_1 & 0.156345717936

pca\_2 & 0.119336931069

mag\_phone\_x & 0.108408939634

pca\_3 & 0.102477680907

acc\_phone\_y & 0.0565966825811

acc\_phone\_z & 0.0386994540508

acc\_phone\_x & 0.0265113061822

gyr\_phone\_z & 0.0212482538775

pca\_4 & 0.00920313547547

gyr\_phone\_y & 0.00824849950277

gyr\_phone\_x & 0.00663799552116

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

{'kernel': 'rbf', 'C': 100, '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': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100, 10)}

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

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

Feature importance random forest:

pca\_1 & 0.176188558356

mag\_phone\_y & 0.169949387582

mag\_phone\_x & 0.130422482988

mag\_phone\_z & 0.120726224945

pca\_3 & 0.11672598118

pca\_2 & 0.109235783951

acc\_phone\_y & 0.0573909375566

acc\_phone\_z & 0.0391447465146

acc\_phone\_x & 0.0300551737722

gyr\_phone\_z & 0.0219895751626

gyr\_phone\_x & 0.0104777178055

gyr\_phone\_y & 0.0091541387012

pca\_4 & 0.00853929148552

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

{'kernel': 'rbf', 'C': 100, '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': (100, 10)}

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

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

Feature importance random forest:

pca\_1 & 0.154252717672

pca\_3 & 0.134180100582

mag\_phone\_y & 0.13038404829

mag\_phone\_x & 0.117797130282

mag\_phone\_z & 0.112759575027

pca\_2 & 0.109817349793

acc\_phone\_y & 0.0789373735417

acc\_phone\_z & 0.0499616781584

gyr\_phone\_z & 0.0402153764485

acc\_phone\_x & 0.0337652973376

pca\_4 & 0.0153092780694

gyr\_phone\_y & 0.011718319142

gyr\_phone\_x & 0.0109017556566

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

{'kernel': 'rbf', 'C': 100, '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': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100, 10)}

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

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

Feature importance random forest:

pca\_1 & 0.183962261944

mag\_phone\_y & 0.147457081432

pca\_2 & 0.135564908316

mag\_phone\_z & 0.120159949296

mag\_phone\_x & 0.115776694718

pca\_3 & 0.109059286398

acc\_phone\_y & 0.0752906734774

acc\_phone\_z & 0.0387754611679

acc\_phone\_x & 0.02370081338

gyr\_phone\_z & 0.0225330864609

pca\_4 & 0.0109417626531

gyr\_phone\_y & 0.00873997779647

gyr\_phone\_x & 0.00803804295887

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

{'kernel': 'rbf', 'C': 100, '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': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

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

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

Feature importance random forest:

pca\_1 & 0.165172252789

mag\_phone\_y & 0.150332970617

mag\_phone\_z & 0.148322414078

pca\_2 & 0.126402988675

mag\_phone\_x & 0.121504688338

pca\_3 & 0.119122261732

acc\_phone\_y & 0.0529608716639

acc\_phone\_z & 0.0345055778008

acc\_phone\_x & 0.0288685435695

gyr\_phone\_z & 0.0262347448167

pca\_4 & 0.0093735382774

gyr\_phone\_y & 0.00879646052391

gyr\_phone\_x & 0.00840268711863

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

{'kernel': 'rbf', 'C': 100, '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 & 0.371842240997

mag\_phone\_y & 0.196978381801

mag\_phone\_z & 0.148945269073

pca\_3 & 0.13584516064

mag\_phone\_x & 0.047545689631

gyr\_phone\_z & 0.0277524759286

acc\_phone\_x & 0.0201149754357

acc\_phone\_y & 0.0188369637556

acc\_phone\_z & 0.0103644921476

gyr\_phone\_x & 0.00879247940764

pca\_2 & 0.00669200410158

gyr\_phone\_y & 0.00628986708163

pca\_4 & 0.0

Chapter 3 & 0.9908 \emph{( 0.9808 - 1.0007 )} & 0.9418 \emph{( 0.9045 - 0.9790 )} & 0.9989 \emph{( 0.9955 - 1.0023 )} & 0.9405 \emph{( 0.9029 - 0.9781 )} & 0.9973 \emph{( 0.9919 - 1.0027 )} & 0.9747 \emph{( 0.9497 - 0.9997 )} & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.9557 \emph{( 0.9230 - 0.9884 )} & 0.9837 \emph{( 0.9705 - 0.9969 )} & 0.9367 \emph{( 0.8980 - 0.9755 )} & 0.8995 \emph{( 0.8681 - 0.9308 )} & 0.8861 \emph{( 0.8355 - 0.9366 )} \\\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, 10)}

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

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

Feature importance random forest:

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0810343529632

pca\_3\_temp\_mean\_ws\_100 & 0.0683151545772

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0587104438491

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.051998638814

pca\_2\_temp\_mean\_ws\_100 & 0.0370346724594

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0351202268209

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0333191919896

pca\_1\_temp\_mean\_ws\_100 & 0.0322714680006

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0257223200023

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0255394904245

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0232419805472

mag\_phone\_x\_pse & 0.0222501789613

acc\_phone\_y\_max\_freq & 0.0221346508524

mag\_phone\_y & 0.021737282559

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.021359581918

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0213507169566

pca\_1 & 0.0202809231168

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0194384155443

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0193405561656

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0188506369323

pca\_2 & 0.0185868692898

mag\_phone\_y\_pse & 0.0184543216916

pca\_2\_temp\_std\_ws\_100 & 0.0162342485286

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0156633435485

mag\_phone\_z & 0.0154148216592

acc\_phone\_z\_pse & 0.0139155968955

pca\_4\_temp\_std\_ws\_100 & 0.0137442667569

acc\_phone\_y & 0.0121053150905

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0119759683099

mag\_phone\_z\_pse & 0.0118859866338

acc\_phone\_x\_pse & 0.0115813764274

pca\_1\_temp\_std\_ws\_100 & 0.0115075908364

mag\_phone\_z\_max\_freq & 0.0111568642414

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.0109559954082

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0107785868686

mag\_phone\_x\_max\_freq & 0.0103282460137

mag\_phone\_z\_temp\_std\_ws\_100 & 0.00970273720554

mag\_phone\_y\_max\_freq & 0.00898293677147

mag\_phone\_x\_temp\_std\_ws\_100 & 0.00788868476537

pca\_3\_temp\_std\_ws\_100 & 0.00749043878942

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.00711236745604

acc\_phone\_y\_pse & 0.00575109370922

mag\_phone\_x & 0.00554723032443

pca\_3 & 0.00551968117186

acc\_phone\_z\_temp\_std\_ws\_100 & 0.00511439165804

acc\_phone\_z & 0.00444499080462

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00363720763684

mag\_phone\_y\_temp\_std\_ws\_100 & 0.00293889466808

acc\_phone\_x\_max\_freq & 0.00263119824233

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00252247593232

gyr\_phone\_z\_max\_freq & 0.00192365474803

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00169411587912

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.00156405211754

acc\_phone\_z\_freq\_weighted & 0.00145000872102

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00143832698828

gyr\_phone\_z\_pse & 0.00139709852218

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00134817789209

pca\_4\_temp\_mean\_ws\_100 & 0.00132006833467

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00127620532764

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.00127365009282

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00113180534237

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00112099442157

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00101999384809

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000965099138691

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000920286207322

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000915644223365

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000875176527271

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000872153975946

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000870036191231

acc\_phone\_z\_max\_freq & 0.00077150134995

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000764794544473

gyr\_phone\_y\_pse & 0.000701293450063

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000699758444937

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000693744245342

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000680976809317

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000658688385564

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000650447449548

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000589719592332

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000582390516868

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000538858743698

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000531338584491

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000483301574745

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000478847770627

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000466985698023

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.00046341923131

gyr\_phone\_x\_freq\_weighted & 0.000455371817621

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000419636966985

gyr\_phone\_x\_max\_freq & 0.000405882049869

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000391429377364

gyr\_phone\_z & 0.000375987964861

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000374075102116

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000371394893741

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000359183208974

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00035565077257

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.000320865196151

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000317924381552

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00030492288412

acc\_phone\_x\_freq\_weighted & 0.000304922817693

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00029374448685

gyr\_phone\_y\_freq\_weighted & 0.000286009972011

acc\_phone\_y\_freq\_weighted & 0.000284715437947

gyr\_phone\_x\_pse & 0.000281942031871

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000271933160349

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000267587209944

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.00026309638895

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000263076884214

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000261104773628

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000254801929599

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000238214887384

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00023517784377

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.00022705895193

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000207584881802

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000204348465201

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000200255176438

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000198485169159

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000197340202114

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000192711435798

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000188871732644

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000182760242337

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000178671831082

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000177547562788

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000160788818521

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000159406604423

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000149997076571

mag\_phone\_x\_freq\_weighted & 0.000146638688819

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000144640097437

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000140617406746

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000138047217601

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000135889877402

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000135510554805

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000134069256885

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000129964964007

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00012969290507

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000129210673726

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000120400512924

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000109223437207

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000107142126613

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000106689679558

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000103484879905

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000103213618158

gyr\_phone\_z\_freq\_weighted & 9.95916020805e-05

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 9.69242183802e-05

mag\_phone\_y\_freq\_weighted & 9.22404689383e-05

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 9.08264579859e-05

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 8.94522415445e-05

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 8.68816772752e-05

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 8.52251981169e-05

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 8.4036452638e-05

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 8.0124594663e-05

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 7.99323655032e-05

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 7.82179445428e-05

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 7.70320775591e-05

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 7.59353286659e-05

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 6.95809554699e-05

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 6.69884720764e-05

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 6.06181487683e-05

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 5.60552740076e-05

gyr\_phone\_y & 4.80916003412e-05

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 4.77452360502e-05

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 4.42799851309e-05

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 4.06625431329e-05

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 3.59711185359e-05

gyr\_phone\_x & 3.37802389754e-05

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 2.36636317562e-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

gyr\_phone\_x\_freq\_1.41414141414\_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

mag\_phone\_z\_freq\_0.10101010101\_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\_y\_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\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_1.51515151515\_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\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.606060606061\_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

mag\_phone\_x\_freq\_0.808080808081\_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\_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

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\_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

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

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

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

acc\_phone\_x & 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

mag\_phone\_z\_freq\_0.505050505051\_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\_1.11111111111\_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

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

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

acc\_phone\_y\_freq\_0.707070707071\_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

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

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

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

mag\_phone\_z\_freq\_1.51515151515\_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': 2000, '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\_freq\_0.0\_Hz\_ws\_33 & 0.0659332373512

pca\_2\_temp\_mean\_ws\_100 & 0.059423076159

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0531349771103

pca\_1\_temp\_mean\_ws\_100 & 0.0407589801662

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0398536345196

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0383955140589

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0362304674881

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0346265095248

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0312498838615

pca\_3\_temp\_mean\_ws\_100 & 0.0308912662928

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0286864665839

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0270312529406

pca\_1 & 0.0268432966597

pca\_1\_temp\_std\_ws\_100 & 0.0222989316035

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0210499007407

mag\_phone\_x\_pse & 0.0208610240286

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0192961880074

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.0184966476975

mag\_phone\_x & 0.0163812500736

mag\_phone\_y & 0.0160634525044

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0156339818432

pca\_2 & 0.0154796336264

acc\_phone\_x\_pse & 0.0151961649846

pca\_4\_temp\_std\_ws\_100 & 0.0151372308117

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0148514163311

pca\_3 & 0.0146203533517

mag\_phone\_z & 0.014217055837

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0141992880022

acc\_phone\_y\_max\_freq & 0.0141410525695

pca\_2\_temp\_std\_ws\_100 & 0.0139826460967

mag\_phone\_z\_pse & 0.01283989912

mag\_phone\_y\_max\_freq & 0.0126286555418

acc\_phone\_z\_pse & 0.0115879300204

mag\_phone\_y\_pse & 0.0112942938262

mag\_phone\_z\_temp\_std\_ws\_100 & 0.011284408517

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0108388430093

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0101677136829

mag\_phone\_x\_temp\_std\_ws\_100 & 0.00991914683917

acc\_phone\_y & 0.0089805041704

pca\_3\_temp\_std\_ws\_100 & 0.00872287397008

mag\_phone\_z\_max\_freq & 0.00752358757783

acc\_phone\_y\_pse & 0.00745032743751

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00561682373776

mag\_phone\_y\_temp\_std\_ws\_100 & 0.00428922136928

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00410323591042

acc\_phone\_z & 0.00408690439656

mag\_phone\_x\_max\_freq & 0.00376171716897

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.00326703543672

acc\_phone\_z\_max\_freq & 0.00261329254464

pca\_4\_temp\_mean\_ws\_100 & 0.00243206592593

gyr\_phone\_z\_max\_freq & 0.00230985672697

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0022620147649

acc\_phone\_x & 0.00213246345513

mag\_phone\_x\_freq\_weighted & 0.00181535298047

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.00110885434245

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00102377456904

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00101522637984

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00101404008571

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000966378440966

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000867890916106

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000824246662662

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000787186345741

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00078623970751

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000736208451718

acc\_phone\_x\_max\_freq & 0.000722009821818

gyr\_phone\_x\_max\_freq & 0.000714071823748

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000713273573939

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000680500140835

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000678758943797

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000666027209604

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000656953758326

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000647916962883

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000639169596478

pca\_4 & 0.000637285534206

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000634884123883

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000609766325167

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000588165921324

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000554265366519

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.000551285314269

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000537306626862

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000534215234297

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000526568610619

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000524671355987

gyr\_phone\_z\_freq\_weighted & 0.000496580337903

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000482284373494

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.000474168229914

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000461834539079

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00045989449258

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000458583683562

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000453730054271

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000442305803019

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000424216466784

acc\_phone\_x\_freq\_weighted & 0.000410342687763

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000408958499551

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000398660183684

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000394946219481

gyr\_phone\_y\_freq\_weighted & 0.000366162582281

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000357176184165

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00034742344133

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000340885856837

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000333425862163

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000328118216353

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000325588399213

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000320435109146

gyr\_phone\_z\_pse & 0.000316128967433

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000304049667943

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000298344516264

gyr\_phone\_y\_pse & 0.000298200005956

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000291930790665

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000284282481946

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000282339023046

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000278072041244

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000277312186345

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000275895095609

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000274004220082

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000268590793752

gyr\_phone\_z & 0.000259273365955

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000242602344008

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000241725485921

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000237664786409

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000227826910059

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000224357378437

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000222127841932

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000208801747494

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000206047992254

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000201828151403

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000201382759382

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000199729053001

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000198699982428

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000198118274862

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000190726297466

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000190333752512

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000188053525818

mag\_phone\_y\_freq\_weighted & 0.00018678935804

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000185706286443

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000182448549657

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000179027420492

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000172921108575

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00017185910206

mag\_phone\_z\_freq\_weighted & 0.000168751928909

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000165271299081

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000164121847908

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000161396112302

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000160182568384

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000158936474427

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000149892949336

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000147078685166

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000142179975128

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000138119929831

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000137423767575

gyr\_phone\_x & 0.000130115740342

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000128361096759

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000128119029072

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000125449321464

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00012486745327

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000122711486417

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000117939473045

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000117038616095

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000113649611626

gyr\_phone\_y & 0.000111012492979

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000109739600999

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000109643329763

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000106587478964

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000104023684923

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.000100838368707

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 9.91957466543e-05

gyr\_phone\_x\_pse & 9.90279340678e-05

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 9.82946335407e-05

acc\_phone\_y\_freq\_weighted & 9.12033965783e-05

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 9.10859925335e-05

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 8.98393789113e-05

gyr\_phone\_y\_max\_freq & 8.25134733208e-05

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 8.1506781861e-05

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 8.01397813466e-05

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 7.50241200206e-05

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 7.20332159497e-05

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 7.19780976036e-05

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 6.57660874235e-05

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 6.53731487855e-05

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 6.23973773944e-05

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 5.68456816206e-05

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 5.61797129641e-05

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 5.09392790942e-05

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 4.65815708373e-05

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 4.56728160851e-05

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 4.34697131065e-05

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 4.30615458134e-05

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 3.96157787295e-05

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 3.94599276668e-05

acc\_phone\_z\_freq\_weighted & 3.93246528196e-05

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 3.8389364749e-05

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 3.80708400405e-05

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 3.69709390523e-05

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 3.5252008872e-05

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 3.24335759482e-05

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 2.95090922429e-05

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 2.69537350656e-05

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 2.55377247425e-05

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 2.45792805121e-05

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 2.06940488619e-05

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 2.05145241799e-05

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 1.78925578045e-05

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 1.51037127224e-05

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 1.51028378636e-05

acc\_phone\_z\_freq\_0.30303030303\_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\_0.20202020202\_Hz\_ws\_33 & 0.0

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

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

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

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

gyr\_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\_1.51515151515\_Hz\_ws\_33 & 0.0

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

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0

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

gyr\_phone\_x\_freq\_1.21212121212\_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\_x\_freq\_0.606060606061\_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

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

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

mag\_phone\_x\_freq\_1.0101010101\_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 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': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

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

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

Feature importance random forest:

pca\_1\_temp\_mean\_ws\_100 & 0.0512335465019

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0492129451033

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0444137001528

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0427292400968

pca\_1 & 0.0390266656053

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0389444342427

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0387984052319

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0365601467549

pca\_2\_temp\_mean\_ws\_100 & 0.0352885457613

pca\_3\_temp\_mean\_ws\_100 & 0.0331005658274

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0314590873374

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0302382814353

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0252660486469

mag\_phone\_y & 0.0246230121835

acc\_phone\_y\_max\_freq & 0.0228544313764

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.0226466567294

mag\_phone\_x & 0.0225904957231

acc\_phone\_x\_pse & 0.0205449663569

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.019272579226

pca\_3 & 0.0186320188337

mag\_phone\_x\_pse & 0.017367061342

pca\_2 & 0.0172687381484

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0170375206007

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0166168097455

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0155095541286

pca\_2\_temp\_std\_ws\_100 & 0.0154151058337

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0151503912059

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0143092433643

pca\_4\_temp\_std\_ws\_100 & 0.0141105093536

mag\_phone\_z\_pse & 0.0131833484112

mag\_phone\_z\_temp\_std\_ws\_100 & 0.0130101758118

mag\_phone\_z & 0.0115142665708

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0109944067951

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0108997136211

mag\_phone\_z\_max\_freq & 0.00948740198965

mag\_phone\_y\_pse & 0.00840185907089

pca\_1\_temp\_std\_ws\_100 & 0.00742368953736

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00703740647518

mag\_phone\_y\_max\_freq & 0.00701198083748

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00648269902462

pca\_3\_temp\_std\_ws\_100 & 0.0060155153272

mag\_phone\_y\_temp\_std\_ws\_100 & 0.00597343094877

acc\_phone\_y & 0.00578918193622

pca\_4\_temp\_mean\_ws\_100 & 0.00518480409541

acc\_phone\_z\_pse & 0.00510573455775

acc\_phone\_y\_pse & 0.00474372056766

acc\_phone\_x\_max\_freq & 0.00393174661834

mag\_phone\_x\_max\_freq & 0.00379041569006

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0033353329203

acc\_phone\_z & 0.00221410463058

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.00194033310354

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.00184207687568

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00179863511027

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.0016695890254

acc\_phone\_z\_max\_freq & 0.00163723669628

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00158659669316

acc\_phone\_x & 0.00137997233277

mag\_phone\_y\_freq\_weighted & 0.00133679437814

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00115845066501

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00110030282237

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00109204188885

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000980391072821

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000925792765769

gyr\_phone\_z\_max\_freq & 0.000891638762345

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000885034877059

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000841204614737

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000810883482928

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000762325571003

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000717607089303

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000664655728721

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000659118528398

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000646448225947

mag\_phone\_x\_freq\_weighted & 0.000634768321755

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000591887584393

gyr\_phone\_z\_freq\_weighted & 0.000588972675539

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000568533764109

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000566039539244

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000561242521148

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000543468547682

gyr\_phone\_z\_pse & 0.000511363179573

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00050658670495

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000482309643056

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000481741979748

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000478648125346

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000471400714952

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000450520816171

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00044445907848

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000423661626179

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000423216948966

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000418375138705

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000417882099163

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000417739159206

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000408589374639

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00038126026134

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000380687811239

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.00037499264812

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000373421598089

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000368492680766

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00036818152803

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000367163042434

gyr\_phone\_x\_freq\_weighted & 0.000361107168637

acc\_phone\_y\_freq\_weighted & 0.000360684458838

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000354519837425

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000350527321732

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000349250333632

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000348926983978

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000347456253453

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000345974956622

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000341046549869

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000328354849177

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000323792313289

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000320081399801

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000317139797586

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000313950191923

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000312553244544

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000305912020434

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000304611661838

gyr\_phone\_x & 0.000304145065361

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000300957917634

acc\_phone\_x\_freq\_weighted & 0.000299815640766

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000296210784994

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000285975530271

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.000284310124307

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000284143061925

gyr\_phone\_y\_freq\_weighted & 0.000280606475971

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000266679948188

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000255082585604

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000252830709372

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000250986038053

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000246828210894

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000241840564783

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000237805637234

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000236345976996

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000233344292355

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000231679945532

acc\_phone\_z\_freq\_weighted & 0.000230379456713

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000227279837962

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000223945129515

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000217241721302

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000206218800675

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000203972685083

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000203928336647

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000200003209792

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000198881880055

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.000196868912127

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000194248906573

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000192718936591

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000190033635405

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000183348249429

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000182265464333

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000179568887489

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00017614715921

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000165749092127

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00016477721391

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000160123311179

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000159757638932

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000155263250919

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000153805939918

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000151184646399

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000143717629046

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000142933568247

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000135931412895

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000133970432587

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000130015826961

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000129711989222

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000128974130937

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000127755489833

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000125928038818

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000125539185375

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000123750895598

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000121054008303

gyr\_phone\_y\_pse & 0.000117865070907

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000115783150822

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000115572098777

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000115124000303

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000114460467116

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000112003704158

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000111625084089

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000110690320212

pca\_4 & 0.000108451121941

gyr\_phone\_y & 0.000107761429929

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000106356139134

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000106182118314

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000103346030814

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000102758522369

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 9.43444483196e-05

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 9.32358835083e-05

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 9.19440349694e-05

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 9.19433035726e-05

gyr\_phone\_x\_pse & 7.8956102826e-05

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 7.87026782043e-05

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 7.7160099148e-05

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 7.6457345839e-05

gyr\_phone\_y\_max\_freq & 7.44931178491e-05

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 7.23766526605e-05

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 7.14768097242e-05

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 6.97869836443e-05

mag\_phone\_z\_freq\_weighted & 6.64492389534e-05

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 6.56454976943e-05

gyr\_phone\_x\_max\_freq & 6.4771925431e-05

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 5.99441411866e-05

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 5.51618850361e-05

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 5.41930183383e-05

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 5.25154277592e-05

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 5.23962223347e-05

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 4.80461290265e-05

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 4.67032706061e-05

gyr\_phone\_z & 4.66772936391e-05

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 4.62600483599e-05

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 4.25233940533e-05

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 4.03986689992e-05

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 3.91501257422e-05

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 3.80642742166e-05

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 1.5390245558e-05

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\_0.10101010101\_Hz\_ws\_33 & 0.0

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

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

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

mag\_phone\_x\_freq\_1.21212121212\_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

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

mag\_phone\_z\_freq\_0.808080808081\_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

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 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': 50, 'criterion': 'gini', 'min\_samples\_leaf': 10}

Feature importance random forest:

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0556564417702

pca\_2\_temp\_mean\_ws\_100 & 0.0475326869846

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0429964427309

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.041932925283

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0417582679689

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.041160085477

pca\_3\_temp\_mean\_ws\_100 & 0.0367056857492

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0362888531508

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0360116204547

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0332034593164

pca\_1\_temp\_mean\_ws\_100 & 0.0329417465368

mag\_phone\_x & 0.0274251506445

pca\_3 & 0.0263593921017

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0263007477291

mag\_phone\_x\_pse & 0.0258885809348

pca\_1\_temp\_std\_ws\_100 & 0.0242561729559

pca\_2 & 0.022761170276

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.022673507598

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.0221155296742

pca\_4\_temp\_std\_ws\_100 & 0.0214904022449

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0182912558095

acc\_phone\_y\_max\_freq & 0.0178040393059

pca\_1 & 0.0169881326449

acc\_phone\_z\_pse & 0.0166323647027

mag\_phone\_z & 0.0163411214596

mag\_phone\_z\_temp\_std\_ws\_100 & 0.0159992167754

acc\_phone\_x\_pse & 0.015289766378

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0148432251037

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.0143446552568

mag\_phone\_y & 0.0136027717824

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0131410197411

mag\_phone\_y\_pse & 0.0123815235802

pca\_2\_temp\_std\_ws\_100 & 0.0114321817782

acc\_phone\_y\_pse & 0.0111713195768

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0111342588547

mag\_phone\_z\_pse & 0.0107070321524

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.0100952263555

acc\_phone\_y & 0.0081000043483

acc\_phone\_z\_temp\_std\_ws\_100 & 0.00796497964613

mag\_phone\_z\_max\_freq & 0.00697601109198

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0060426950253

mag\_phone\_x\_max\_freq & 0.00582915727771

pca\_3\_temp\_std\_ws\_100 & 0.00468942606833

acc\_phone\_z & 0.00464149601427

mag\_phone\_y\_max\_freq & 0.00369362070311

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00304903311533

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0028273301753

mag\_phone\_y\_freq\_weighted & 0.00267386301239

mag\_phone\_x\_freq\_weighted & 0.00264733030056

mag\_phone\_y\_temp\_std\_ws\_100 & 0.00253524093055

pca\_4\_temp\_mean\_ws\_100 & 0.00244713790326

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00205763560828

acc\_phone\_x & 0.00202624737952

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00201247915273

gyr\_phone\_z\_pse & 0.00198695814753

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00191052947348

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00178323051804

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00167226065555

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0016298515305

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.00161486164642

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00128849319504

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.00115826462416

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000928860755506

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000921421328974

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000815475133841

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000747875555925

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000707842845125

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000676299839456

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.000535945757302

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0005277182694

gyr\_phone\_y\_max\_freq & 0.000499523270852

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000476360477789

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000464903053685

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000410308072549

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000318118694575

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000281486254902

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00027922794215

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000272505787987

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000215082794033

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000194202921156

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00018408230444

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000183066879958

gyr\_phone\_x & 0.00014555704577

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000135279017259

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000121208347485

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000119771454371

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000114382083098

acc\_phone\_z\_freq\_weighted & 0.000114027005485

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 9.93710530063e-05

gyr\_phone\_y\_pse & 6.46368685999e-05

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 5.29211111977e-05

gyr\_phone\_x\_pse & 4.91702168463e-05

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 4.43497739213e-05

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 4.27208714239e-05

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 3.56280689759e-05

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 3.50954709163e-05

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 3.08258658189e-05

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 2.90147057457e-05

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 2.88138474313e-05

acc\_phone\_y\_freq\_weighted & 2.86223609573e-05

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 2.808926185e-05

gyr\_phone\_z\_freq\_weighted & 1.60601332086e-05

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 1.26858834648e-05

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 1.07078895829e-05

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 1.04232628556e-05

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 9.07888871273e-06

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 9.06155403547e-06

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 8.69121735495e-06

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 8.65219126128e-06

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 8.32100713793e-06

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 8.06168193265e-06

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 7.67410107051e-06

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 7.58262158425e-06

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 7.08881466196e-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\_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\_1.61616161616\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_0.30303030303\_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

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

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

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

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

gyr\_phone\_z\_freq\_0.40404040404\_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\_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

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

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\_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

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

gyr\_phone\_x\_freq\_0.0\_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

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

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\_1.71717172\_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\_0.40404040404\_Hz\_ws\_33 & 0.0

gyr\_phone\_y & 0.0

gyr\_phone\_z & 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\_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

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

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

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

acc\_phone\_z\_max\_freq & 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

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\_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

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

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

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

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': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

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

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

Feature importance random forest:

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0721799474442

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0479496221501

pca\_2\_temp\_mean\_ws\_100 & 0.0422764723847

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0389523635037

mag\_phone\_y & 0.0384618743596

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.036984655819

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0363864484144

pca\_1\_temp\_mean\_ws\_100 & 0.0358577913004

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0342505405014

pca\_3\_temp\_mean\_ws\_100 & 0.0326154467295

pca\_2 & 0.0317696739497

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.030327608465

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.029065950368

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0283268453486

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0251833243261

pca\_1 & 0.0250840546263

pca\_4\_temp\_std\_ws\_100 & 0.0236284215758

mag\_phone\_x & 0.0224875858557

mag\_phone\_x\_pse & 0.0219457124381

mag\_phone\_z & 0.0212197064081

acc\_phone\_x\_pse & 0.0208992094136

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0187950181152

mag\_phone\_z\_temp\_std\_ws\_100 & 0.0144541493767

pca\_1\_temp\_std\_ws\_100 & 0.0143571258025

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0139173079717

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.0136653576714

pca\_2\_temp\_std\_ws\_100 & 0.0134192622846

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0125632805415

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0123055152264

mag\_phone\_y\_max\_freq & 0.0120160735242

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0120077575563

acc\_phone\_y\_max\_freq & 0.0116212114395

mag\_phone\_y\_pse & 0.0114068129186

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0102974550844

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00812538067886

acc\_phone\_z\_pse & 0.00708484365806

pca\_3 & 0.00670202934745

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00609095233164

pca\_3\_temp\_std\_ws\_100 & 0.00605964203254

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.00581439883069

mag\_phone\_z\_pse & 0.00560204639653

mag\_phone\_y\_temp\_std\_ws\_100 & 0.0049974109605

pca\_4\_temp\_mean\_ws\_100 & 0.00482825880025

mag\_phone\_z\_max\_freq & 0.004712083234

acc\_phone\_y\_pse & 0.00430957961843

mag\_phone\_x\_max\_freq & 0.00427373747652

acc\_phone\_y & 0.00358449823241

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.00304300092933

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.00254375022063

acc\_phone\_z\_max\_freq & 0.00211792942416

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00198111587606

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0018399551998

acc\_phone\_z & 0.00180685389381

acc\_phone\_x & 0.00177738406151

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00144981104943

gyr\_phone\_z\_max\_freq & 0.00129449772044

mag\_phone\_x\_freq\_weighted & 0.00120258050361

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00116413576919

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00110634661275

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00107681902891

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.00101802252134

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000947032254759

acc\_phone\_x\_max\_freq & 0.000910939897881

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000885483500182

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000867834393671

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000855607171048

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000784409606516

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000733766794294

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000708286532827

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000684761747263

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0006693243905

gyr\_phone\_z\_pse & 0.000614896368335

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000611236156154

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000602050395041

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00057370869443

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.000552974987096

gyr\_phone\_y\_pse & 0.000513053110328

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000496470367871

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000492357003087

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000479999925996

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000479054655871

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000473874198666

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.000467640927876

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000457849653154

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000456887322054

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000451290036743

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000441428250248

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000433075195819

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000406385753913

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.00039932833868

gyr\_phone\_x\_freq\_weighted & 0.000388227764906

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000360934529368

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000343735130724

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000342970635073

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000342758784634

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000336408876113

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000332977587242

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000327569509057

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000314601299153

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000313343208314

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000312140832706

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000311143303515

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000310326410089

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000308760195671

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000307136865071

gyr\_phone\_z & 0.000306312334731

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000306001828657

mag\_phone\_y\_freq\_weighted & 0.000304337876763

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.00029642095198

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000293289446084

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000287331029007

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000285911918168

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000279806014737

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000278107268545

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000271751153222

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.00027110580242

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000270268532023

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000264827908383

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000261717008943

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000261154318411

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000259919558498

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000255094222499

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000253940776254

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000250551740329

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000247901580028

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000247885897314

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000247640404854

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000240845985533

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000240229006626

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000236186967382

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000234764654254

acc\_phone\_z\_freq\_weighted & 0.000227463776321

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000216339659536

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000213638731619

gyr\_phone\_x\_pse & 0.000205620957338

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000205486933477

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000196773879627

gyr\_phone\_y & 0.000195128103119

gyr\_phone\_y\_freq\_weighted & 0.00019120008734

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000190502515294

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000187660040356

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000178738063507

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000170354899924

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000167941522795

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000162066038964

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000151948346868

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000149722761872

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000149663366925

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000148688123797

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000145990101455

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000145520430613

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000140179274196

gyr\_phone\_z\_freq\_weighted & 0.00014011757359

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000139836717982

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000134638084044

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000134041078627

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000132244228882

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00013182655697

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000131226760927

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000130574180426

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000128182200868

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000127448453387

gyr\_phone\_y\_max\_freq & 0.000124752577976

acc\_phone\_x\_freq\_weighted & 0.000124662250088

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000121816628229

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000113488881966

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000112968960565

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000106079463834

mag\_phone\_z\_freq\_weighted & 0.000103735577301

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 9.89949692871e-05

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 9.75625430845e-05

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 9.66940025577e-05

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 9.4391522194e-05

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 9.24682636669e-05

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 9.20171693091e-05

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 9.171318726e-05

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 9.06479642743e-05

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 9.04120583241e-05

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 8.97539477649e-05

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 8.90111766611e-05

pca\_4 & 8.55105653609e-05

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 8.35494000352e-05

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 8.13181416333e-05

acc\_phone\_y\_freq\_weighted & 8.12958357021e-05

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 8.02554157457e-05

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 7.59526347426e-05

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 7.41745206317e-05

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 6.86921638709e-05

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 6.64433020611e-05

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 6.61882683748e-05

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 6.51939438189e-05

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 6.51930347302e-05

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 5.71317133347e-05

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 5.43866684934e-05

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 5.21566934425e-05

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 4.67609673321e-05

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 4.40716652304e-05

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 3.72464138903e-05

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 3.68912333687e-05

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 3.60837188482e-05

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 3.59612430509e-05

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 3.5915680709e-05

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 3.23404090138e-05

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 3.04221707445e-05

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 2.06989285652e-05

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 2.03965222596e-05

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 1.98400987199e-05

gyr\_phone\_x\_max\_freq & 0.0

acc\_phone\_y\_freq\_1.61616161616\_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

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

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

mag\_phone\_x\_freq\_0.10101010101\_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\_1.11111111111\_Hz\_ws\_33 & 0.0

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

gyr\_phone\_x & 0.0

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

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

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

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

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

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 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': 2}

The best parameters for DT with the Chapter 4 features are:

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

Feature importance decision tree:

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.513319591788

pca\_2\_temp\_mean\_ws\_100 & 0.165685503933

mag\_phone\_x\_pse & 0.0933592167923

mag\_phone\_x\_max\_freq & 0.0778276581209

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0663805444222

pca\_3\_temp\_std\_ws\_100 & 0.0610634339466

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0205762453532

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00178780564375

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\_z\_pse & 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

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

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\_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\_z\_temp\_std\_ws\_100 & 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

pca\_2\_temp\_std\_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

pca\_1\_temp\_mean\_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

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

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 & 0.9995 \emph{( 0.9970 - 1.0019 )} & 0.9418 \emph{( 0.9045 - 0.9790 )} & 0.9995 \emph{( 0.9970 - 1.0019 )} & 0.9949 \emph{( 0.9836 - 1.0062 )} & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.9684 \emph{( 0.9405 - 0.9962 )} & 0.9891 \emph{( 0.9783 - 0.9999 )} & 0.9747 \emph{( 0.9497 - 0.9997 )} & 0.9973 \emph{( 0.9919 - 1.0027 )} & 0.9620 \emph{( 0.9316 - 0.9924 )} & 0.9918 \emph{( 0.9825 - 1.0012 )} & 0.9684 \emph{( 0.9405 - 0.9962 )} \\\hline

The best parameters for NN with the Chapter 5 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 5 features in repeat number 0 are:

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

Feature importance random forest:

pca\_2\_temp\_mean\_ws\_100 & 0.045925950317

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0428517343857

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0381806155946

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0346786117908

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0342330987056

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.03307038494

mag\_phone\_z & 0.0310577166955

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0298934025332

mag\_phone\_x\_pse & 0.0294280654933

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.028759683929

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0283593966035

pca\_1 & 0.0267054284131

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0253680962605

pca\_4\_temp\_std\_ws\_100 & 0.0237070681417

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0224893663527

pca\_2 & 0.0218406348922

pca\_3\_temp\_mean\_ws\_100 & 0.0204506460149

pca\_1\_temp\_mean\_ws\_100 & 0.0201918265149

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0194049933997

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0182405224158

pca\_3 & 0.0177953682763

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0177858739661

mag\_phone\_y & 0.0176897030349

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.016863709041

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.016742317677

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0166911283713

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0165131996834

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0160264826794

mag\_phone\_z\_temp\_std\_ws\_100 & 0.015640002992

pca\_2\_temp\_std\_ws\_100 & 0.0147668616939

mag\_cluster & 0.0144972974706

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0143240213911

mag\_phone\_z\_max\_freq & 0.0120468665278

mag\_phone\_y\_max\_freq & 0.0107712118742

acc\_phone\_y\_max\_freq & 0.0105692240194

mag\_phone\_z\_pse & 0.010214342905

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.0100323752021

pca\_1\_temp\_std\_ws\_100 & 0.00995795579524

mag\_phone\_y\_temp\_std\_ws\_100 & 0.009465794051

mag\_phone\_y\_pse & 0.00910820045961

pca\_3\_temp\_std\_ws\_100 & 0.00880138621417

mag\_phone\_x & 0.00860870474417

acc\_phone\_x\_pse & 0.00824912970516

acc\_phone\_y\_pse & 0.00729573162227

acc\_phone\_y & 0.00611796153925

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00560441883715

acc\_phone\_x & 0.00515548395824

acc\_phone\_z\_pse & 0.00512192638687

mag\_phone\_x\_max\_freq & 0.0049504564632

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00398040822907

mag\_phone\_x\_freq\_weighted & 0.00387605150622

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0038559615213

acc\_phone\_z\_max\_freq & 0.00323624758301

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00257917773173

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.00256158716255

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.00249406211326

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.00240052879274

pca\_4\_temp\_mean\_ws\_100 & 0.00233444150943

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00232287803016

mag\_phone\_y\_freq\_weighted & 0.00227913460115

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.00206305550693

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00202646273203

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00140041817688

gyr\_phone\_y & 0.00137861373773

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.00131639909701

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00121463892515

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00105612817706

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0010390348627

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000980118822503

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000955723189778

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000929911068313

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000917174653907

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000913093903129

gyr\_phone\_z\_pse & 0.000905775857684

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000872304071151

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000849570723417

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000845871689933

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000825738321278

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000813199205402

acc\_phone\_x\_freq\_weighted & 0.000800495691771

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000784211169738

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000773103899893

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000720114117614

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000701411675934

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.00070053922492

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000682051494939

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000676295874528

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000657891479085

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000648531757693

acc\_cluster & 0.000634470824183

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000623820712302

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000622258601525

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000595615894439

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000587393368267

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00058413316543

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000581831469399

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000557936678611

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000551936866771

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000551888232428

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000546429418244

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000528608861826

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000523246611593

acc\_phone\_z & 0.000522041472924

gyr\_phone\_z\_max\_freq & 0.000513395997708

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000509339395042

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000508552452829

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000499514706198

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00049743432071

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000454069714897

pca\_4 & 0.000451294191137

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000441133391156

gyr\_phone\_z & 0.000441013174371

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00044040082858

gyr\_phone\_x\_pse & 0.000438477439517

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000435363632118

mag\_phone\_z\_freq\_weighted & 0.000423053884465

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.00041663466451

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000395569441449

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000369173867987

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000368957294602

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00036572990863

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000364799686362

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000361778698453

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00034939621154

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000342103974544

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000333778155933

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000332010721686

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000321804831766

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000306849532362

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000301557129174

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000299022758784

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000288087879329

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000287523884274

gyr\_phone\_y\_pse & 0.00028481718416

acc\_phone\_x\_max\_freq & 0.000260105903627

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000257447524315

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000255636921474

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000250000123788

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000243601632484

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000238815117525

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000233665310512

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000222040180659

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000219628465162

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000214009937677

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000210364872054

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000204400247839

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000202073922008

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000201459307272

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000193810017029

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000193398071859

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000192964261993

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00019142509544

gyr\_phone\_y\_freq\_weighted & 0.000183365801799

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000174506828528

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000171804244922

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000156153252876

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000153881373815

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000152007968616

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000149727398486

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000148206030232

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000124674010293

acc\_phone\_z\_freq\_weighted & 0.000114606264805

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000111913726411

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000111167266754

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000106793521165

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 9.8876889936e-05

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 9.70468705116e-05

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 9.60863696597e-05

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 8.68124155908e-05

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 8.18222619332e-05

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 7.57076984436e-05

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 6.32272822551e-05

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 6.29616527036e-05

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 6.24190405212e-05

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 6.07682937024e-05

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 6.01056075509e-05

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 5.99610228009e-05

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 5.99291973613e-05

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 5.81778143146e-05

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 5.76898959074e-05

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 5.63775789358e-05

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 5.05728712669e-05

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 4.94998009247e-05

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 4.08095735081e-05

gyr\_phone\_z\_freq\_weighted & 3.91892371588e-05

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 3.90133578345e-05

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 3.23016695048e-05

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

gyr\_phone\_x\_max\_freq & 0.0

acc\_phone\_x\_freq\_0.30303030303\_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\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.10101010101\_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

acc\_phone\_y\_freq\_weighted & 0.0

gyr\_phone\_x\_freq\_0.40404040404\_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

acc\_phone\_z\_freq\_1.11111111111\_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\_0.606060606061\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_0.505050505051\_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

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

acc\_phone\_z\_freq\_1.31313131313\_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 & 0.0

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

gyr\_phone\_x\_freq\_weighted & 0.0

gyr\_phone\_y\_freq\_1.71717172\_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

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

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

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

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

mag\_phone\_y\_freq\_0.808080808081\_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, 10)}

The best parameters for RF with the Chapter 5 features in repeat number 1 are:

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

Feature importance random forest:

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0531459660928

pca\_3\_temp\_mean\_ws\_100 & 0.0480444520416

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0467298614388

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0417602873014

pca\_1\_temp\_mean\_ws\_100 & 0.0388119493988

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0340194881302

mag\_phone\_x\_pse & 0.0312959313893

mag\_cluster & 0.0299536348265

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0290861809584

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0281247027742

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0252395988049

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0252195717808

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0243082933137

pca\_1 & 0.0234002004438

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0231758174463

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.022065403373

mag\_phone\_x & 0.0212059832309

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0207283131148

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0182085293906

pca\_4\_temp\_std\_ws\_100 & 0.0180642455043

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0177932129498

pca\_3 & 0.0175044513261

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.0174278241

pca\_2\_temp\_mean\_ws\_100 & 0.0166471487522

mag\_phone\_z & 0.0153321369695

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0150294417971

mag\_phone\_z\_max\_freq & 0.0148759037859

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0146106296177

mag\_phone\_y\_pse & 0.0144207793491

mag\_phone\_z\_temp\_std\_ws\_100 & 0.013859862472

mag\_phone\_y & 0.0137859110777

pca\_1\_temp\_std\_ws\_100 & 0.0136355214145

pca\_2 & 0.0117898697125

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.0111287924382

acc\_phone\_y\_max\_freq & 0.0109926272977

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0101325152554

acc\_phone\_y\_pse & 0.00944399003793

acc\_phone\_x\_pse & 0.00921147291594

pca\_4\_temp\_mean\_ws\_100 & 0.00913538046157

pca\_2\_temp\_std\_ws\_100 & 0.00881053702382

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00768364963956

acc\_phone\_z\_pse & 0.00622480531586

pca\_3\_temp\_std\_ws\_100 & 0.00553224178034

mag\_phone\_y\_max\_freq & 0.00539821779088

mag\_phone\_y\_temp\_std\_ws\_100 & 0.0053860511664

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.00534798982818

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.00482210005182

acc\_phone\_z\_max\_freq & 0.00453484693609

acc\_cluster & 0.00426378202543

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00412140607992

acc\_phone\_x\_max\_freq & 0.00326657500732

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.00238591313739

mag\_phone\_x\_freq\_weighted & 0.00224635454171

mag\_phone\_x\_max\_freq & 0.00223776494049

mag\_phone\_z\_pse & 0.0021472481818

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0020201322476

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00180749860581

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00179163612939

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00174363578999

gyr\_phone\_x\_max\_freq & 0.0016069327647

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.00155092795694

pca\_4 & 0.0014551795208

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00136520411479

gyr\_phone\_z\_max\_freq & 0.00133090220614

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00130851011266

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00126351601136

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00116927564118

gyr\_phone\_z & 0.00115231648404

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.001111360014

gyr\_phone\_z\_pse & 0.00108899500725

acc\_phone\_x & 0.00107640612778

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00105987931759

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00105886856104

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0010077631498

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00096514322346

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.000923395181973

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00089383023026

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000873874867529

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.000856452044114

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00081611771872

gyr\_phone\_x\_freq\_weighted & 0.000810137439215

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000793526617779

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000790572883954

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000790389249338

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000763883796291

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00076204130343

acc\_phone\_y & 0.000740702059276

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000707497317162

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000702081166144

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000690704241155

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00064920126352

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000647154420989

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00063343605983

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000612998036733

mag\_phone\_z\_freq\_weighted & 0.000610870668394

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000610392806705

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000600071892916

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000591566942656

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000571955898781

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000563529318508

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000552183116926

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000542182718928

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000525964872285

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000510898013841

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000503957420178

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000495375018159

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000493666996069

acc\_phone\_z\_freq\_weighted & 0.00049334145351

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000480098641534

gyr\_phone\_y & 0.000471965991274

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00047007932879

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000468906492841

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000453038240994

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000446117301556

gyr\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00043973208561

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000436140718535

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000422478896788

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000418608811591

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000409955552484

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.000409369098867

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000407822026605

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000404412158833

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000384733782112

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000369253873284

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000368721563165

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000359797535669

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000353248348948

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000350763925669

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.00034870585092

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00034738143688

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000344997738363

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000324623192097

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000314875561955

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000280753421507

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000278481888006

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000278392477969

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000277374837165

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000271887772141

gyr\_phone\_z\_freq\_weighted & 0.000271455631648

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000268512789381

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000262835711236

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000233184698428

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000233149045996

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000230550866341

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000230344892636

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000224461309279

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000220162943736

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00021665422891

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000216474454771

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000208194516036

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000195289421961

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000190844973033

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000185067220974

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.00016922457895

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000165126401832

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000162433202288

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000152247524462

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000151392149549

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000138044910611

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000129547054682

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000128065569685

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000124358394218

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000120464777564

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000112670366331

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 9.93988463116e-05

gyr\_phone\_y\_freq\_weighted & 7.69467564224e-05

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 6.87156888374e-05

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 6.54389714828e-05

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 6.36251497894e-05

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 6.26795930176e-05

gyr\_phone\_x & 6.24292235311e-05

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 6.05878359927e-05

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 6.00345535483e-05

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 5.96942830828e-05

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 5.79009748947e-05

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 4.37057227181e-05

gyr\_phone\_x\_pse & 3.9796764178e-05

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 3.21674947466e-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\_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\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

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

gyr\_phone\_y\_freq\_0.808080808081\_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\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.0

acc\_phone\_x\_freq\_weighted & 0.0

mag\_phone\_y\_freq\_1.31313131313\_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\_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\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

acc\_phone\_y\_freq\_1.41414141414\_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

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

acc\_phone\_y\_freq\_0.505050505051\_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

gyr\_phone\_x\_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\_z & 0.0

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

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

acc\_phone\_x\_freq\_0.606060606061\_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\_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\_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

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

mag\_phone\_x\_freq\_0.30303030303\_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

gyr\_cluster & 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': 100, 'criterion': 'gini', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0474277846511

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0441848876782

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0398060203788

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0359233587132

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0320360289605

pca\_3\_temp\_mean\_ws\_100 & 0.031666262971

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0293134365353

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0292516738018

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0277969547542

mag\_phone\_x & 0.0273167771454

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0266391440672

mag\_phone\_z & 0.0259641458558

pca\_1\_temp\_mean\_ws\_100 & 0.0258597009101

pca\_2\_temp\_mean\_ws\_100 & 0.0240528043917

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0237664472744

pca\_1 & 0.0236523470702

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.0235370148448

acc\_phone\_x\_pse & 0.0223265123293

mag\_phone\_y & 0.0199864743005

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.019892354813

mag\_cluster & 0.0196219014394

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.019043307349

mag\_phone\_x\_pse & 0.0189084721493

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0174743450168

pca\_3\_temp\_std\_ws\_100 & 0.0168682787423

pca\_2\_temp\_std\_ws\_100 & 0.0167359183412

pca\_1\_temp\_std\_ws\_100 & 0.0161654514278

pca\_4\_temp\_std\_ws\_100 & 0.0160530613339

pca\_3 & 0.0159742551644

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0158097484444

acc\_phone\_y\_max\_freq & 0.0152589364535

acc\_phone\_z\_temp\_std\_ws\_100 & 0.013950451094

mag\_phone\_y\_pse & 0.0139240713563

mag\_phone\_z\_max\_freq & 0.0138312748799

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.01198404259

pca\_2 & 0.0116852121916

mag\_phone\_z\_pse & 0.0116517654683

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.00998319055331

mag\_phone\_y\_temp\_std\_ws\_100 & 0.00957113766993

mag\_phone\_z\_temp\_std\_ws\_100 & 0.00834677455916

acc\_phone\_z\_pse & 0.00785751840597

acc\_phone\_y\_pse & 0.00719874286042

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.006915206881

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.00602740400869

acc\_phone\_y & 0.00591566319457

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.00565202930321

pca\_4\_temp\_mean\_ws\_100 & 0.00436208960992

mag\_phone\_x\_freq\_weighted & 0.0039500745048

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00368454499418

acc\_phone\_z\_max\_freq & 0.00366011825844

acc\_cluster & 0.00314319996836

mag\_phone\_x\_max\_freq & 0.00242970694315

acc\_phone\_z & 0.00239941368298

mag\_phone\_y\_max\_freq & 0.00217302360493

gyr\_phone\_z\_max\_freq & 0.00212131994948

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.00198605564414

mag\_phone\_y\_freq\_weighted & 0.00172867628441

acc\_phone\_x & 0.00157648143211

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00153026649761

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00144675927017

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00139930131865

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00138003607418

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00123276295862

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00118490304243

gyr\_phone\_z\_pse & 0.00112679528159

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00105854369255

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00105534781982

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00100244879977

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000961770878991

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000909906958028

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000895487829996

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000861330469825

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.000814600449705

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000779282636986

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000775767571812

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.000718845367026

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000685489521623

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000679682934391

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000668235201927

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000649066750974

acc\_phone\_x\_max\_freq & 0.000646023806564

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000641778703806

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000634868747802

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000617141373364

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000608694594655

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000603767388808

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000592841329471

gyr\_phone\_z & 0.000553593410183

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000546141708384

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000544799043335

acc\_phone\_z\_freq\_weighted & 0.000538798980919

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000528671973188

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000512292640064

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000510920876777

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00050560055868

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000499487297137

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000460663733274

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000443349780832

pca\_4 & 0.00042963981612

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000417712776919

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000412721198216

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000412140178207

mag\_phone\_z\_freq\_weighted & 0.000412029974479

gyr\_phone\_z\_freq\_weighted & 0.000409333135543

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000408115806174

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000407419962282

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000399452384951

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000391952599485

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000378979776904

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00037478355823

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000357057122901

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000356551191431

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000355441044014

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000352774060187

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000350677460249

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000341191892081

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000324094456845

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.000319240863079

gyr\_phone\_y & 0.000318346476329

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000316848259638

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000310840768179

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000306031436579

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000301412723226

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000300956659157

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000296798111261

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000289087494372

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00027685378854

gyr\_phone\_x\_freq\_weighted & 0.000275705877337

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000274645009608

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000273670225735

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000271620897263

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000269042529559

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00026123943888

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000253441758048

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000247043755335

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.00024651248753

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000243008722666

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000241637418731

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000239855216211

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000235969618037

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000230828776606

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000226777230006

acc\_phone\_x\_freq\_weighted & 0.000225311044448

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000222077871068

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000221512010725

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000220506609808

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000209851119695

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000207891102002

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000207421183898

gyr\_phone\_y\_max\_freq & 0.000203340780553

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000202919947859

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000196684073528

gyr\_phone\_x\_max\_freq & 0.000193397483896

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000190553600444

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000190120632877

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000182347008186

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000181638754229

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000176510302609

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000169771970876

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000165669512377

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000162705157447

acc\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000159844358409

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000158975488133

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000158614219103

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000158578413948

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000155573413192

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000152667652197

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000142040055306

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000136796623527

gyr\_phone\_y\_pse & 0.000133187614827

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000126137617275

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000124957564435

gyr\_cluster & 0.000119474313023

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000109859072808

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 9.87513185323e-05

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 9.71255300555e-05

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 9.49639608819e-05

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 9.47663349446e-05

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 9.4636635306e-05

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 9.40107557647e-05

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 9.19451555213e-05

acc\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 9.04710143911e-05

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 8.96075547806e-05

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 8.82553245107e-05

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 8.69561107934e-05

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 8.57054689638e-05

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 8.54830096324e-05

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 8.30511206353e-05

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 8.26083052538e-05

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 7.90606284797e-05

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 7.75435187245e-05

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 6.65022380561e-05

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 6.6281167233e-05

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 6.42349696571e-05

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 6.17319484361e-05

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 6.14830231463e-05

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 6.10257436248e-05

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 5.92426365918e-05

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 5.6584720905e-05

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 5.38496657809e-05

gyr\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 5.08928577288e-05

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 4.88889400702e-05

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 4.42500399425e-05

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 3.11247165843e-05

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 3.08523690251e-05

gyr\_phone\_y\_freq\_weighted & 3.01413536849e-05

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 2.96104532177e-05

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 2.9424557992e-05

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 2.89146556585e-05

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 2.84716782236e-05

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 2.83110134073e-05

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 2.40652901786e-05

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 1.36892283288e-05

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

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

gyr\_phone\_x\_pse & 0.0

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

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

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

acc\_phone\_y\_freq\_weighted & 0.0

gyr\_phone\_z\_freq\_0.20202020202\_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\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0

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

gyr\_phone\_x & 0.0

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

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

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

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

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 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': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100,)}

The best parameters for RF with the Chapter 5 features in repeat number 3 are:

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

Feature importance random forest:

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0501145766731

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0395070967882

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0379009987424

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0365406573613

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0360578642127

pca\_2\_temp\_mean\_ws\_100 & 0.0353230419269

pca\_3\_temp\_mean\_ws\_100 & 0.0331395341297

mag\_phone\_x\_pse & 0.0321892244613

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0309958564169

mag\_cluster & 0.0284373372611

pca\_4\_temp\_std\_ws\_100 & 0.0278415514026

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0264407475587

mag\_phone\_x & 0.0260334134907

mag\_phone\_z & 0.0258274854996

pca\_2 & 0.0248681521155

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0241778654939

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0236587392054

acc\_phone\_x\_pse & 0.0225337136139

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0221233758233

mag\_phone\_y\_pse & 0.0211992509768

pca\_1\_temp\_std\_ws\_100 & 0.0205713440724

pca\_3 & 0.0198181274423

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0192385871707

pca\_1\_temp\_mean\_ws\_100 & 0.0179149771736

mag\_phone\_y & 0.0168051749801

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.013767058218

acc\_phone\_z\_pse & 0.0135837557786

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0129635608036

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0121699587044

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0117855521932

mag\_phone\_x\_temp\_std\_ws\_100 & 0.0117733320077

acc\_phone\_y\_max\_freq & 0.0117483328043

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.0116964516138

mag\_phone\_z\_pse & 0.0111444296997

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0108688202465

mag\_phone\_y\_temp\_std\_ws\_100 & 0.00965172595355

pca\_1 & 0.00924772113797

pca\_3\_temp\_std\_ws\_100 & 0.008599188805

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.00840555407365

mag\_phone\_x\_max\_freq & 0.00796153687603

mag\_phone\_z\_temp\_std\_ws\_100 & 0.00763497994763

acc\_phone\_y & 0.00621045165551

pca\_4\_temp\_mean\_ws\_100 & 0.0058335332886

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.0054329929779

mag\_phone\_z\_max\_freq & 0.00515384266826

mag\_phone\_x\_freq\_weighted & 0.00504403906578

pca\_2\_temp\_std\_ws\_100 & 0.00490551180563

acc\_phone\_z & 0.00415958384265

acc\_phone\_y\_pse & 0.00415887659959

mag\_phone\_y\_max\_freq & 0.00414257488617

acc\_phone\_z\_max\_freq & 0.00350742162876

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.00307027713485

mag\_phone\_y\_freq\_weighted & 0.00286689779329

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00282419321714

acc\_phone\_x\_max\_freq & 0.00248480878369

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00223646638135

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00209991847601

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.00209537341488

mag\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.00206062030386

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.00203263508166

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00188308166515

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.00175199511486

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00173875267132

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00155468495367

gyr\_phone\_z & 0.00130176168612

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00129703399116

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00125668713275

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.0012434033566

gyr\_phone\_x\_pse & 0.00117310140374

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.00114680987507

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.00105455348874

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00102865080407

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00100417135189

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000973754849832

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000959435239466

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000959357361425

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000924650644535

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00085988906199

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000855085844633

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000847798469826

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000839681105244

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000809365436406

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000802328792575

acc\_phone\_x & 0.00080041912385

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000790524088

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000775224616223

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000767966569727

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00076618573039

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000739177590253

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000719588223006

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.00070012614261

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000665534401187

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000662395758973

gyr\_phone\_z\_pse & 0.000661207535607

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000651976042381

gyr\_phone\_z\_max\_freq & 0.000635168243598

acc\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000632111583513

gyr\_phone\_y\_freq\_weighted & 0.000603438956572

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000596632998396

gyr\_phone\_z\_freq\_weighted & 0.000585550110827

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000581655051284

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000576664963547

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000572110253263

gyr\_phone\_x\_max\_freq & 0.000567420144853

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000557761960804

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000502182223197

gyr\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000496272625675

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000490528974323

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000452243725332

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000449967679466

mag\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000441080579674

acc\_phone\_y\_freq\_weighted & 0.000437011400189

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000423413458286

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000423201962334

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000421188571476

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000417719663646

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000417132732026

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000409303291604

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000376987032511

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00037560042246

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00033885884611

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000335285271403

acc\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000332415673483

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000322097534246

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000307862126661

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000307626200132

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000306392445428

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000300993700406

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000287904973985

acc\_phone\_x\_freq\_weighted & 0.000279347403942

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000276474864376

acc\_cluster & 0.000269415126914

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000263956983702

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000243919683258

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000241085015754

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000220623501199

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000220378049495

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000210487080652

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000200519643751

gyr\_phone\_x & 0.000192219702221

acc\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000192213750793

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000184409388843

gyr\_phone\_y\_pse & 0.00018001235211

gyr\_phone\_y & 0.000177497816848

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000175946046307

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000169710385538

gyr\_cluster & 0.00016420068179

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000156200627255

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.00015425277988

mag\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000153674490703

gyr\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000133166213977

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000129969508965

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000126469250293

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000123215455269

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000122270016909

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000118103795204

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000116516535103

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000111402436256

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000110938567914

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000108896190155

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 9.77759183784e-05

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 9.77340084638e-05

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 9.70856710695e-05

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 9.69401886836e-05

gyr\_phone\_y\_temp\_mean\_ws\_100 & 9.43415094745e-05

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 9.36752416801e-05

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 6.38530528945e-05

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 6.20381430365e-05

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 6.17711340461e-05

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 6.17080938863e-05

acc\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 6.05117967051e-05

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 6.04823982586e-05

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 5.98191432095e-05

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 5.95584113833e-05

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 5.9413837289e-05

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 5.94106559792e-05

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 5.9352422674e-05

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 5.6482970326e-05

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 5.63725490196e-05

gyr\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 5.4948286893e-05

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 5.02003336295e-05

gyr\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 4.2907695985e-05

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 4.28627170071e-05

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 3.82079634533e-05

gyr\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 3.24812879537e-05

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 2.37538571105e-05

acc\_phone\_z\_freq\_0.40404040404\_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\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 0.0

acc\_phone\_z\_freq\_1.0101010101\_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\_freq\_1.21212121212\_Hz\_ws\_33 & 0.0

gyr\_phone\_y\_freq\_0.20202020202\_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\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0

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

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

gyr\_phone\_x\_freq\_0.0\_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\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0

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

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

mag\_phone\_x\_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

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

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

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

acc\_phone\_y\_freq\_0.20202020202\_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 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': 1000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100, 10)}

The best parameters for RF with the Chapter 5 features in repeat number 4 are:

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

Feature importance random forest:

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.0519780606403

mag\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0458397799291

pca\_1\_temp\_mean\_ws\_100 & 0.0457278451043

mag\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0432811272551

pca\_1 & 0.0411231493242

pca\_3\_temp\_mean\_ws\_100 & 0.0409535533464

mag\_phone\_x\_temp\_mean\_ws\_100 & 0.0354769443841

pca\_2\_temp\_mean\_ws\_100 & 0.0336461921214

acc\_phone\_y\_temp\_mean\_ws\_100 & 0.0335602328586

acc\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.0333437653708

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.0301219231086

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.0298380904738

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0278057314088

acc\_phone\_x\_temp\_std\_ws\_100 & 0.0272281692055

mag\_phone\_z & 0.0245077812665

pca\_4\_temp\_std\_ws\_100 & 0.021790632064

pca\_2 & 0.021541342249

mag\_phone\_y & 0.0204760161625

acc\_phone\_z\_temp\_std\_ws\_100 & 0.0185446786449

acc\_phone\_y\_temp\_std\_ws\_100 & 0.0184104438317

mag\_phone\_x\_pse & 0.0162925111629

gyr\_phone\_x\_temp\_std\_ws\_100 & 0.0159174181823

mag\_phone\_z\_pse & 0.0153823064971

acc\_phone\_x\_pse & 0.0150461493637

mag\_phone\_z\_temp\_std\_ws\_100 & 0.0147950899725

mag\_phone\_x & 0.0146966209095

pca\_3 & 0.0138112337134

mag\_phone\_z\_max\_freq & 0.0134363533839

mag\_phone\_y\_pse & 0.0132185143079

pca\_2\_temp\_std\_ws\_100 & 0.0129976537194

acc\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.0128501458603

mag\_phone\_y\_max\_freq & 0.012630268035

acc\_phone\_z\_pse & 0.0122610717478

acc\_phone\_z\_temp\_mean\_ws\_100 & 0.0122584991073

mag\_cluster & 0.0115865105838

pca\_3\_temp\_std\_ws\_100 & 0.00919798880414

pca\_1\_temp\_std\_ws\_100 & 0.00908424092296

gyr\_phone\_y\_temp\_std\_ws\_100 & 0.00814846715371

acc\_phone\_y\_max\_freq & 0.00770189387078

mag\_phone\_x\_temp\_std\_ws\_100 & 0.00738806095966

acc\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.00694222146063

acc\_phone\_x\_temp\_mean\_ws\_100 & 0.00597403684731

acc\_phone\_y & 0.00518240076244

acc\_phone\_y\_pse & 0.00493645675637

gyr\_phone\_z\_temp\_mean\_ws\_100 & 0.00483048674258

mag\_phone\_y\_temp\_std\_ws\_100 & 0.00478234186077

gyr\_phone\_x\_temp\_mean\_ws\_100 & 0.00474890906037

pca\_4\_temp\_mean\_ws\_100 & 0.00433417646918

mag\_phone\_x\_max\_freq & 0.00406866308942

acc\_phone\_z & 0.00361092998344

acc\_phone\_x & 0.0025329008452

mag\_phone\_x\_freq\_weighted & 0.00195066799231

acc\_cluster & 0.0019448194368

gyr\_phone\_z\_max\_freq & 0.00170814389699

mag\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.00170176139855

mag\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.0015901730067

mag\_phone\_y\_freq\_weighted & 0.001530913957

acc\_phone\_z\_max\_freq & 0.00118902584494

mag\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000939512149917

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000938262622399

mag\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000925715711784

gyr\_phone\_z & 0.000913736500685

acc\_phone\_x\_max\_freq & 0.000910233652477

mag\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000813880392956

gyr\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000704530876151

gyr\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.000674399348908

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000674313187143

mag\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000673213588624

gyr\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000659573238796

mag\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000647927704841

mag\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000627989264727

gyr\_phone\_y\_temp\_mean\_ws\_100 & 0.000615872186025

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000608679825258

mag\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000601942738864

mag\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000588055461928

mag\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000577352085486

mag\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000568478485293

mag\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000566888784772

gyr\_phone\_z\_freq\_0.0\_Hz\_ws\_33 & 0.000553683892883

acc\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000547759228863

gyr\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000539318731027

gyr\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000534678933975

mag\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.00052809372249

mag\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000520180982064

mag\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000509387956115

pca\_4 & 0.000505842612828

mag\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000485539703514

gyr\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000482279540426

mag\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000479835864411

gyr\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 0.00046600135868

acc\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000464037916838

acc\_phone\_x\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000440171955791

acc\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000439347702081

acc\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000433553181575

acc\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000426035166878

mag\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000411654713772

gyr\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.00040745636517

gyr\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000401973782885

gyr\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000387318883186

acc\_phone\_x\_freq\_1.71717172\_Hz\_ws\_33 & 0.000386727773272

acc\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000386505269801

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000384384724609

acc\_phone\_z\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000376525298958

gyr\_phone\_z\_pse & 0.000363174599871

mag\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000358739971166

gyr\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000358453290937

gyr\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000340274340474

gyr\_phone\_y\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000329864652914

mag\_phone\_y\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000327576075982

gyr\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000322451708016

gyr\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000317612739769

acc\_phone\_y\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000315859355854

gyr\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 0.000311394332326

gyr\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000310156896733

gyr\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000304557841472

acc\_phone\_y\_freq\_1.51515151515\_Hz\_ws\_33 & 0.000300176714063

gyr\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000284312286336

gyr\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000279749225096

mag\_phone\_x\_freq\_0.505050505051\_Hz\_ws\_33 & 0.000263757886409

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000256303599737

mag\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000251036822066

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000249877358733

acc\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000249784562126

acc\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000248556423721

acc\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000242092101942

mag\_phone\_x\_freq\_1.11111111111\_Hz\_ws\_33 & 0.000241812486925

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000241336054766

mag\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000229041878348

mag\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000222566359383

acc\_phone\_x\_freq\_weighted & 0.000216890803191

gyr\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 0.000214429860941

mag\_phone\_y\_freq\_1.0101010101\_Hz\_ws\_33 & 0.000213440299837

gyr\_phone\_x\_freq\_0.707070707071\_Hz\_ws\_33 & 0.00021190046802

mag\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 0.000211421187565

gyr\_phone\_z\_freq\_weighted & 0.000207121127811

gyr\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000206424673829

acc\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000205002773962

acc\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000201141204321

gyr\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.000196552518913

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000190646197399

gyr\_phone\_y\_max\_freq & 0.000182145830999

mag\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000180965459505

gyr\_phone\_x\_pse & 0.00018039769529

mag\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000174760026494

gyr\_phone\_y\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000173187316702

gyr\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000170996304786

acc\_phone\_y\_freq\_weighted & 0.000167087644371

acc\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000165273647997

mag\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 0.000163307432582

mag\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000159760572719

gyr\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000155314370927

mag\_phone\_z\_freq\_weighted & 0.00014750286412

gyr\_cluster & 0.000146453830072

acc\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000143677008446

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000143189064593

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.000136080270424

gyr\_phone\_y\_freq\_weighted & 0.00013335636657

gyr\_phone\_x\_max\_freq & 0.000131498391462

gyr\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000130834755699

gyr\_phone\_y\_freq\_0.0\_Hz\_ws\_33 & 0.00012961126956

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.000126334317361

mag\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000124840891653

mag\_phone\_y\_freq\_0.40404040404\_Hz\_ws\_33 & 0.000124785304362

mag\_phone\_x\_freq\_1.31313131313\_Hz\_ws\_33 & 0.000122730355793

mag\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 0.000117868138587

gyr\_phone\_y & 0.000113643536138

gyr\_phone\_x\_freq\_weighted & 0.00011272502131

gyr\_phone\_x\_freq\_0.30303030303\_Hz\_ws\_33 & 0.000112719466413

acc\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 0.00011054291163

mag\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 0.000107646935195

acc\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.000107447078244

acc\_phone\_z\_freq\_weighted & 0.000107443626094

gyr\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 0.00010426833808

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.000103786667623

gyr\_phone\_x\_freq\_0.606060606061\_Hz\_ws\_33 & 9.91792099136e-05

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 9.83404473978e-05

gyr\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 9.7151999298e-05

acc\_phone\_z\_freq\_1.21212121212\_Hz\_ws\_33 & 9.63636947495e-05

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 9.59190861452e-05

mag\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 9.58909215355e-05

gyr\_phone\_z\_freq\_0.20202020202\_Hz\_ws\_33 & 9.239656835e-05

gyr\_phone\_z\_freq\_1.0101010101\_Hz\_ws\_33 & 9.15941436456e-05

acc\_phone\_x\_freq\_1.21212121212\_Hz\_ws\_33 & 8.96479526589e-05

acc\_phone\_x\_freq\_0.10101010101\_Hz\_ws\_33 & 8.82551354058e-05

acc\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 8.58451308254e-05

acc\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 7.66759354532e-05

mag\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 7.45694216949e-05

acc\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 6.85373392246e-05

acc\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 6.59228751036e-05

gyr\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 6.54897297613e-05

mag\_phone\_z\_freq\_1.51515151515\_Hz\_ws\_33 & 6.47117077093e-05

acc\_phone\_x\_freq\_0.909090909091\_Hz\_ws\_33 & 6.39189406857e-05

mag\_phone\_y\_freq\_0.20202020202\_Hz\_ws\_33 & 6.08031615065e-05

gyr\_phone\_x\_freq\_0.808080808081\_Hz\_ws\_33 & 5.76944837536e-05

acc\_phone\_z\_freq\_0.606060606061\_Hz\_ws\_33 & 5.47622750197e-05

acc\_phone\_z\_freq\_0.505050505051\_Hz\_ws\_33 & 5.33869780355e-05

acc\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 5.0352090257e-05

acc\_phone\_x\_freq\_0.40404040404\_Hz\_ws\_33 & 4.88872366268e-05

gyr\_phone\_x\_freq\_1.41414141414\_Hz\_ws\_33 & 4.79336010269e-05

acc\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 4.5854662366e-05

gyr\_phone\_y\_pse & 4.31210590137e-05

gyr\_phone\_y\_freq\_1.31313131313\_Hz\_ws\_33 & 4.28032182133e-05

gyr\_phone\_x\_freq\_1.61616161616\_Hz\_ws\_33 & 4.16250651904e-05

acc\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 3.56150623776e-05

mag\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 3.3341690911e-05

mag\_phone\_x\_freq\_0.20202020202\_Hz\_ws\_33 & 2.83714084364e-05

acc\_phone\_z\_freq\_1.11111111111\_Hz\_ws\_33 & 2.73493292179e-05

mag\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 2.67966602837e-05

acc\_phone\_z\_freq\_1.31313131313\_Hz\_ws\_33 & 2.56477356106e-05

acc\_phone\_y\_freq\_1.71717172\_Hz\_ws\_33 & 2.26543229497e-05

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 2.06853373053e-05

acc\_phone\_z\_freq\_0.707070707071\_Hz\_ws\_33 & 1.81035294343e-05

gyr\_phone\_y\_freq\_0.30303030303\_Hz\_ws\_33 & 1.17879722495e-05

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

acc\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 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\_0.606060606061\_Hz\_ws\_33 & 0.0

gyr\_phone\_x\_freq\_0.505050505051\_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

mag\_phone\_x\_freq\_1.21212121212\_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

acc\_phone\_x\_freq\_1.11111111111\_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\_1.0101010101\_Hz\_ws\_33 & 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': 2}

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 & 0.513319591788

mag\_phone\_y\_temp\_mean\_ws\_100 & 0.165685503933

mag\_phone\_x\_pse & 0.0933592167923

gyr\_phone\_z\_temp\_std\_ws\_100 & 0.0869567897754

mag\_phone\_x & 0.0778276581209

mag\_phone\_y\_max\_freq & 0.0610634339466

acc\_phone\_x\_temp\_std\_ws\_100 & 0.00178780564375

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

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

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

mag\_phone\_z\_pse & 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

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

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

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

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 & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.9405 \emph{( 0.9029 - 0.9781 )} & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.9975 \emph{( 0.9895 - 1.0055 )} & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.9684 \emph{( 0.9405 - 0.9962 )} & 0.9891 \emph{( 0.9783 - 0.9999 )} & 0.9747 \emph{( 0.9497 - 0.9997 )} & 0.9973 \emph{( 0.9919 - 1.0027 )} & 0.9684 \emph{( 0.9405 - 0.9962 )} & 0.9918 \emph{( 0.9825 - 1.0012 )} & 0.9557 \emph{( 0.9230 - 0.9884 )} \\\hline

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

{'alpha': 0.0001, 'activation': 'logistic', 'max\_iter': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100, 10)}

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

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

Feature importance random forest:

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.237215305586

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.234235871243

pca\_2\_temp\_mean\_ws\_100 & 0.194408533536

mag\_phone\_z\_pse & 0.0938416990134

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0302113303957

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0251753207463

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0244741026535

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0217975585331

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0215666576516

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0176207336482

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0147801394923

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0145995748699

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0138466025581

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00935311780868

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00926283422607

mag\_phone\_z\_freq\_weighted & 0.00870625430758

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00846479527345

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00779020894038

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00779002107499

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00485933844229

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

{'kernel': 'rbf', 'C': 10, '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, 10)}

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

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

Feature importance random forest:

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.245868656486

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.22566198155

pca\_2\_temp\_mean\_ws\_100 & 0.159166261295

mag\_phone\_z\_pse & 0.107097597157

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0382078830451

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0376940156304

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0228734090341

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0206339378275

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0174666632748

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0171526445746

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0163836436631

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.015968912966

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0149386674762

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0126127130792

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0112327381726

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0092794867893

mag\_phone\_z\_freq\_weighted & 0.00854818176567

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00778464778293

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00715195074516

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00427600768573

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

{'kernel': 'rbf', 'C': 10, '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': 2000, 'learning\_rate': 'adaptive', 'hidden\_layer\_sizes': (100, 10)}

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

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

Feature importance random forest:

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.240606814734

pca\_2\_temp\_mean\_ws\_100 & 0.20523853529

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.190297905492

mag\_phone\_z\_pse & 0.107779473729

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0337950035476

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0329653042577

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0227039096531

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0226468951741

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0199605013023

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0157154485418

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0151552834604

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0135133469307

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0134617581496

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0124572219957

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0123727816669

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0116024517242

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0108885865066

mag\_phone\_z\_freq\_weighted & 0.00804669382402

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00722245177268

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00356963224781

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

{'kernel': 'rbf', 'C': 10, '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': 1000, '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': 'gini', 'min\_samples\_leaf': 2}

Feature importance random forest:

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.234381058455

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.225331690901

pca\_2\_temp\_mean\_ws\_100 & 0.171294651715

mag\_phone\_z\_pse & 0.0930324884025

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0365315388524

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0311889971471

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0309671998836

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0287698559916

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0253264774921

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0244372140189

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.015446756627

mag\_phone\_z\_freq\_weighted & 0.0128491152453

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0125501996793

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0100911930311

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00934720734882

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00909752319152

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00763530560457

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00737823165285

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.00723369719976

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00710959756074

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

{'kernel': 'rbf', 'C': 10, '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, 10)}

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

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

Feature importance random forest:

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.22395710362

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.221290330074

pca\_2\_temp\_mean\_ws\_100 & 0.168205988261

mag\_phone\_z\_pse & 0.102891155066

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0437680891461

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0381040838874

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.0251297956165

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0230968440744

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0207145251446

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0183642627318

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0181548312451

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.0171753307305

mag\_phone\_z\_freq\_weighted & 0.0135295489884

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0107614374788

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.0100830598998

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00997090787416

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00961338515498

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.0092287895827

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00919437940485

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00676615201879

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

{'kernel': 'rbf', 'C': 10, 'gamma': 0.0001}

The best parameters for KNN with the Selected features features are:

{'n\_neighbors': 5}

The best parameters for DT with the Selected features features are:

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

Feature importance decision tree:

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.387648094342

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.360040675074

pca\_2\_temp\_mean\_ws\_100 & 0.221721634777

mag\_phone\_z\_pse & 0.0189769601534

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0116126356536

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\_0.909090909091\_Hz\_ws\_33 & 0.0

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

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

mag\_phone\_z\_freq\_1.71717172\_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

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

mag\_phone\_z\_freq\_weighted & 0.0

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

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

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

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

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

Selected features & 0.9897 \emph{( 0.9791 - 1.0002 )} & 0.9152 \emph{( 0.8709 - 0.9595 )} & 1.0000 \emph{( 1.0000 - 1.0000 )} & 0.9861 \emph{( 0.9674 - 1.0047 )} & 0.9918 \emph{( 0.9825 - 1.0012 )} & 0.9494 \emph{( 0.9145 - 0.9843 )} & 0.9130 \emph{( 0.8837 - 0.9424 )} & 0.9114 \emph{( 0.8662 - 0.9566 )} & 0.9973 \emph{( 0.9919 - 1.0027 )} & 0.9873 \emph{( 0.9696 - 1.0051 )} & 0.9620 \emph{( 0.9420 - 0.9819 )} & 0.9494 \emph{( 0.9145 - 0.9843 )} \\\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:

pca\_2\_temp\_mean\_ws\_100 & 0.391489641562

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.332181790526

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.245738972105

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0116126356536

mag\_phone\_z\_pse & 0.00989224518636

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00908471496707

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\_0.909090909091\_Hz\_ws\_33 & 0.0

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

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

mag\_phone\_z\_freq\_1.71717172\_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\_weighted & 0.0

gyr\_phone\_y\_freq\_0.909090909091\_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\_1.41414141414\_Hz\_ws\_33 & 0.0

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

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

Feature importance random forest:

mag\_phone\_z\_temp\_mean\_ws\_100 & 0.255680398332

pca\_2\_temp\_mean\_ws\_100 & 0.214866934751

mag\_phone\_x\_freq\_0.0\_Hz\_ws\_33 & 0.183885531973

mag\_phone\_z\_pse & 0.118820729068

gyr\_phone\_z\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0310833659355

mag\_phone\_z\_freq\_1.71717172\_Hz\_ws\_33 & 0.0238934916935

mag\_phone\_y\_freq\_1.61616161616\_Hz\_ws\_33 & 0.0236820157268

gyr\_phone\_y\_freq\_0.707070707071\_Hz\_ws\_33 & 0.0208284161006

mag\_phone\_y\_freq\_0.606060606061\_Hz\_ws\_33 & 0.017814613281

acc\_phone\_z\_freq\_0.10101010101\_Hz\_ws\_33 & 0.0154887540189

acc\_phone\_x\_freq\_1.0101010101\_Hz\_ws\_33 & 0.0150759718998

gyr\_phone\_y\_freq\_0.909090909091\_Hz\_ws\_33 & 0.0132759199371

acc\_phone\_z\_freq\_0.40404040404\_Hz\_ws\_33 & 0.011069795234

mag\_phone\_z\_freq\_weighted & 0.00962818570194

acc\_phone\_z\_freq\_0.808080808081\_Hz\_ws\_33 & 0.00845228861156

gyr\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00826091586374

mag\_phone\_y\_freq\_0.10101010101\_Hz\_ws\_33 & 0.00813464849721

acc\_phone\_z\_freq\_0.30303030303\_Hz\_ws\_33 & 0.00699528487526

gyr\_phone\_y\_freq\_1.41414141414\_Hz\_ws\_33 & 0.0067609210339

acc\_phone\_z\_freq\_1.41414141414\_Hz\_ws\_33 & 0.00630181746548

Process finished with exit code 0