**model\_evaluation\_and\_assessment\_excercise.R**

Ashish Saxena

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| **setwd**("C:/Users/Khushboo/Desktop”) |  |
| WLE<- **read.csv**("WLE.csv",header=T, na.strings=**c**("","NA")) data<-WLE **View**(data) training<-data[1**:**4010,] testing<-data[4011**:**4024,] **names**(training)  ## [1] "user\_name" "raw\_timestamp\_part\_1"  ## [3] "raw\_timestamp\_part\_2" "cvtd\_timestamp"  ## [5] "new\_window" "num\_window"  ## [7] "roll\_belt" "pitch\_belt"  ## [9] "yaw\_belt" "total\_accel\_belt"  ## [11] "kurtosis\_roll\_belt" "kurtosis\_picth\_belt"  ## [13] "skewness\_roll\_belt" "skewness\_roll\_belt.1"  ## [15] "max\_roll\_belt" "max\_picth\_belt"  ## [17] "max\_yaw\_belt" "min\_roll\_belt"  ## [19] "min\_pitch\_belt" "min\_yaw\_belt"  ## [21] "amplitude\_roll\_belt" "amplitude\_pitch\_belt"  ## [23] "amplitude\_yaw\_belt" "var\_total\_accel\_belt"  ## [25] "avg\_roll\_belt" "stddev\_roll\_belt"  ## [27] "var\_roll\_belt" "avg\_pitch\_belt"  ## [29] "stddev\_pitch\_belt" "var\_pitch\_belt"  ## [31] "avg\_yaw\_belt" "stddev\_yaw\_belt"  ## [33] "var\_yaw\_belt" "gyros\_belt\_x"  ## [35] "gyros\_belt\_y" "gyros\_belt\_z"  ## [37] "accel\_belt\_x" "accel\_belt\_y"  ## [39] "accel\_belt\_z" "magnet\_belt\_x"  ## [41] "magnet\_belt\_y" "magnet\_belt\_z"  ## [43] "roll\_arm" "pitch\_arm"  ## [45] "yaw\_arm" "total\_accel\_arm"  ## [47] "var\_accel\_arm" "avg\_roll\_arm"  ## [49] "stddev\_roll\_arm" "var\_roll\_arm"  ## [51] "avg\_pitch\_arm" "stddev\_pitch\_arm"  ## [53] "var\_pitch\_arm" "avg\_yaw\_arm"  ## [55] "stddev\_yaw\_arm" "var\_yaw\_arm"  ## [57] "gyros\_arm\_x" "gyros\_arm\_y"  ## [59] "gyros\_arm\_z" "accel\_arm\_x"  ## [61] "accel\_arm\_y" "accel\_arm\_z"  ## [63] "magnet\_arm\_x" "magnet\_arm\_y"  ## [65] "magnet\_arm\_z" "kurtosis\_roll\_arm" |

## [67] "kurtosis\_picth\_arm" "kurtosis\_yaw\_arm"

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| ## [69] "skewness\_roll\_arm" "skewness\_pitch\_arm"  ## [71] "skewness\_yaw\_arm" "max\_roll\_arm"  ## [73] "max\_picth\_arm" "max\_yaw\_arm"  ## [75] "min\_roll\_arm" "min\_pitch\_arm"  ## [77] "min\_yaw\_arm" "amplitude\_roll\_arm"  ## [79] "amplitude\_pitch\_arm" "amplitude\_yaw\_arm"  ## [81] "roll\_dumbbell" "pitch\_dumbbell"  ## [83] "yaw\_dumbbell" "kurtosis\_roll\_dumbbell"  ## [85] "kurtosis\_picth\_dumbbell" "skewness\_roll\_dumbbell"  ## [87] "skewness\_pitch\_dumbbell" "max\_roll\_dumbbell"  ## [89] "max\_picth\_dumbbell" "max\_yaw\_dumbbell"  ## [91] "min\_roll\_dumbbell" "min\_pitch\_dumbbell"  ## [93] "min\_yaw\_dumbbell" "amplitude\_roll\_dumbbell"  ## [95] "amplitude\_pitch\_dumbbell" "amplitude\_yaw\_dumbbell"  ## [97] "total\_accel\_dumbbell" "var\_accel\_dumbbell"  ## [99] "avg\_roll\_dumbbell" "stddev\_roll\_dumbbell"  ## [101] "var\_roll\_dumbbell" "avg\_pitch\_dumbbell"  ## [103] "stddev\_pitch\_dumbbell" "var\_pitch\_dumbbell"  ## [105] "avg\_yaw\_dumbbell" "stddev\_yaw\_dumbbell"  ## [107] "var\_yaw\_dumbbell" "gyros\_dumbbell\_x"  ## [109] "gyros\_dumbbell\_y" "gyros\_dumbbell\_z"  ## [111] "accel\_dumbbell\_x" "accel\_dumbbell\_y"  ## [113] "accel\_dumbbell\_z" "magnet\_dumbbell\_x"  ## [115] "magnet\_dumbbell\_y" "magnet\_dumbbell\_z"  ## [117] "roll\_forearm" "pitch\_forearm"  ## [119] "yaw\_forearm" "kurtosis\_roll\_forearm"  ## [121] "kurtosis\_picth\_forearm" "skewness\_roll\_forearm"  ## [123] "skewness\_pitch\_forearm" "max\_roll\_forearm"  ## [125] "max\_picth\_forearm" "max\_yaw\_forearm"  ## [127] "min\_roll\_forearm" "min\_pitch\_forearm"  ## [129] "min\_yaw\_forearm" "amplitude\_roll\_forearm"  ## [131] "amplitude\_pitch\_forearm" "amplitude\_yaw\_forearm"  ## [133] "total\_accel\_forearm" "var\_accel\_forearm"  ## [135] "avg\_roll\_forearm" "stddev\_roll\_forearm"  ## [137] "var\_roll\_forearm" "avg\_pitch\_forearm"  ## [139] "stddev\_pitch\_forearm" "var\_pitch\_forearm"  ## [141] "avg\_yaw\_forearm" "stddev\_yaw\_forearm"  ## [143] "var\_yaw\_forearm" "gyros\_forearm\_x"  ## [145] "gyros\_forearm\_y" "gyros\_forearm\_z"  ## [147] "accel\_forearm\_x" "accel\_forearm\_y"  ## [149] "accel\_forearm\_z" "magnet\_forearm\_x"  ## [151] "magnet\_forearm\_y" "magnet\_forearm\_z"  ## [153] "accel\_forearm\_y.1" "accel\_forearm\_z.1"  ## [155] "magnet\_forearm\_x.1" "magnet\_forearm\_y.1" ## [157] "magnet\_forearm\_z.1" "classe"  *# logistic regression model:*  fit <- **glm**(classe**~**.,data = training,family = binomial) |
| ## Warning: glm.fit: algorithm did not converge  ## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred **summary**(fit)  ##  ## Call:  ## glm(formula = classe ~ ., family = binomial, data = training) ##  ## Deviance Residuals:  ## Min 1Q Median 3Q Max ## -1.477e-04 -2.100e-08 2.100e-08 2.100e-08 9.859e-05 ##  ## Coefficients: (18 not defined because of singularities)  ## Estimate Std. Error z value Pr(>|z|)  ## (Intercept) 3.202e+10 1.709e+13 0.002 0.999  ## user\_namecarlitos 6.085e+06 3.247e+09 0.002 0.999  ## user\_nameeurico -8.308e+06 4.435e+09 -0.002 0.999  ## user\_namejeremy -3.867e+06 2.065e+09 -0.002 0.999  ## user\_namepedro 6.342e+06 3.385e+09 0.002 0.999  ## raw\_timestamp\_part\_1 -2.421e+01 1.292e+04 -0.002 0.999  ## raw\_timestamp\_part\_2 1.411e-05 2.360e-02 0.001 1.000  ## cvtd\_timestamp28/11/2011 14:15 NA NA NA NA  ## cvtd\_timestamp30/11/2011 17:12 NA NA NA NA  ## cvtd\_timestamp5/12/2011 11:23 -2.151e+03 1.117e+06 -0.002 0.998  ## cvtd\_timestamp5/12/2011 11:25 NA NA NA NA  ## cvtd\_timestamp5/12/2011 14:22 -1.842e+01 8.271e+04 0.000 1.000  ## cvtd\_timestamp5/12/2011 14:23 NA NA NA NA  ## new\_windowyes -1.196e+04 9.115e+08 0.000 1.000  ## num\_window 3.216e+01 1.436e+04 0.002 0.998  ## roll\_belt 3.836e+00 8.842e+03 0.000 1.000  ## pitch\_belt 3.331e+00 1.228e+04 0.000 1.000  ## yaw\_belt -1.298e-01 5.861e+02 0.000 1.000  ## total\_accel\_belt -2.160e+00 1.120e+04 0.000 1.000  ## kurtosis\_roll\_belt -2.413e+02 1.132e+07 0.000 1.000  ## kurtosis\_picth\_belt 2.133e+00 6.052e+04 0.000 1.000  ## skewness\_roll\_belt 1.471e+01 4.592e+05 0.000 1.000  ## skewness\_roll\_belt.1 -1.419e+01 1.658e+05 0.000 1.000  ## max\_roll\_belt 1.833e+02 2.214e+07 0.000 1.000  ## max\_picth\_belt 2.699e+01 2.798e+05 0.000 1.000  ## max\_yaw\_belt 2.329e+02 1.125e+07 0.000 1.000  ## min\_roll\_belt -2.742e+02 2.014e+07 0.000 1.000  ## min\_pitch\_belt -2.265e+01 1.450e+06 0.000 1.000  ## min\_yaw\_belt NA NA NA NA  ## amplitude\_roll\_belt -2.385e+02 2.213e+07 0.000 1.000  ## amplitude\_pitch\_belt NA NA NA NA  ## amplitude\_yaw\_belt NA NA NA NA  ## var\_total\_accel\_belt -1.510e+01 4.775e+05 0.000 1.000  ## avg\_roll\_belt 2.785e+00 1.051e+05 0.000 1.000 |

## stddev\_roll\_belt 1.753e+01 1.265e+06 0.000 1.000

## var\_roll\_belt -3.117e+00 1.134e+05 0.000 1.000

## avg\_pitch\_belt -6.328e+00 1.748e+05 0.000 1.000

## stddev\_pitch\_belt -8.170e+01 1.457e+06 0.000 1.000

## var\_pitch\_belt 1.734e+01 3.934e+05 0.000 1.000

## avg\_yaw\_belt 8.784e+01 2.140e+06 0.000 1.000

## stddev\_yaw\_belt 1.326e+00 4.623e+06 0.000 1.000

## var\_yaw\_belt 1.552e-02 1.262e+04 0.000 1.000

## gyros\_belt\_x 1.681e+01 1.064e+05 0.000 1.000

## gyros\_belt\_y 1.424e+01 3.427e+05 0.000 1.000

## gyros\_belt\_z -6.446e+00 1.389e+05 0.000 1.000

## accel\_belt\_x -1.552e-01 1.451e+03 0.000 1.000

## accel\_belt\_y 4.502e-02 1.660e+03 0.000 1.000

## accel\_belt\_z 3.158e-01 1.794e+03 0.000 1.000

## magnet\_belt\_x 2.267e-01 8.493e+02 0.000 1.000

## magnet\_belt\_y 1.765e-01 8.810e+02 0.000 1.000

## magnet\_belt\_z 1.660e-01 5.184e+02 0.000 1.000

## roll\_arm -5.731e-02 1.442e+02 0.000 1.000

## pitch\_arm -5.222e-01 6.479e+02 -0.001 0.999

## yaw\_arm -1.016e-01 1.354e+02 -0.001 0.999

## total\_accel\_arm -5.238e-01 2.292e+03 0.000 1.000

## var\_accel\_arm -4.505e-01 2.112e+04 0.000 1.000

## avg\_roll\_arm -1.565e-01 1.405e+04 0.000 1.000

## stddev\_roll\_arm 3.474e+00 1.064e+05 0.000 1.000

## var\_roll\_arm -2.031e-02 3.502e+02 0.000 1.000

## avg\_pitch\_arm 1.466e+00 1.531e+05 0.000 1.000

## stddev\_pitch\_arm 1.567e+01 1.588e+05 0.000 1.000

## var\_pitch\_arm 1.251e-02 3.281e+03 0.000 1.000

## avg\_yaw\_arm 1.020e+00 1.778e+04 0.000 1.000

## stddev\_yaw\_arm -6.699e+00 5.032e+04 0.000 1.000

## var\_yaw\_arm 2.898e-02 4.722e+02 0.000 1.000

## gyros\_arm\_x 1.337e+00 1.778e+04 0.000 1.000

## gyros\_arm\_y 6.535e+00 4.083e+04 0.000 1.000

## gyros\_arm\_z 4.908e+00 2.287e+04 0.000 1.000

## accel\_arm\_x -1.632e-02 5.067e+02 0.000 1.000

## accel\_arm\_y -3.202e-02 5.528e+02 0.000 1.000

## accel\_arm\_z -1.523e-02 3.129e+02 0.000 1.000

## magnet\_arm\_x 7.353e-03 1.451e+02 0.000 1.000

## magnet\_arm\_y 1.141e-01 3.629e+02 0.000 1.000

## magnet\_arm\_z -5.990e-02 2.168e+02 0.000 1.000

## kurtosis\_roll\_arm -1.279e+00 1.372e+05 0.000 1.000

## kurtosis\_picth\_arm 2.095e+00 2.848e+05 0.000 1.000

## kurtosis\_yaw\_arm -8.336e+00 1.133e+05 0.000 1.000

## skewness\_roll\_arm 2.048e+01 1.972e+06 0.000 1.000

## skewness\_pitch\_arm 3.350e+01 1.123e+06 0.000 1.000

## skewness\_yaw\_arm -6.954e+00 2.958e+05 0.000 1.000

## max\_roll\_arm -3.085e+01 1.179e+07 0.000 1.000

## max\_picth\_arm -1.668e+03 2.989e+07 0.000 1.000

## max\_yaw\_arm 3.360e+00 2.645e+05 0.000 1.000

## min\_roll\_arm 3.030e+01 1.186e+07 0.000 1.000

## min\_pitch\_arm 1.668e+03 2.988e+07 0.000 1.000

## min\_yaw\_arm -5.460e+00 2.966e+05 0.000 1.000

## amplitude\_roll\_arm 2.402e+01 1.174e+07 0.000 1.000

## amplitude\_pitch\_arm 1.669e+03 2.985e+07 0.000 1.000

## amplitude\_yaw\_arm NA NA NA NA

## roll\_dumbbell 1.295e-01 6.889e+02 0.000 1.000

## pitch\_dumbbell -3.122e-01 1.172e+03 0.000 1.000

## yaw\_dumbbell 1.662e-01 6.861e+02 0.000 1.000

## kurtosis\_roll\_dumbbell 3.774e+02 1.605e+07 0.000 1.000

## kurtosis\_picth\_dumbbell -4.045e+00 4.009e+05 0.000 1.000

## skewness\_roll\_dumbbell 4.256e+01 3.945e+05 0.000 1.000

## skewness\_pitch\_dumbbell 2.731e+01 4.182e+05 0.000 1.000

## max\_roll\_dumbbell 2.581e+02 1.216e+07 0.000 1.000

## max\_picth\_dumbbell 2.558e+02 1.105e+07 0.000 1.000

## max\_yaw\_dumbbell -3.795e+02 1.572e+07 0.000 1.000

## min\_roll\_dumbbell -2.594e+02 1.209e+07 0.000 1.000

## min\_pitch\_dumbbell -2.567e+02 1.104e+07 0.000 1.000

## min\_yaw\_dumbbell NA NA NA NA

## amplitude\_roll\_dumbbell -2.599e+02 1.217e+07 0.000 1.000

## amplitude\_pitch\_dumbbell -2.565e+02 1.105e+07 0.000 1.000

## amplitude\_yaw\_dumbbell NA NA NA NA

## total\_accel\_dumbbell 1.707e+00 5.707e+03 0.000 1.000

## var\_accel\_dumbbell 7.186e-01 4.159e+04 0.000 1.000

## avg\_roll\_dumbbell -4.136e-01 1.115e+04 0.000 1.000

## stddev\_roll\_dumbbell 6.602e-02 9.903e+04 0.000 1.000

## var\_roll\_dumbbell 1.127e-02 8.361e+02 0.000 1.000

## avg\_pitch\_dumbbell 2.273e+00 6.363e+04 0.000 1.000

## stddev\_pitch\_dumbbell -9.758e-01 5.308e+05 0.000 1.000

## var\_pitch\_dumbbell 1.958e-02 4.552e+03 0.000 1.000

## avg\_yaw\_dumbbell 9.768e-01 3.070e+04 0.000 1.000

## stddev\_yaw\_dumbbell 3.835e+00 1.491e+05 0.000 1.000

## var\_yaw\_dumbbell -2.194e-02 1.529e+03 0.000 1.000

## gyros\_dumbbell\_x 1.089e+01 4.168e+04 0.000 1.000

## gyros\_dumbbell\_y -5.854e-01 3.294e+04 0.000 1.000

## gyros\_dumbbell\_z 5.848e+00 3.567e+04 0.000 1.000

## accel\_dumbbell\_x 4.649e-01 1.511e+03 0.000 1.000

## accel\_dumbbell\_y -1.996e-01 8.743e+02 0.000 1.000

## accel\_dumbbell\_z -2.526e-01 1.095e+03 0.000 1.000

## magnet\_dumbbell\_x -1.429e-01 4.937e+02 0.000 1.000

## magnet\_dumbbell\_y 8.417e-02 6.860e+02 0.000 1.000

## magnet\_dumbbell\_z 5.264e-02 3.787e+02 0.000 1.000

## roll\_forearm 9.560e-03 1.646e+02 0.000 1.000

## pitch\_forearm 1.215e-01 1.499e+03 0.000 1.000

## yaw\_forearm -5.853e-03 1.043e+02 0.000 1.000

## kurtosis\_roll\_forearm 2.956e+01 9.889e+06 0.000 1.000

## kurtosis\_picth\_forearm 2.758e+00 1.556e+05 0.000 1.000

## skewness\_roll\_forearm -2.087e+00 4.561e+05 0.000 1.000

## skewness\_pitch\_forearm 2.092e+01 8.209e+05 0.000 1.000

## max\_roll\_forearm -5.134e+02 8.853e+06 0.000 1.000

## max\_picth\_forearm -1.242e+00 2.123e+04 0.000 1.000 ## max\_yaw\_forearm -3.206e+01 9.579e+06 0.000 1.000

## min\_roll\_forearm 5.123e+02 8.855e+06 0.000 1.000

## min\_pitch\_forearm 3.160e-02 2.930e+04 0.000 1.000

## min\_yaw\_forearm NA NA NA NA

## amplitude\_roll\_forearm 5.167e+02 8.817e+06 0.000 1.000

## amplitude\_pitch\_forearm NA NA NA NA

## amplitude\_yaw\_forearm NA NA NA NA

## total\_accel\_forearm 3.209e-01 2.326e+03 0.000 1.000

## var\_accel\_forearm -8.244e-01 1.426e+04 0.000 1.000

## avg\_roll\_forearm -3.349e-01 1.792e+04 0.000 1.000

## stddev\_roll\_forearm 3.649e-01 1.261e+05 0.000 1.000

## var\_roll\_forearm 1.848e-03 7.983e+02 0.000 1.000

## avg\_pitch\_forearm -5.398e-01 1.044e+05 0.000 1.000

## stddev\_pitch\_forearm -1.688e+01 6.420e+05 0.000 1.000

## var\_pitch\_forearm 2.086e-01 9.747e+03 0.000 1.000

## avg\_yaw\_forearm 1.224e+00 3.374e+04 0.000 1.000

## stddev\_yaw\_forearm 3.636e+00 1.006e+05 0.000 1.000

## var\_yaw\_forearm -1.549e-02 8.103e+02 0.000 1.000

## gyros\_forearm\_x 1.341e+01 2.526e+04 0.001 1.000

## gyros\_forearm\_y 2.150e-03 1.120e+04 0.000 1.000

## gyros\_forearm\_z -1.424e+00 2.607e+04 0.000 1.000

## accel\_forearm\_x -8.488e-02 2.285e+02 0.000 1.000

## accel\_forearm\_y -7.488e-02 2.917e+02 0.000 1.000

## accel\_forearm\_z -1.275e-01 4.796e+02 0.000 1.000

## magnet\_forearm\_x 4.579e-02 1.750e+02 0.000 1.000

## magnet\_forearm\_y -1.938e-02 1.765e+02 0.000 1.000

## magnet\_forearm\_z 1.386e-01 2.646e+02 0.001 1.000

## accel\_forearm\_y.1 NA NA NA NA

## accel\_forearm\_z.1 NA NA NA NA

## magnet\_forearm\_x.1 NA NA NA NA

## magnet\_forearm\_y.1 NA NA NA NA ## magnet\_forearm\_z.1 NA NA NA NA ##

## (Dispersion parameter for binomial family taken to be 1) ##

## Null deviance: 5.1432e+03 on 4009 degrees of freedom

## Residual deviance: 1.3222e-07 on 3862 degrees of freedom

## AIC: 296

##

## Number of Fisher Scoring iterations: 25 **library**(ResourceSelection)

## ResourceSelection 0.3-2 2017-02-28 **hoslem.test**(training**$**classe, **fitted**(fit))

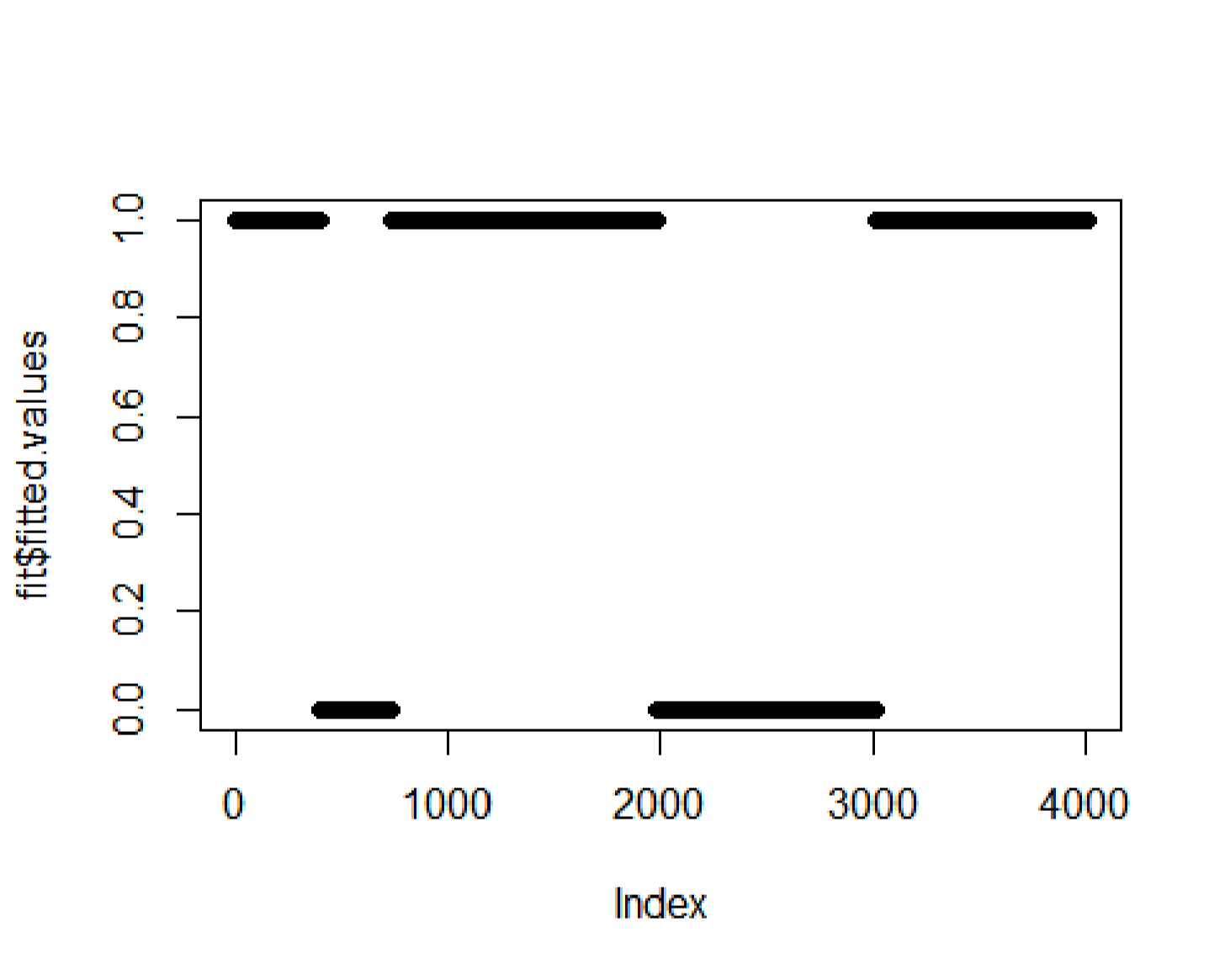
## Warning in Ops.factor(1, y): '-' not meaningful for factors

##

## Hosmer and Lemeshow goodness of fit (GOF) test

##

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| ## data: training$classe, fitted(fit)  ## X-squared = 4010, df = 8, p-value < 2.2e-16  *#plot the fitted model* **plot**(fit**$**fitted.values) |



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| pred <- **predict**(fit,newdata = testing,type = 'response') | deficient fit may be misleading |
| ## Warning in predict.lm(object, newdata, se.fit, scale = 1, type =  ## ifelse(type == : prediction from a rank**library**(caret)  ## Loading required package: lattice  ## Loading required package: ggplot2  *#with default prob cut 0.50* testing**$**pred\_classe <- **ifelse**(pred**<**0.7,'yes','no')    **table**(testing**$**pred\_classe,testing**$**classe)  ##  ## A B C D E  ## no 0 0 14 0 0 |

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| *#training split of churn classes* | (training),2)**\***100  (testing),2)**\***100    **/nrow**(testing),2)**\***100  **$**classe)                    Class: A Class: B Class: C Class: D Class: E  ## Sensitivity NA NA 1 NA NA  ## Specificity 1 1 NA 1 1  ## Pos Pred Value NA NA NA NA NA  ## Neg Pred Value NA NA NA NA NA |
| **round**(**table**(training**$**classe)**/ nrow**  ##  ## A B C D E  ## 34 22 2 7 34  *# test split of churn classes* **round**(**table**(testing**$**classe)**/nrow**  ##  ## A B C D E  ## 0 0 100 0 0  *#predicted split of churn classes* **round**(**table**(testing**$**pred\_classe)  ##  ## no  ## 100  *#create confusion matrix*  **confusionMatrix**(testing**$** classe,testing  ## Confusion Matrix and Statistics  ##  ## Reference  ## Prediction A B C D E  ## A 0 0 0 0 0  ## B 0 0 0 0 0  ## C 0 0 14 0 0  ## D 0 0 0 0 0  ## E 0 0 0 0 0  ##  ## Overall Statistics  ##  ## Accuracy : 1  ## 95% CI : (0.7684, 1) # # No Information Rate : 1 ## PValue [Acc > NIR] : 1 ##  ## Kappa : NaN ## Mcnemar's Test PValue : NA ##  ## Statistics by Class:  ##  ## |
| ## Prevalence 0 0 1 0 0  ## Detection Rate 0 0 1 0 0  ## Detection Prevalence 0 0 1 0 0 ## Balanced Accuracy NA NA NA NA NA  *# load libraries* **library**(caret) **library**(rpart)      *# define training control*  *#train\_control<- trainControl(method="cv", number=10)*    *# train the model*  *#model<- train(classe~.,data=training, trControl=train\_control, method="glm")*        *append predictions*  *pred<- cbind(testing,predictions)*    *# summarize results* *confusion Matrix<- confusion Matrix(pred$predictions,pred$pred\_classe)* | |

Confusion Matrix and Statistics

Reference Prediction yes no yes 54 48 no 170 1395

Accuracy : 0.8692

95% CI : (0.8521, 0.8851)

No Information Rate : 0.8656

P-Value [Acc > NIR] : 0.3492

Kappa : 0.2699

Mcnemar's Test P-Value : 2.503e-16

Sensitivity : 0.24107

Specificity : 0.96674

Pos Pred Value : 0.52941

Neg Pred Value : 0.89137

Prevalence : 0.13437

Detection Rate : 0.03239

Detection Prevalence : 0.06119

Balanced Accuracy : 0.60390

'Positive' Class : yes

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