Practice Machine Learning

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Introdution

Using devices such as Jawbone Up, Nike FuelBand, and Fitbit it is now possible to collect a large amount of data about personal activity relatively inexpensively. These type of devices are part of the quantified self movement – a group of enthusiasts who take measurements about themselves regularly to improve their health, to find patterns in their behavior, or because they are tech geeks. One thing that people regularly do is quantify how much of a particular activity they do, but they rarely quantify how well they do it. In this project, your goal will be to use data from accelerometers on the belt, forearm, arm, and dumbell of 6 participants. They were asked to perform barbell lifts correctly and incorrectly in 5 different ways

```
suppressMessages(library(dplyr))
```

```
## Warning: replacing previous import 'vctrs::data_frame' by 'tibble::data_frame'
## when loading 'dplyr'
```

Preprocesing of the data

the fist step loading the data

```
download.file("https://d396qusza40orc.cloudfront.net/predmachlearn/pml-training.csv","training.csv")
download.file("https://d396qusza40orc.cloudfront.net/predmachlearn/pml-testing.csv","testing.csv")
training<-read.csv("training.csv")
testing<-read.csv("testing.csv")
```

taking only some variables

```
training$user_name=as.factor(training$user_name)
testing$user_name=as.factor(testing$user_name)
training$classe=as.factor(training$classe)
#using only the variables that start with gyros,accel and magnet
training<-select(training,user_name,grep('^accel|^gyros|^magnet',names(training)),classe)
testing<-select(testing,user_name,grep('^accel|^gyros|^magnet',names(training)))
summary(training)
```

```
##     user_name     gyros_belt_x        gyros_belt_y       gyros_belt_z
##  adelmo  :3892   Min.   :-1.040000   Min.   :-0.64000   Min.   :-1.4600
##  carlitos:3112   1st Qu.:-0.030000   1st Qu.: 0.00000   1st Qu.:-0.2000
##  charles :3536   Median : 0.030000   Median : 0.02000   Median :-0.1000
##  eurico  :3070   Mean   :-0.005592   Mean   : 0.03959   Mean   :-0.1305
```

```
##  jeremy  :3402   3rd Qu.: 0.110000   3rd Qu.: 0.11000   3rd Qu.:-0.0200
##  pedro   :2610   Max.   : 2.220000   Max.   : 0.64000   Max.   : 1.6200
##   accel_belt_x       accel_belt_y     accel_belt_z     magnet_belt_x
##  Min.   :-120.000   Min.   :-69.00   Min.   :-275.00   Min.   :-52.0
##  1st Qu.: -21.000   1st Qu.:  3.00   1st Qu.:-162.00   1st Qu.:  9.0
##  Median : -15.000   Median : 35.00   Median :-152.00   Median : 35.0
##  Mean   :  -5.595   Mean   : 30.15   Mean   : -72.59   Mean   : 55.6
##  3rd Qu.:  -5.000   3rd Qu.: 61.00   3rd Qu.:  27.00   3rd Qu.: 59.0
##  Max.   :  85.000   Max.   :164.00   Max.   : 105.00   Max.   :485.0
##  magnet_belt_y   magnet_belt_z     gyros_arm_x        gyros_arm_y
##  Min.   :354.0   Min.   :-623.0   Min.   :-6.37000   Min.   :-3.4400
##  1st Qu.:581.0   1st Qu.:-375.0   1st Qu.:-1.33000   1st Qu.:-0.8000
##  Median :601.0   Median :-320.0   Median : 0.08000   Median :-0.2400
##  Mean   :593.7   Mean   :-345.5   Mean   : 0.04277   Mean   :-0.2571
##  3rd Qu.:610.0   3rd Qu.:-306.0   3rd Qu.: 1.57000   3rd Qu.: 0.1400
##  Max.   :673.0   Max.   : 293.0   Max.   : 4.87000   Max.   : 2.8400
##   gyros_arm_z       accel_arm_x       accel_arm_y      accel_arm_z
##  Min.   :-2.3300   Min.   :-404.00   Min.   :-318.0   Min.   :-636.00
##  1st Qu.:-0.0700   1st Qu.:-242.00   1st Qu.: -54.0   1st Qu.:-143.00
##  Median : 0.2300   Median : -44.00   Median :  14.0   Median : -47.00
##  Mean   : 0.2695   Mean   : -60.24   Mean   :  32.6   Mean   : -71.25
##  3rd Qu.: 0.7200   3rd Qu.:  84.00   3rd Qu.: 139.0   3rd Qu.:  23.00
##  Max.   : 3.0200   Max.   : 437.00   Max.   : 308.0   Max.   : 292.00
##   magnet_arm_x     magnet_arm_y     magnet_arm_z    gyros_dumbbell_x
##  Min.   :-584.0   Min.   :-392.0   Min.   :-597.0   Min.   :-204.0000
##  1st Qu.:-300.0   1st Qu.:  -9.0   1st Qu.: 131.2   1st Qu.:  -0.0300
##  Median : 289.0   Median : 202.0   Median : 444.0   Median :   0.1300
##  Mean   : 191.7   Mean   : 156.6   Mean   : 306.5   Mean   :   0.1611
##  3rd Qu.: 637.0   3rd Qu.: 323.0   3rd Qu.: 545.0   3rd Qu.:   0.3500
##  Max.   : 782.0   Max.   : 583.0   Max.   : 694.0   Max.   :   2.2200
##  gyros_dumbbell_y   gyros_dumbbell_z  accel_dumbbell_x  accel_dumbbell_y
##  Min.   :-2.10000   Min.   : -2.380   Min.   :-419.00   Min.   :-189.00
##  1st Qu.:-0.14000   1st Qu.: -0.310   1st Qu.: -50.00   1st Qu.:  -8.00
##  Median : 0.03000   Median : -0.130   Median :  -8.00   Median :  41.50
##  Mean   : 0.04606   Mean   : -0.129   Mean   : -28.62   Mean   :  52.63
##  3rd Qu.: 0.21000   3rd Qu.:  0.030   3rd Qu.:  11.00   3rd Qu.: 111.00
##  Max.   :52.00000   Max.   :317.000   Max.   : 235.00   Max.   : 315.00
##  accel_dumbbell_z  magnet_dumbbell_x magnet_dumbbell_y magnet_dumbbell_z
##  Min.   :-334.00   Min.   :-643.0    Min.   :-3600     Min.   :-262.00
##  1st Qu.:-142.00   1st Qu.:-535.0    1st Qu.:  231     1st Qu.: -45.00
##  Median :  -1.00   Median :-479.0    Median :  311     Median :  13.00
##  Mean   : -38.32   Mean   :-328.5    Mean   :  221     Mean   :  46.05
##  3rd Qu.:  38.00   3rd Qu.:-304.0    3rd Qu.:  390     3rd Qu.:  95.00
##  Max.   : 318.00   Max.   : 592.0    Max.   :  633     Max.   : 452.00
##  gyros_forearm_x   gyros_forearm_y     gyros_forearm_z    accel_forearm_x
##  Min.   :-22.000   Min.   : -7.02000   Min.   : -8.0900   Min.   :-498.00
##  1st Qu.: -0.220   1st Qu.: -1.46000   1st Qu.: -0.1800   1st Qu.:-178.00
##  Median :  0.050   Median :  0.03000   Median :  0.0800   Median : -57.00
##  Mean   :  0.158   Mean   :  0.07517   Mean   :  0.1512   Mean   : -61.65
##  3rd Qu.:  0.560   3rd Qu.:  1.62000   3rd Qu.:  0.4900   3rd Qu.:  76.00
##  Max.   :  3.970   Max.   :311.00000   Max.   :231.0000   Max.   : 477.00
##  accel_forearm_y  accel_forearm_z   magnet_forearm_x  magnet_forearm_y
##  Min.   :-632.0   Min.   :-446.00   Min.   :-1280.0   Min.   :-896.0
##  1st Qu.:  57.0   1st Qu.:-182.00   1st Qu.: -616.0   1st Qu.:   2.0
```

```
##  Median : 201.0   Median : -39.00   Median : -378.0   Median : 591.0
##  Mean   : 163.7   Mean   : -55.29   Mean   : -312.6   Mean   : 380.1
##  3rd Qu.: 312.0   3rd Qu.:  26.00   3rd Qu.:  -73.0   3rd Qu.: 737.0
##  Max.   : 923.0   Max.   : 291.00   Max.   :  672.0   Max.   :1480.0
##  magnet_forearm_z classe
##  Min.   :-973.0   A:5580
##  1st Qu.: 191.0   B:3797
##  Median : 511.0   C:3422
##  Mean   : 393.6   D:3216
##  3rd Qu.: 653.0   E:3607
##  Max.   :1090.0
```