Getting and Cleaning Data Course Project

This is an R Markdown document.

I will use the “sqldf” library to perform some data manipulation:

```
library("sqldf")
```

```
## Loading required package: gsubfn
## Loading required package: proto
## Loading required package: RSQLite
## Loading required package: DBI
## Loading required package: RSQLite.extfuns
```

Set my working directory:

```
setwd("~/Documents/CURSOS/Getting and Cleaning Data/UCI HAR
Dataset")
```

Read the activity and column labels data sets:

```
activity_labels <- read.table("activity_labels.txt", col.names =
c("activity_ID",
    "activity_name"))
column_labels <- read.table("features.txt", col.names =
c("column_ID", "column_name"))
```

Get rid of punctuation signs from the column labels:

```
head(column_labels$column_name)
```

```
## [1] tBodyAcc-mean()-X tBodyAcc-mean()-Y tBodyAcc-mean()-Z
tBodyAcc-std()-X
## [5] tBodyAcc-std()-Y  tBodyAcc-std()-Z
## 477 Levels: angle(X,gravityMean) ... tGravityAccMag-std()
```

```
column_labels$column_name <- gsub("[[:punct:]]", "",
column_labels$column_name)
head(column_labels$column_name)
```

```
## [1] "tBodyAccmeanX" "tBodyAccmeanY" "tBodyAccmeanZ"
"tBodyAccstdX"
## [5] "tBodyAccstdY"  "tBodyAccstdZ"
```

Find all column names wich contains the string “mean” and exclude those which contains “meanFreq”:

```
mean_cols <- grep("mean", column_labels$column_name)
x_meanFreq <- grep("meanFreq", column_labels$column_name)
mean_cols <- setdiff(mean_cols, x_meanFreq)
```

Find all column names wich contains the string “std” and union them with the columns which contains mean. Variable “all_cols” is a vector with the column number of the measurements with mean and standard deviation on the original data set:

```
std_cols <- grep("std", column_labels$column_name)
all_cols <- union(mean_cols, std_cols)
head(all_cols)
```

```
## [1]  1  2  3 41 42 43
```

Clean labels for “mean” and “std”:

```
head(column_labels$column_name)
```

```
## [1] "tBodyAccmeanX" "tBodyAccmeanY" "tBodyAccmeanZ"
"tBodyAccstdX"
## [5] "tBodyAccstdY"  "tBodyAccstdZ"
```

```
column_labels$column_name <- gsub("mean", "_mean_",
column_labels$column_name)
column_labels$column_name <- gsub("std", "_stddev_",
column_labels$column_name)
head(column_labels$column_name)
```

```
## [1] "tBodyAcc_mean_X"   "tBodyAcc_mean_Y"   "tBodyAcc_mean_Z"
## [4] "tBodyAcc_stddev_X" "tBodyAcc_stddev_Y" "tBodyAcc_stddev_Z"
```

Read files with training and test data, append appropriate column names for each data set:

```
activity_test <- read.table("test/y_test.txt", col.names =
c("activity_ID"))
dim(activity_test)
```

```
## [1] 2947    1
```

```
measures_test <- read.table("test/x_test.txt", col.names =
column_labels$column_name)
dim(measures_test)
```

```
## [1] 2947  561
```

```
subject_test <- read.table("test/subject_test.txt", col.names =
c("subject_ID"))
dim(subject_test)
```

```
## [1] 2947    1
```

```
activity_train <- read.table("train/y_train.txt", col.names =
c("activity_ID"))
dim(activity_train)
```

```
## [1] 7352    1
```

```
measures_train <- read.table("train/x_train.txt", col.names =
column_labels$column_name)
dim(measures_train)
```

```
## [1] 7352  561
```

```
subject_train <- read.table("train/subject_train.txt", col.names =
c("subject_ID"))
dim(subject_train)
```

```
## [1] 7352    1
```

Subset the columns of the training and test data in order to extract only the measurements on the mean and standard deviation:

```
measures_test_sub <- measures_test[, all_cols]
dim(measures_test_sub)
```

```
## [1] 2947   66
```

```
measures_train_sub <- measures_train[, all_cols]
dim(measures_train_sub)
```

```
## [1] 7352   66
```

Append the columns with activity_ID and subject_ID to the training and test data frames:

```
measures_test_act <- cbind(activity_test, measures_test_sub,
subject_test)
dim(measures_test_act)
```

```
## [1] 2947   68
```

```
head(measures_test_act)
```

```
##   activity_ID tBodyAcc_mean_X tBodyAcc_mean_Y tBodyAcc_mean_Z
## 1           5          0.2572        -0.02329         -0.01465
## 2           5          0.2860        -0.01316         -0.11908
## 3           5          0.2755        -0.02605         -0.11815
## 4           5          0.2703        -0.03261         -0.11752
## 5           5          0.2748        -0.02785         -0.12953
## 6           5          0.2792        -0.01862         -0.11390
##   tGravityAcc_mean_X tGravityAcc_mean_Y tGravityAcc_mean_Z
## 1             0.9365            -0.2827             0.1153
## 2             0.9274            -0.2892             0.1526
## 3             0.9299            -0.2875             0.1461
## 4             0.9289            -0.2934             0.1429
## 5             0.9266            -0.3030             0.1383
## 6             0.9257            -0.3089             0.1306
##   tBodyAccJerk_mean_X tBodyAccJerk_mean_Y tBodyAccJerk_mean_Z
## 1             0.07205            0.045754            -0.106043
## 2             0.07018           -0.017876            -0.001721
## 3             0.06937           -0.004908            -0.013673
## 4             0.07485            0.032274             0.012141
## 5             0.07838            0.022277             0.002748
## 6             0.07598            0.017519             0.008208
##   tBodyGyro_mean_X tBodyGyro_mean_Y tBodyGyro_mean_Z
tBodyGyroJerk_mean_X
## 1         0.119976         -0.09179          0.18963
-0.20490
## 2        -0.001552         -0.18729          0.18071
-0.13867
## 3        -0.048213         -0.16628          0.15417
-0.09781
## 4        -0.056642         -0.12602          0.11834
-0.10223
## 5        -0.059992         -0.08472          0.07866
-0.09185
## 6        -0.039698         -0.06683          0.07055
-0.09274
##   tBodyGyroJerk_mean_Y tBodyGyroJerk_mean_Z tBodyAccMag_mean_
## 1              -0.17449             -0.09339            -0.8669
## 2              -0.02580             -0.07142            -0.9690
## 3              -0.03421             -0.06003            -0.9762
## 4              -0.04471             -0.05344            -0.9743
## 5              -0.02901             -0.06124            -0.9758
## 6              -0.03214             -0.07258            -0.9817
##   tGravityAccMag_mean_ tBodyAccJerkMag_mean_ tBodyGyroMag_mean_
## 1              -0.8669                -0.9298             -0.7955
## 2              -0.9690                -0.9737             -0.8984
```

```
## 3                -0.9762                -0.9816                -0.9392
## 4                -0.9743                -0.9827                -0.9472
## 5                -0.9758                -0.9869                -0.9574
## 6                -0.9817                -0.9873                -0.9697
##   tBodyGyroJerkMag_mean_ fBodyAcc_mean_X fBodyAcc_mean_Y
fBodyAcc_mean_Z
## 1                -0.9252         -0.9185         -0.9182
-0.7891
## 2                -0.9734         -0.9609         -0.9644
-0.9567
## 3                -0.9867         -0.9919         -0.9650
-0.9669
## 4                -0.9888         -0.9930         -0.9683
-0.9669
## 5                -0.9901         -0.9924         -0.9692
-0.9797
## 6                -0.9878         -0.9938         -0.9707
-0.9756
##   fBodyAccJerk_mean_X fBodyAccJerk_mean_Y fBodyAccJerk_mean_Z
## 1             -0.8996              -0.9375              -0.9236
## 2             -0.9435              -0.9692              -0.9734
## 3             -0.9910              -0.9734              -0.9717
## 4             -0.9905              -0.9725              -0.9703
## 5             -0.9915              -0.9798              -0.9835
## 6             -0.9938              -0.9790              -0.9861
##   fBodyGyro_mean_X fBodyGyro_mean_Y fBodyGyro_mean_Z
fBodyAccMag_mean_
## 1          -0.8236          -0.8079          -0.9179
-0.7909
## 2          -0.9225          -0.9265          -0.9682
-0.9541
## 3          -0.9728          -0.9808          -0.9721
-0.9756
## 4          -0.9715          -0.9813          -0.9667
-0.9734
## 5          -0.9764          -0.9804          -0.9688
-0.9777
## 6          -0.9797          -0.9805          -0.9602
-0.9780
##   fBodyBodyAccJerkMag_mean_ fBodyBodyGyroMag_mean_
## 1                   -0.8951                -0.7706
## 2                   -0.9454                -0.9245
## 3                   -0.9711                -0.9752
## 4                   -0.9717                -0.9763
## 5                   -0.9875                -0.9770
## 6                   -0.9913                -0.9770
##   fBodyBodyGyroJerkMag_mean_ tBodyAcc_stddev_X tBodyAcc_stddev_Y
## 1                    -0.8902           -0.9384           -0.9201
## 2                    -0.9520           -0.9754           -0.9675
## 3                    -0.9857           -0.9938           -0.9699
## 4                    -0.9856           -0.9947           -0.9733
## 5                    -0.9905           -0.9939           -0.9674
## 6                    -0.9887           -0.9945           -0.9704
##   tBodyAcc_stddev_Z tGravityAcc_stddev_X tGravityAcc_stddev_Y
## 1           -0.6677                -0.9254                -0.9370
## 2           -0.9450                -0.9891                -0.9839
## 3           -0.9627                -0.9959                -0.9883
```

```
## 4            -0.9671                -0.9931                -0.9704
## 5            -0.9783                -0.9956                -0.9710
## 6            -0.9653                -0.9988                -0.9907
##   tGravityAcc_stddev_Z tBodyAccJerk_stddev_X
tBodyAccJerk_stddev_Y
## 1              -0.5643                -0.9067
-0.9380
## 2              -0.9648                -0.9492
-0.9727
## 3              -0.9816                -0.9911
-0.9714
## 4              -0.9916                -0.9908
-0.9729
## 5              -0.9681                -0.9921
-0.9787
## 6              -0.9712                -0.9938
-0.9791
##   tBodyAccJerk_stddev_Z tBodyGyro_stddev_X tBodyGyro_stddev_Y
## 1               -0.9359             -0.8831             -0.8162
## 2               -0.9777             -0.9256             -0.9296
## 3               -0.9729             -0.9730             -0.9785
## 4               -0.9759             -0.9678             -0.9751
## 5               -0.9866             -0.9747             -0.9780
## 6               -0.9876             -0.9799             -0.9765
##   tBodyGyro_stddev_Z tBodyGyroJerk_stddev_X
tBodyGyroJerk_stddev_Y
## 1            -0.9409                -0.9012
-0.9109
## 2            -0.9676                -0.9623
-0.9563
## 3            -0.9756                -0.9842
-0.9879
## 4            -0.9632                -0.9842
-0.9896
## 5            -0.9676                -0.9885
-0.9919
## 6            -0.9635                -0.9894
-0.9895
##   tBodyGyroJerk_stddev_Z tBodyAccMag_stddev_
tGravityAccMag_stddev_
## 1              -0.9393              -0.7052
-0.7052
## 2              -0.9813              -0.9539
-0.9539
## 3              -0.9762              -0.9791
-0.9791
## 4              -0.9807              -0.9770
-0.9770
## 5              -0.9820              -0.9769
-0.9769
## 6              -0.9778              -0.9777
-0.9777
##   tBodyAccJerkMag_stddev_ tBodyGyroMag_stddev_
tBodyGyroJerkMag_stddev_
## 1               -0.8960              -0.7621
-0.8943
## 2               -0.9410              -0.9109
```

```
-0.9441
## 3                -0.9714              -0.9718
-0.9844
## 4                -0.9748              -0.9704
-0.9856
## 5                -0.9889              -0.9695
-0.9904
## 6                -0.9920              -0.9733
-0.9890
##   fBodyAcc_stddev_X fBodyAcc_stddev_Y fBodyAcc_stddev_Z
## 1           -0.9483           -0.9251           -0.6363
## 2           -0.9843           -0.9702           -0.9419
## 3           -0.9948           -0.9737           -0.9623
## 4           -0.9956           -0.9769           -0.9690
## 5           -0.9945           -0.9675           -0.9782
## 6           -0.9946           -0.9710           -0.9614
##   fBodyAccJerk_stddev_X fBodyAccJerk_stddev_Y
fBodyAccJerk_stddev_Z
## 1               -0.9244               -0.9432
-0.9479
## 2               -0.9616               -0.9800
-0.9808
## 3               -0.9919               -0.9710
-0.9723
## 4               -0.9920               -0.9754
-0.9806
## 5               -0.9936               -0.9787
-0.9885
## 6               -0.9945               -0.9808
-0.9876
##   fBodyGyro_stddev_X fBodyGyro_stddev_Y fBodyGyro_stddev_Z
## 1            -0.9033            -0.8227            -0.9562
## 2            -0.9271            -0.9320            -0.9701
## 3            -0.9732            -0.9772            -0.9791
## 4            -0.9672            -0.9719            -0.9653
## 5            -0.9744            -0.9766            -0.9700
## 6            -0.9800            -0.9742            -0.9678
##   fBodyAccMag_stddev_ fBodyBodyAccJerkMag_stddev_
fBodyBodyGyroMag_stddev_
## 1             -0.7111                        -0.8964
-0.7971
## 2             -0.9597                        -0.9342
-0.9168
## 3             -0.9838                        -0.9703
-0.9740
## 4             -0.9821                        -0.9785
-0.9712
## 5             -0.9788                        -0.9897
-0.9696
## 6             -0.9799                        -0.9917
-0.9751
##   fBodyBodyGyroJerkMag_stddev_ subject_ID
## 1                      -0.9073          2
## 2                      -0.9382          2
## 3                      -0.9833          2
## 4                      -0.9858          2
## 5                      -0.9906          2
```

```
## 6                       -0.9898          2
```

```
measures_train_act <- cbind(activity_train, measures_train_sub,
subject_train)
dim(measures_train_act)
```

```
## [1] 7352   68
```

```
head(measures_train_act)
```

```
##   activity_ID tBodyAcc_mean_X tBodyAcc_mean_Y tBodyAcc_mean_Z
## 1           5          0.2886        -0.02029         -0.1329
## 2           5          0.2784        -0.01641         -0.1235
## 3           5          0.2797        -0.01947         -0.1135
## 4           5          0.2792        -0.02620         -0.1233
## 5           5          0.2766        -0.01657         -0.1154
## 6           5          0.2772        -0.01010         -0.1051
##   tGravityAcc_mean_X tGravityAcc_mean_Y tGravityAcc_mean_Z
## 1             0.9634            -0.1408             0.11537
## 2             0.9666            -0.1416             0.10938
## 3             0.9669            -0.1420             0.10188
## 4             0.9676            -0.1440             0.09985
## 5             0.9682            -0.1488             0.09449
## 6             0.9679            -0.1482             0.09191
##   tBodyAccJerk_mean_X tBodyAccJerk_mean_Y tBodyAccJerk_mean_Z
## 1             0.07800            0.005001           -0.067831
## 2             0.07401            0.005771            0.029377
## 3             0.07364            0.003104           -0.009046
## 4             0.07732            0.020058           -0.009865
## 5             0.07344            0.019122            0.016780
## 6             0.07793            0.018684            0.009344
##   tBodyGyro_mean_X tBodyGyro_mean_Y tBodyGyro_mean_Z
tBodyGyroJerk_mean_X
## 1        -0.006101         -0.03136          0.10773
-0.09917
## 2        -0.016112         -0.08389          0.10058
-0.11050
## 3        -0.031698         -0.10234          0.09613
-0.10849
## 4        -0.043410         -0.09139          0.08554
-0.09117
## 5        -0.033960         -0.07471          0.07739
-0.09077
## 6        -0.028776         -0.07039          0.07901
-0.09425
##   tBodyGyroJerk_mean_Y tBodyGyroJerk_mean_Z tBodyAccMag_mean_
## 1             -0.05552            -0.06199           -0.9594
## 2             -0.04482            -0.05924           -0.9793
## 3             -0.04241            -0.05583           -0.9837
## 4             -0.03633            -0.06046           -0.9865
## 5             -0.03763            -0.05829           -0.9928
## 6             -0.04336            -0.04194           -0.9943
```

```
##   tGravityAcc_mean_ tBodyAccJerk_mean_ tBodyGyro_mean_
## 1           -0.9594            -0.9933         -0.9690
## 2           -0.9793            -0.9913         -0.9807
## 3           -0.9837            -0.9885         -0.9763
## 4           -0.9865            -0.9931         -0.9821
## 5           -0.9928            -0.9935         -0.9852
## 6           -0.9943            -0.9930         -0.9859
##   tBodyGyroJerk_mean_ fBodyAcc_mean_X fBodyAcc_mean_Y
fBodyAcc_mean_Z
## 1             -0.9942         -0.9948         -0.9830
-0.9393
## 2             -0.9951         -0.9975         -0.9769
-0.9735
## 3             -0.9934         -0.9936         -0.9725
-0.9833
## 4             -0.9955         -0.9955         -0.9836
-0.9911
## 5             -0.9958         -0.9973         -0.9823
-0.9884
## 6             -0.9953         -0.9967         -0.9869
-0.9927
##   fBodyAccJerk_mean_X fBodyAccJerk_mean_Y fBodyAccJerk_mean_Z
## 1             -0.9923             -0.9872             -0.9897
## 2             -0.9950             -0.9813             -0.9897
## 3             -0.9910             -0.9816             -0.9876
## 4             -0.9944             -0.9887             -0.9914
## 5             -0.9963             -0.9888             -0.9906
## 6             -0.9949             -0.9882             -0.9902
##   fBodyGyro_mean_X fBodyGyro_mean_Y fBodyGyro_mean_Z
fBodyAccMag_mean_
## 1          -0.9866          -0.9818          -0.9895
-0.9522
## 2          -0.9774          -0.9925          -0.9896
-0.9809
## 3          -0.9754          -0.9937          -0.9868
-0.9878
## 4          -0.9871          -0.9936          -0.9872
-0.9875
## 5          -0.9824          -0.9930          -0.9887
-0.9936
## 6          -0.9849          -0.9928          -0.9808
-0.9948
##   fBodyBodyAccJerkMag_mean_ fBodyBodyGyroMag_mean_
## 1                   -0.9937                -0.9801
## 2                   -0.9903                -0.9883
## 3                   -0.9893                -0.9893
## 4                   -0.9928                -0.9894
## 5                   -0.9955                -0.9914
## 6                   -0.9947                -0.9905
##   fBodyBodyGyroJerkMag_mean_ tBodyAcc_stddev_X tBodyAcc_stddev_Y
## 1                    -0.9920           -0.9953           -0.9831
## 2                    -0.9959           -0.9982           -0.9753
## 3                    -0.9950           -0.9954           -0.9672
## 4                    -0.9952           -0.9961           -0.9834
## 5                    -0.9951           -0.9981           -0.9808
## 6                    -0.9951           -0.9973           -0.9905
##   tBodyAcc_stddev_Z tGravityAcc_stddev_X tGravityAcc_stddev_Y
```

```
## 1             -0.9135              -0.9852               -0.9817
## 2             -0.9603              -0.9974               -0.9894
## 3             -0.9789              -0.9996               -0.9929
## 4             -0.9907              -0.9966               -0.9814
## 5             -0.9905              -0.9984               -0.9881
## 6             -0.9954              -0.9990               -0.9868
##   tGravityAcc_stddev_Z tBodyAccJerk_stddev_X
tBodyAccJerk_stddev_Y
## 1              -0.8776               -0.9935
-0.9884
## 2              -0.9316               -0.9955
-0.9811
## 3              -0.9929               -0.9907
-0.9810
## 4              -0.9785               -0.9927
-0.9876
## 5              -0.9787               -0.9964
-0.9884
## 6              -0.9973               -0.9948
-0.9887
##   tBodyAccJerk_stddev_Z tBodyGyro_stddev_X tBodyGyro_stddev_Y
## 1               -0.9936             -0.9853              -0.9766
## 2               -0.9918             -0.9831              -0.9890
## 3               -0.9897             -0.9763              -0.9936
## 4               -0.9935             -0.9914              -0.9924
## 5               -0.9925             -0.9852              -0.9924
## 6               -0.9923             -0.9852              -0.9921
##   tBodyGyro_stddev_Z tBodyGyroJerk_stddev_X
tBodyGyroJerk_stddev_Y
## 1              -0.9922               -0.9921
-0.9925
## 2              -0.9891               -0.9899
-0.9973
## 3              -0.9864               -0.9885
-0.9956
## 4              -0.9876               -0.9911
-0.9966
## 5              -0.9874               -0.9914
-0.9965
## 6              -0.9831               -0.9916
-0.9960
##   tBodyGyroJerk_stddev_Z tBodyAccMag_stddev_
tGravityAccMag_stddev_
## 1               -0.9921              -0.9506
-0.9506
## 2               -0.9939              -0.9761
-0.9761
## 3               -0.9915              -0.9880
-0.9880
## 4               -0.9933              -0.9864
-0.9864
## 5               -0.9945              -0.9913
-0.9913
## 6               -0.9931              -0.9952
-0.9952
##   tBodyAccJerkMag_stddev_ tBodyGyroMag_stddev_
tBodyGyroJerkMag_stddev_
```

```
## 1                  -0.9943                  -0.9643
-0.9914
## 2                  -0.9917                  -0.9838
-0.9961
## 3                  -0.9904                  -0.9861
-0.9951
## 4                  -0.9934                  -0.9874
-0.9953
## 5                  -0.9959                  -0.9891
-0.9953
## 6                  -0.9954                  -0.9864
-0.9952
##   fBodyAcc_stddev_X fBodyAcc_stddev_Y fBodyAcc_stddev_Z
## 1           -0.9954           -0.9831           -0.9062
## 2           -0.9987           -0.9749           -0.9554
## 3           -0.9963           -0.9655           -0.9770
## 4           -0.9963           -0.9832           -0.9902
## 5           -0.9986           -0.9801           -0.9919
## 6           -0.9976           -0.9923           -0.9970
##   fBodyAccJerk_stddev_X fBodyAccJerk_stddev_Y
fBodyAccJerk_stddev_Z
## 1                -0.9958                -0.9909
-0.9971
## 2                -0.9967                -0.9821
-0.9926
## 3                -0.9912                -0.9814
-0.9904
## 4                -0.9914                -0.9869
-0.9944
## 5                -0.9969                -0.9886
-0.9929
## 6                -0.9952                -0.9902
-0.9931
##   fBodyGyro_stddev_X fBodyGyro_stddev_Y fBodyGyro_stddev_Z
## 1           -0.9850           -0.9739           -0.9940
## 2           -0.9849           -0.9872           -0.9898
## 3           -0.9766           -0.9934           -0.9873
## 4           -0.9928           -0.9916           -0.9887
## 5           -0.9860           -0.9920           -0.9879
## 6           -0.9853           -0.9917           -0.9854
##   fBodyAccMag_stddev_ fBodyBodyAccJerkMag_stddev_
fBodyBodyGyroMag_stddev_
## 1           -0.9561                     -0.9938
-0.9613
## 2           -0.9759                     -0.9920
-0.9833
## 3           -0.9890                     -0.9909
-0.9860
## 4           -0.9867                     -0.9917
-0.9878
## 5           -0.9901                     -0.9944
-0.9891
## 6           -0.9953                     -0.9952
-0.9859
##   fBodyBodyGyroJerkMag_stddev_ subject_ID
## 1                      -0.9907          1
## 2                      -0.9964          1
```

```
## 3                          -0.9951            1
## 4                          -0.9952            1
## 5                          -0.9955            1
## 6                          -0.9952            1
```

Merge the training and test data variables into 1 data frame named “all_measures”:

```
all_measures <- rbind(measures_test_act, measures_train_act)
dim(all_measures)
```

```
## [1] 10299    68
```

Perform an SQL join to include labels for each activity_ID. The resulting data frame meets the characteristics of tidy data:

- Each variable in one column
- Each different observation in one row
- A row at the top with variable names
- Variable names are human readable

```
tidy_measures <- sqldf("select a.activity_name, m.* from
activity_labels as a, all_measures m where a.activity_ID =
m.activity_ID")
```

```
## Loading required package: tcltk
```

```
dim(tidy_measures)
```

```
## [1] 10299    69
```

```
head(tidy_measures[, c(1:5, 65:69)], 20)
```

```
##    activity_name activity_ID tBodyAcc_mean_X tBodyAcc_mean_Y
## 1        WALKING           1           0.1215       -0.0319019
## 2        WALKING           1           0.1311       -0.0361046
## 3        WALKING           1           0.1350       -0.0053608
## 4        WALKING           1           0.1378       -0.0106515
## 5        WALKING           1           0.1417       -0.0078034
## 6        WALKING           1           0.1472       -0.0141944
## 7        WALKING           1           0.1475       -0.0238848
## 8        WALKING           1           0.1529       -0.0722100
## 9        WALKING           1           0.1547       -0.0320368
## 10       WALKING           1           0.1562       -0.0496146
## 11       WALKING           1           0.1569       -0.0021175
## 12       WALKING           1           0.1626       -0.0368599
## 13       WALKING           1           0.1626        0.0057187
## 14       WALKING           1           0.1644       -0.0239891
```

```
## 15       WALKING            1          0.1657      -0.0145335
## 16       WALKING            1          0.1680      -0.0091353
## 17       WALKING            1          0.1683      -0.0186195
## 18       WALKING            1          0.1687      -0.0055779
## 19       WALKING            1          0.1696      -0.0088641
## 20       WALKING            1          0.1719       0.0005195
##    tBodyAcc_mean_Z fBodyAccMag_stddev_
fBodyBodyAccJerkMag_stddev_
## 1        -0.005196             -0.3601
-0.104839
## 2        -0.178336             -0.5249
-0.329774
## 3        -0.072839             -0.4684
-0.324689
## 4        -0.081164             -0.4622
-0.238561
## 5        -0.132632             -0.3223
0.326975
## 6        -0.071223             -0.3849
-0.194247
## 7        -0.117789             -0.3276
-0.026209
## 8        -0.062104             -0.3470
0.012697
## 9        -0.052296             -0.5770
-0.413920
## 10       -0.112901             -0.3499
0.105957
## 11       -0.085928             -0.4514
-0.296906
## 12       -0.093059             -0.3657
0.003777
## 13       -0.092314             -0.3803
-0.136136
## 14       -0.042246             -0.4881
-0.485824
## 15       -0.119659             -0.3777
-0.072572
## 16       -0.110908             -0.4032
-0.105120
## 17       -0.054696             -0.4806
-0.435915
## 18       -0.100539             -0.6052
-0.314084
## 19       -0.123126             -0.4736
-0.353147
## 20       -0.107163             -0.4637
-0.138527
##    fBodyBodyGyroMag_stddev_ fBodyBodyGyroJerkMag_stddev_
subject_ID
## 1                   -0.4147                      -0.6607
29
## 2                   -0.2616                      -0.1005
23
## 3                   -0.4875                      -0.6487
29
## 4                   -0.4797                      -0.7069
```

```
29
## 5                    -0.5518                    -0.5984
10
## 6                    -0.3473                    -0.6911
29
## 7                    -0.5799                    -0.6155
10
## 8                    -0.4130                    -0.5022
13
## 9                    -0.5106                    -0.7590
11
## 10                   -0.3202                    -0.2177
1
## 11                   -0.4666                    -0.6992
29
## 12                   -0.5045                    -0.4516
21
## 13                   -0.4358                    -0.6167
29
## 14                   -0.5612                    -0.6199
28
## 15                   -0.4217                    -0.5779
29
## 16                   -0.3297                    -0.1439
7
## 17                   -0.3443                    -0.3511
28
## 18                   -0.7072                    -0.6893
26
## 19                   -0.3574                    -0.3749
28
## 20                   -0.4754                    -0.1477
6
```

```
tail(tidy_measures[, c(1:5, 65:69)], 20)
```

```
##       activity_name activity_ID tBodyAcc_mean_X tBodyAcc_mean_Y
## 10280        LAYING           6          0.4779         0.264443
## 10281        LAYING           6          0.4788        -0.022650
## 10282        LAYING           6          0.4844        -0.006595
## 10283        LAYING           6          0.4868         0.036752
## 10284        LAYING           6          0.4883        -0.005456
## 10285        LAYING           6          0.4908        -0.019362
## 10286        LAYING           6          0.5038        -0.544314
## 10287        LAYING           6          0.5157        -0.030471
## 10288        LAYING           6          0.5168         0.003408
## 10289        LAYING           6          0.5283         0.013857
## 10290        LAYING           6          0.5335         0.043680
## 10291        LAYING           6          0.5382        -0.043285
## 10292        LAYING           6          0.5439         0.373293
## 10293        LAYING           6          0.5638         0.047432
## 10294        LAYING           6          0.6254         0.018359
## 10295        LAYING           6          0.6326         1.000000
## 10296        LAYING           6          0.6719        -0.014351
## 10297        LAYING           6          0.6803         0.594513
```

```
## 10298         LAYING           6          0.6928          0.064792
## 10299         LAYING           6          1.0000          0.535820
##       tBodyAcc_mean_Z fBodyAccMag_stddev_
fBodyBodyAccJerkMag_stddev_
## 10280         -0.25606            -0.03752
-0.6985
## 10281         -0.08283            -0.67943
-0.8831
## 10282         -0.16803            -0.74716
-0.9813
## 10283         -0.18034            -0.80343
-0.8691
## 10284         -0.57475            -0.75160
-0.9783
## 10285         -0.30709            -0.64530
-0.8834
## 10286         -0.29583             0.02672
-0.9615
## 10287         -0.21497            -0.81014
-0.8841
## 10288         -0.11269            -0.78754
-0.9823
## 10289         -0.13100            -0.84203
-0.9488
## 10290         -0.15781            -0.55510
-0.6926
## 10291         -0.12260            -0.85861
-0.9214
## 10292         -0.42798            -0.86243
-0.9837
## 10293         -0.34697            -0.93626
-0.9774
## 10294         -0.20197            -0.57880
-0.9744
## 10295         -0.44393            -0.30958
-0.9564
## 10296         -0.15990            -0.54071
-0.6588
## 10297         -0.57420            -0.57051
-0.9312
## 10298         -0.50895            -0.56994
-0.9294
## 10299         -0.75753             0.12753
-0.9591
##       fBodyBodyGyroMag_stddev_ fBodyBodyGyroJerkMag_stddev_
subject_ID
## 10280                  -0.6534                       -0.8010
22
## 10281                  -0.8033                       -0.9351
13
## 10282                  -0.8284                       -0.9893
29
## 10283                  -0.6860                       -0.8797
8
## 10284                  -0.8890                       -0.9825
25
## 10285                  -0.6622                       -0.8784
```

```
6
## 10286                -0.8358                -0.9641
25
## 10287                -0.6820                -0.8298
6
## 10288                -0.9394                -0.9758
19
## 10289                -0.8939                -0.9616
19
## 10290                -0.5183                -0.8622
22
## 10291                -0.7427                -0.9520
15
## 10292                -0.9307                -0.9824
25
## 10293                -0.9304                -0.9737
25
## 10294                -0.7528                -0.9856
22
## 10295                -0.4685                -0.9649
25
## 10296                -0.5365                -0.7350
10
## 10297                -0.7417                -0.9461
25
## 10298                -0.8352                -0.8985
25
## 10299                -0.7560                -0.9699
25
```

Build and execute a new SQL SELECT statement to summarize the data by subject_ID and activity name:

```
measures_avg <- paste(", avg(", names(tidy_measures[3:68]), ")",
sep = "", collapse = " ")
sqlstmt <- paste("select subject_ID, activity_name", measures_avg,
"from tidy_measures group by subject_id, activity_name")
tidy_measures_avg <- sqldf(sqlstmt)
dim(tidy_measures_avg)
```

```
## [1] 180  68
```

```
head(tidy_measures_avg[, c(1:5, 65:68)], 10)
```

```
##    subject_ID      activity_name avg(tBodyAcc_mean_X)
avg(tBodyAcc_mean_Y)
## 1           1             LAYING                0.2216
-0.040514
## 2           1            SITTING                0.2612
-0.001308
## 3           1           STANDING                0.2789
-0.016138
```

```
## 4            1             WALKING                  0.2773
-0.017384
## 5            1 WALKING_DOWNSTAIRS                  0.2892
-0.009919
## 6            1   WALKING_UPSTAIRS                  0.2555
-0.023953
## 7            2             LAYING                  0.2814
-0.018159
## 8            2            SITTING                  0.2771
-0.015688
## 9            2           STANDING                  0.2779
-0.018421
## 10           2            WALKING                  0.2764
-0.018595
##    avg(tBodyAcc_mean_Z) avg(fBodyAccMag_stddev_)
## 1               -0.1132                 -0.7983
## 2               -0.1045                 -0.9284
## 3               -0.1106                 -0.9823
## 4               -0.1111                 -0.3980
## 5               -0.1076                 -0.1865
## 6               -0.0973                 -0.4163
## 7               -0.1072                 -0.9751
## 8               -0.1092                 -0.9556
## 9               -0.1059                 -0.9605
## 10              -0.1055                 -0.5771
##    avg(fBodyBodyAccJerkMag_stddev_)
avg(fBodyBodyGyroMag_stddev_)
## 1                           -0.9218
-0.8243
## 2                           -0.9816
-0.9322
## 3                           -0.9925
-0.9785
## 4                           -0.1035
-0.3210
## 5                           -0.1041
-0.3984
## 6                           -0.5331
-0.1830
## 7                           -0.9846
-0.9611
## 8                           -0.9841
-0.9614
## 9                           -0.9752
-0.9568
## 10                          -0.1641
-0.6518
##    avg(fBodyBodyGyroJerkMag_stddev_)
## 1                            -0.9327
## 2                            -0.9870
## 3                            -0.9947
## 4                            -0.3816
## 5                            -0.3919
## 6                            -0.6939
## 7                            -0.9895
## 8                            -0.9896
## 9                            -0.9778
```

```
## 10                                -0.5581
```

```
tail(tidy_measures_avg[, c(1:5, 65:68)], 10)
```

```
##     subject_ID      activity_name avg(tBodyAcc_mean_X)
## 171         29           STANDING                0.2780
## 172         29            WALKING                0.2720
## 173         29 WALKING_DOWNSTAIRS                0.2931
## 174         29   WALKING_UPSTAIRS                0.2654
## 175         30             LAYING                0.2810
## 176         30            SITTING                0.2683
## 177         30           STANDING                0.2771
## 178         30            WALKING                0.2764
## 179         30 WALKING_DOWNSTAIRS                0.2832
## 180         30   WALKING_UPSTAIRS                0.2714
##     avg(tBodyAcc_mean_Y) avg(tBodyAcc_mean_Z)
avg(fBodyAccMag_stddev_)
## 171           -0.017261            -0.10866
-0.98225
## 172           -0.016292            -0.10663
-0.39326
## 173           -0.014941            -0.09813
-0.03309
## 174           -0.029947            -0.11800
-0.15599
## 175           -0.019449            -0.10366
-0.96405
## 176           -0.008047            -0.09952
-0.94354
## 177           -0.017016            -0.10876
-0.92173
## 178           -0.017588            -0.09862
-0.46985
## 179           -0.017438            -0.09998
-0.17854
## 180           -0.025331            -0.12470
-0.39451
##     avg(fBodyBodyAccJerkMag_stddev_)
avg(fBodyBodyGyroMag_stddev_)
## 171                          -0.99033
-0.97594
## 172                          -0.16951
-0.42916
## 173                          -0.07977
-0.32302
## 174                          -0.28058
-0.07433
## 175                          -0.96809
-0.95264
## 176                          -0.98529
-0.95951
## 177                          -0.94664
-0.88887
## 178                          -0.36654
-0.33154
```

```
## 179                                -0.13312
-0.25236
## 180                                -0.58088
-0.15147
##     avg(fBodyBodyGyroJerkMag_stddev_)
## 171                           -0.9915
## 172                           -0.6187
## 173                           -0.6267
## 174                           -0.7565
## 175                           -0.9755
## 176                           -0.9909
## 177                           -0.9550
## 178                           -0.5786
## 179                           -0.6455
## 180                           -0.7913
```

```
write.csv(tidy_measures_avg, file("tidy_measures_avg.csv"))
```