

# Exploratory Data Analysis

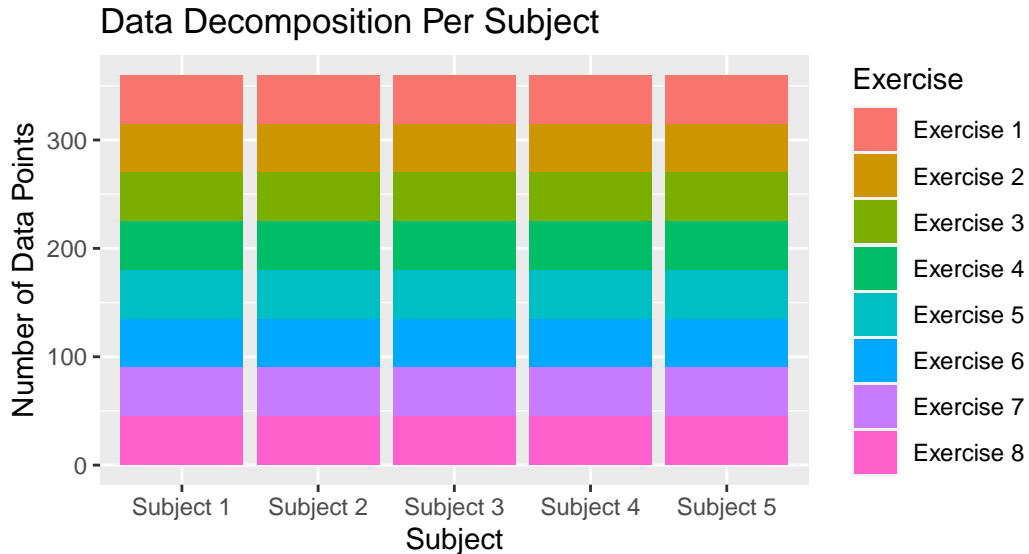
## Data Structure

We have data from 5 subjects. In the study each subject performs 8 different exercises while wearing 5 motion sensors on different parts of their body. Each sensor takes 9 measurements while the subject is performing the exercise. In all directions (x, y, and z) the sensor calculates the acceleration ( $\frac{\text{meters}}{\text{second}^2}$ ), angular rate ( $\frac{\text{radians}}{\text{second}}$ ), and magnetic field (relative).

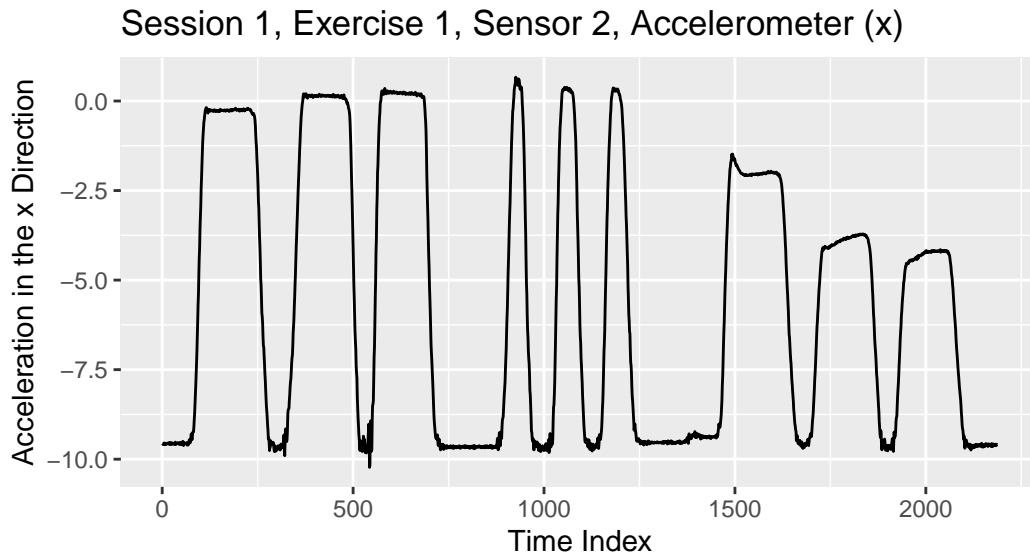
5 subjects  $\times$  8 exercises  $\times$  5 motion sensors  $\times$  9 measurements = 1800 total data points

8 exercises  $\times$  5 motion sensors  $\times$  9 measurements = 360 data points per subject

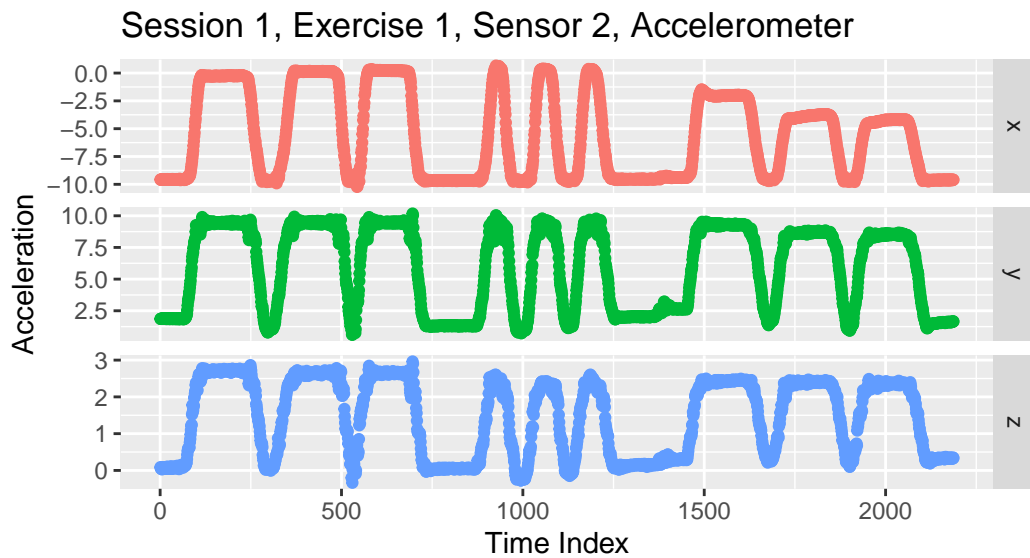
5 motion sensors  $\times$  9 measurements = 45 data points per exercise

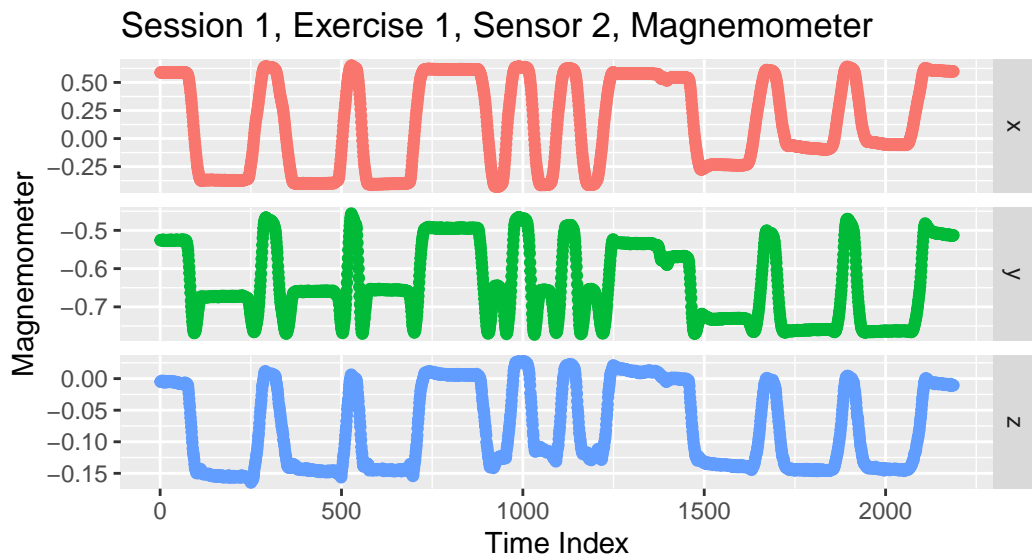
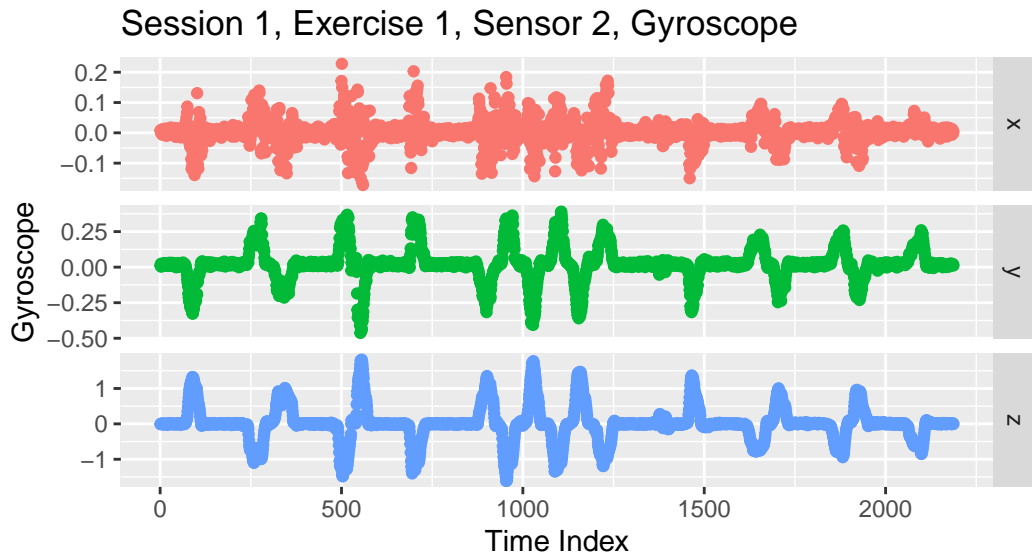


In our case, each data point is a time series of observations. The following is a single data point that represents acceleration in the  $x$  direction ( $\frac{\text{meters}}{\text{second}^2}$ ).



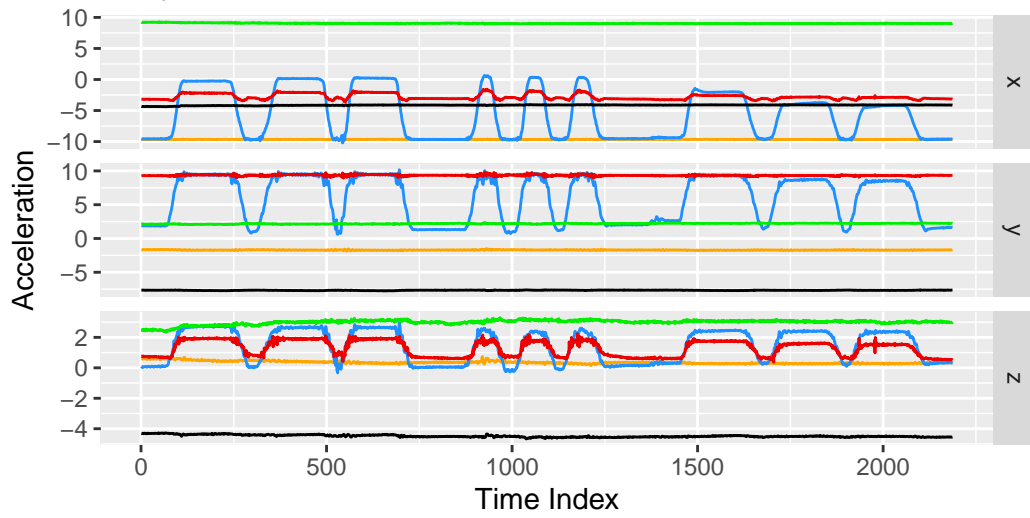
We can visualize all of the measurements a sensor gives us:



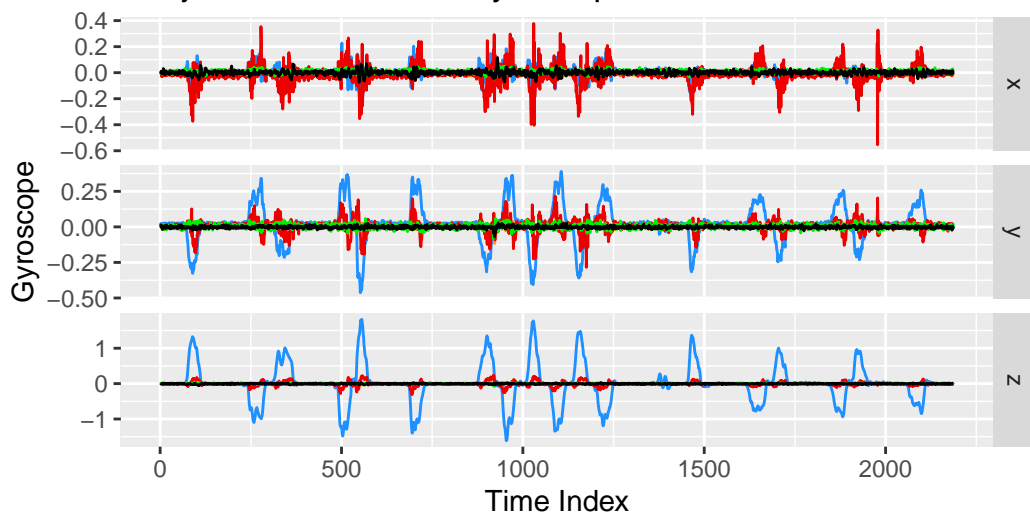


We can also visualize all of the data from a specific session and exercise:

Subject 1, Exercise 1, Accelerometer



Subject 1, Exercise 1, Gyroscope



### Subject 1, Exercise 1, Magnetometer

