**Statistics # 9 – Linear Regression**

It is desirable for golfers to generate a high clubhead speed at impact with the ball. A survey of Golf Digest’s Top 100 golf instructors, on their beliefs of which kinematic factors were most important for maximizing clubhead speed, revealed three primary variables:

1. **X-factor**: This is a measurement of upper torso rotation relative to hip rotation at the point when the hips stop rotating in the backswing direction. E.g., if the upper torso rotated 100° during the backswing and the hips rotated 40°, then the X-factor would be 60°. It is believed larger X-factors are associated with more clubhead speed.
2. **X-factor stretch**: This represents the difference between the maximum X-factor, attained early in the downswing, relative to the X-factor attained when the hips stopped rotating in the backswing direction. Many golf instructors believe the hips should begin to rotate forward during the downswing before the upper torso. This means that the X-factor angle will increase at the start of the downswing. E.g., if the X-factor was 60° at the end of the backswing, but increased to 70° as the hips reversed rotation into the downswing direction, then the X-factor stretch would be 10°. It is believed larger X-factor stretches are associated with more clubhead speed.
3. **Delayed wrist release**: This represents the amount of time it takes for the clubhead to contact the ball *after* the angle between the lead forearm and club shaft begins to increase. It is believed that delaying the opening of this wrist angle for as long as possible in the downswing will increase clubhead speed.

Given this information, a biomechanics researcher collected kinematic data on a group of golfers of varying skill. Clubhead speed was measured in addition to the three variables described above. Your task is to analyze the data to determine the strength of association between the three variables and clubhead speed as well as any association among the three variables.

Instructions

1. Download the Excel file “Statistics 9 – Linear Regression” from my webpage and save the file as “Last Name First Name Statistics 9” e.g. “MacKenzie Sasho Statistics 9”. Remember to change the file name when saving to your H: drive.
2. Follow the instructions in the spreadsheet and refer to the various readings, exercises, and class notes.
3. You must conduct your analysis in both Excel and SPSS.
4. Email your Excel file to the class Gmail account; Type “Statistics 9” as your **Subject**.