Assessment 3 script.

Slide 1(Title)

This is my presentation of the GPS data for Assessment 3

Slide 2(Typical analysis)

GPS tracking is used in the AFL to track player movement during training and matches. Data is gathered by strapping wearable devices to players. The data is analysed to provide information about activity and exertion.  
Typical data collected can include velocity, acceleration and distance covered. This data can then be used to calculate time spent and distance travelled at certain speeds.   
These metrics can then be used to compare players and positions. They can be used to evaluate fatigue by comparing output across each quarter of a game.  
Data can be presented showing summary statistics using means and standard deviations to show where players fall within the data set.

Slide 3(description of data)

This is a tibble showing the layout of the data.

The data set I have chosen contains GPS data from 5 athletes following 10 stoppages during an AFL game. The location information is in the form of latitude and longitude coordinates. The movement information is shown in acceleration and velocity. Each player ends their possession with one of 2 types of disposals, a handball or kick. The data set is quite small, with 2 players having a single possession, one player having 2 possessions and the other 2 having 3.

Slide 4 (analysis)

Initially, I wasn’t entirely sure how to interpret this data set as I have not seen much if any GPS data before. I have decided to concentrate on the acceleration and velocity data as I am unfamiliar with how to use GPS coordinates correctly to derive information. I have attempted to plot the coordinates using the leaflet package which I have added in a later slide, but I need to learn more about this process as the traces are difficult to interpret and I couldn’t work out how to change the colour of each trace for individual athletes. The question I will concentrate on is, What information can be derived about what happens when players gain possession from stoppages within an AFL game? I will analyse the data for the velocity during possession, the change in velocity between quarters, the maximum velocity achieved and some summary stats about acceleration.

Slide 4(velocity tracking)

The first graph I decided to plot was the velocity of each player over the time they were in possession. I have colour coded each line by the stoppage the possession originated from.

Each player has held possession of the ball for at least 15 seconds, which seems like quite a long time to be able to hold the ball in an AFL game, Jack was able to possess the ball for 22 seconds which is the highest within the data set. If we look at the velocity the possession started with, the centre bounce has the lowest initial velocity, I will guess this is because of the centre bounce where everyone is in a set position around the centre waiting for the bounce compared to the other 2 stoppage situations.

I wanted to add a signifier of each max velocity, either with a vertical line or a different shaped point, but I couldn’t figure out exactly how, or was unable to accurately search for the information via google across the various R-based information out there. I have plotted max velocity later in the slides

Slide 5(mean velocity)

Next, I looked at the mean velocity across quarters. Within the data there is no information for quarter 1, potentially as all these players started the game as interchange players, hence the low number of data points.

I have used a column plot to present this data. The graph shows an increase in the mean velocity of the players throughout the game. This is a different result than I would have expected and is different to the results seen by Coutts et al who found that average speed dropped throughout a match. This may not be entirely conclusive as the data set is small, and as stated previously these players may be inter-change players who depending on the minutes played may not fatigue in the same way as those on the field for longer.

Slide 6 (Max velocity)

The graph we have here shows the maximum velocity reached by each player during the game. As we can see Luke was the clear leader at 5m/s, Daniel with just under 4.5 and down to Thomas who reached 1.5 m/s. As seen previously, Thomas gained possession off the centre bounce, stays around his max velocity for most of his possession, then slows and disposes of possession, I would guess his low velocity is due to waiting for players to get open near him to pass to, whereas the other 4 players having higher velocity I would assume the started running with the ball during their possession. The differences in max velocity between the players could have many factors including how open they were, who was chasing them and where on the field they were.

Slide 7 (acceleration)

In this graph I have plotted the mean acceleration using a geom point plot, with error bars showing the standard deviation. I have then plotted the maximum acceleration of each player using the viridis colour package. The mean acceleration numbers were all negative. Given that every player was moving when they gained possession, as we saw in the velocity time plot, and the velocity they were travelling at towards their disposal was quite low, this number seems to make sense.

We can see that Jack has the highest acceleration overall, which from the velocity time plot looks to be from his possession after a ball-up.

Slide 8 (summary)

\* This data set is small, containing only 10 possessions across 5 players.

\* Provided information to answer my question.

+ Players move quite differently depending on what stoppage they gained possession from

+ Possessions can last up to around 20 seconds

+ Depending on players role, their mean velocity can stay quite high throughout a match

+ The maximum velocity of a player can differ between stoppage type

+ During a possession a player can end up negatively accelerating overall

Slide 9 (references)

Coutts, A., Quinn, J., Hocking, J., Castagna, C., & Rampinini, E. (2010). Match running performance in elite Australian Rules Football. Journal Of Science And Medicine In Sport, 13(5), 543-548. https://doi.org/10.1016/j.jsams.2009.09.004