Megan Mitchell

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ECO 602

Data Exploration and Deterministic Functions

#1

Chart, box and whisker chart

Description automatically generated

Figure 1- Histograms of elevation, slope, and aspect of bird sampling sites.

#2

The histogram titled “Elevation” shows elevation of different bird sampling sites. The shape of this plot relates to how the data points (sampling sites and elevation) are distributed. In this case, it closely resembles a “bell” shape “skewed” or shifted to the left because the tallest rectangles are centered at the left-middle of the plot and shorter rectangles tapers off on each side. A bell-shaped plot means that most of the data points are distributed evenly and will occur the most in the center of the plot although data is more skewed to the left rather than centered. From this, we can infer that most bird sampling sites lie at an elevation of 300-400 meters (middle of plot). Few sample sites were at elevations lower than 200 meters (left) or higher than 600 meters (right).

#3

The units of slope are in percent slope (%). Slope ranges from 0-110%.

#4

The histogram titled “Slope” shows the slope of different bird sampling sites. The shape of this plot is like the shape of the Elevation plot, except in this case data is more centered instead of skewed left. From this histogram, we can see how most sampling sites are not flat although there was a relatively even mixture of steep and flat sampling sites. We know this based on the length of the rectangles across different slopes, which corresponds to the number of observations. The most observations of sampling sites were between 40-50% slope, which can be inferred from the tallest rectangle in the right-center of the plot.

#5

Aspect is the direction that the landscape faces. For example, a north facing mountain would have a north aspect. The unit of aspect is in degrees, which range from 0-360 degrees.

#6

The histogram titled “Aspect” shows the number of bird sampling sites at different aspects. Aspect is measured in degrees from 0-360, and these values indicate a north, east, south, or west facing aspect. The shape of this plot differs from the other two plots because data points (rectangles) are distributed uniformly rather than centered near or at the middle. This means that bird nesting sites were observed on north, east, south, or west facing slopes. If bird nesting sites were only observed on north or south slopes, then tall rectangles would be clustered in one portion of the plot instead of spread out everywhere.

#7

A picture containing timeline

Description automatically generated

Figure 2- Scatterplots of elevation, slope, and aspect vs total basal area with fitted linear function in 3 panel design.

#8

In the elevation scatterplot, data points are clustered to the left of the plot. There seems to be more datapoints associated with elevations between 200-500 meters. In the slope scatterplot, datapoints are more even but seem slightly shifted towards the right and more datapoints are associated with slopes between 60-80 %. In both elevation and slope scatterplots, the line does not fit well because it does not pass through all the data points or show an association between the variables. In contrast, data points are uniformly distributed in the aspect plot. The linear model is a better fit because it approximates the associations well (bird nesting sites across all aspects) and the line passes through most data points.

*Codes used to generate all figures*

*install.packages("here")*

*setwd("C:/Users/Megan Mitchell/OneDrive - University of Massachusetts/Environmental\_Data/data")*

*dat\_habitat <- read.csv('hab.sta.csv')*

*dat\_habitat*

*par(mfrow = c(3, 1))*

*hist(dat\_habitat$elev, main="Elevation", xlab="Elevation" , ylab="# Sampling Sites")*

*hist(dat\_habitat$slope, main= "Slope", xlab="Slope", ylab= "# Sampling Sites")*

*hist(dat\_habitat$aspect, main= "Aspect", xlab="Aspect", ylab="# Sampling Sites")*

*plot(x= dat\_habitat$elev, y=dat\_habitat$ba.tot, main= "Elevation vs Total Basal Area", xlab= "Elevation", ylab= "Total Basal Area")*

*points(x = data\_center\_x, y = data\_center\_y, col = "red")*

*curve(line\_point\_slope(x, x1 = 3.5, y1 = 1.25, slope = 0.08), add = TRUE)*

*plot(x= dat\_habitat$slope, y=dat\_habitat$ba.tot, main= "Slope vs Total Basal Area", xlab= "Slope", ylab= "Total Basal Area")*

*points(x = data\_center\_x, y = data\_center\_y, col = "red")*

*curve(line\_point\_slope(x, x1 = 3.5, y1 = 1.25, slope = 0.4), add = TRUE)*

*plot(x= dat\_habitat$aspect, y=dat\_habitat$ba.tot, main= "Aspect vs Total Basal Area", xlab= "Aspect", ylab= "Total Basal Area")*

*points(x = data\_center\_x, y = data\_center\_y, col = "red")*

*curve(line\_point\_slope(x, x1 = 3.5, y1 = 1.25, slope = 0.1), add = TRUE)*

Diagram

Description automatically generated with medium confidence

Figure 3- Elevation, slope, and aspect histograms and scatterplots in a panel of 6.