

## **Hawks: A Data Analysis on 3 Different Hawk Species**

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## **Hawks: A Data Analysis on 3 Different Hawk Species**

### **ABSTRACT**

Hawks are a part of a large group of predatory birds with varying species that include sharp talons and beaks (see Appendix A). At the Cornell College in Mount Vernon, Iowa from the years 1992 through 2003, a study on various measurements on three different hawk species (Cooper's, Red-tailed, and Sharp-shinned) was performed. A data analysis will be performed on the three different species of hawks based off of specific measurements of the winged creature.

### **BACKGROUND**

A Cooper's hawk is a medium-sized hawk native to North America tends to live in wooded habitats and is easily confused with its smaller family member, the Sharp-shinned (Wikipedia). The Red-tailed (or 'Chickenhawk') hawk is another bird of prey that is located across North America within forest or desert biomes (Wikipedia). Lastly, the Sharp-shinned hawk is a small hawk located in North America and is separated into four smaller sub-species (Wikipedia).

### **BUSINESS UNDERSTANDING**

Hawks are not susceptible to extinction, but they have been prone to be vulnerable to hunting for game as well as have gathered predators against them such as larger birds of prey, red foxes, or raccoons (see Appendix B). A data analysis will be performed upon three different hawk species (Cooper's, Red-tailed, and Sharp-shinned) to determine which measurements contribute to the survival of the winged animal.

### **DATA UNDERSTANDING**

#### **Table 1**

*hawks.csv dataset*

A data frame with 908 observations on 19 variables.

## X Month Day Year CaptureTime ReleaseTime BandNumber Species Age Sex Wing

```
## 1 1 9 19 1992 13:30 877-76317 RT I 385
## 2 2 9 22 1992 10:30 877-76318 RT I 376
## 3 3 9 23 1992 12:45 877-76319 RT I 381
## 4 4 9 23 1992 10:50 745-49508 CH I F 265
## 5 5 9 27 1992 11:15 1253-98801 SS I F 205
## 6 6 9 28 1992 11:25 1207-55910 RT I 412
```

## Weight Culmen Hallux Tail StandardTail Tarsus WingPitFat KeelFat Crop

```
## 1 920 25.7 30.1 219 NA NA NA NA NA
## 2 930 NA NA 221 NA NA NA NA NA
## 3 990 26.7 31.3 235 NA NA NA NA NA
## 4 470 18.7 23.5 220 NA NA NA NA NA
## 5 170 12.5 14.3 157 NA NA NA NA NA
## 6 1090 28.5 32.2 230 NA NA NA NA NA
```

**Month** 8=September to 12=December

**Day** Date in the month

**Year** Year: 1992-2003

**CaptureTime** Time of capture (HH:MM)

**ReleaseTime** Time of release (HH:MM)

**BandNumber** ID band code

**Species** CH=Cooper's, RT=Red-tailed, SS=Sharp-Shinned

**Age** A=Adult or I=Immature

**Sex** F=Female or M=Male

**Wing** Length (in mm) of primary wing feather from tip to wrist it attaches to

**Weight** Body weight (in gm)

**Culmen** Length (in mm) of the upper bill from the tip to where it bumps into the fleshy part of the bird

**Hallux** Length (in mm) of the killing talon

**Tail** Measurement (in mm) related to the length of the tail (invented at the MacBride Raptor Center)

**StandardTail** Standard measurement of tail length (in mm)

**Tarsus** Length of the basic foot bone (in mm)

**WingPitFat** Amount of fat in the wing pit

**KeelFat** Amount of fat on the breastbone (measured by feel)

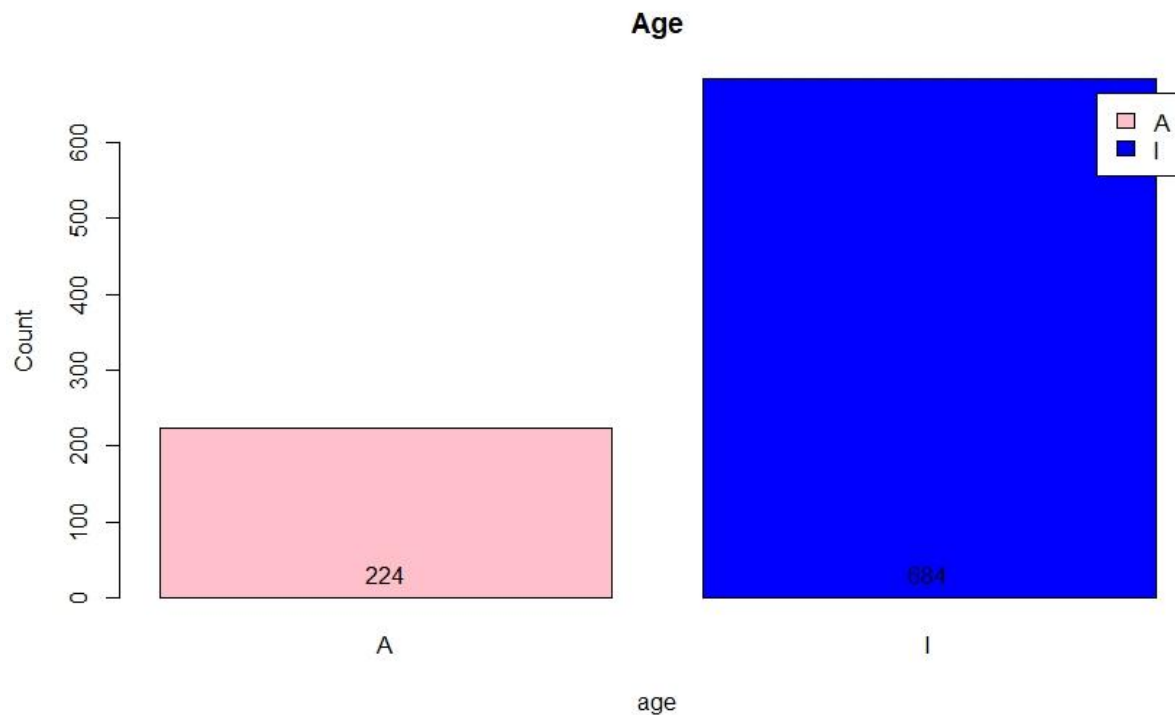
**Crop** Amount of material in the crop, coded from 1=full to 0=empty

## **DATA PREPARATION**

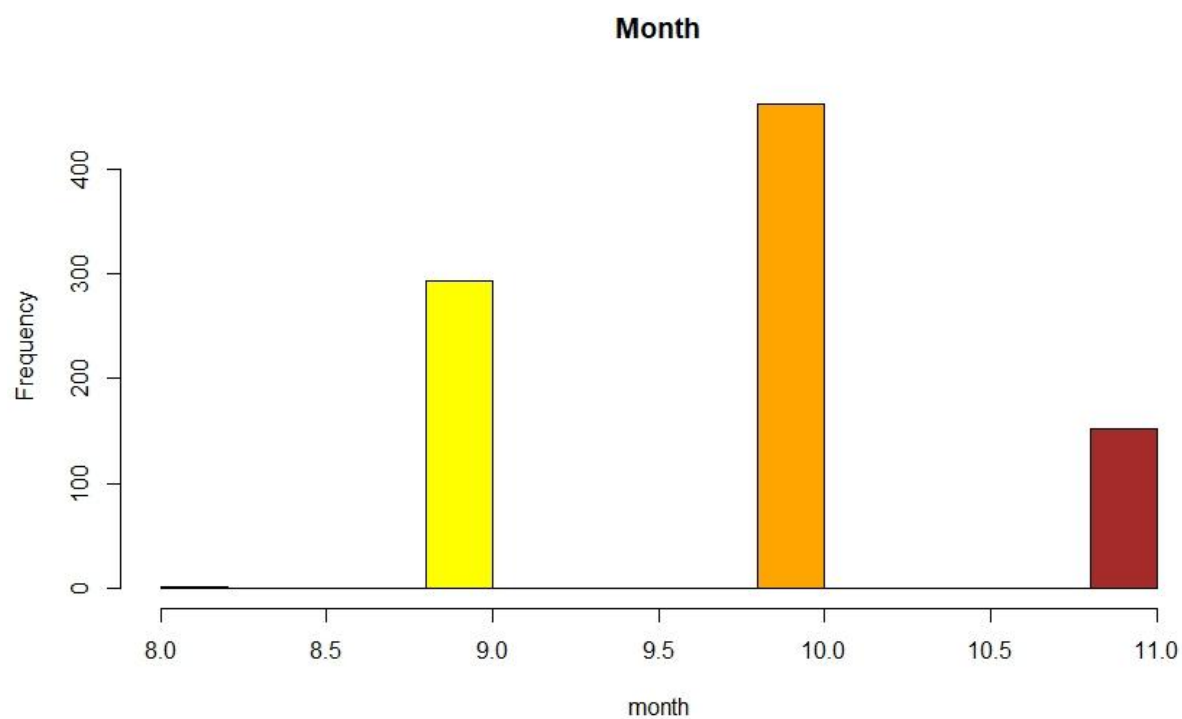
Due to the fact that this data is supplied from a R repository, there is no Nulls, but there is missing values as well as NaN's, thus the only data manipulation will be replacing those NaN's.

### Business Questions

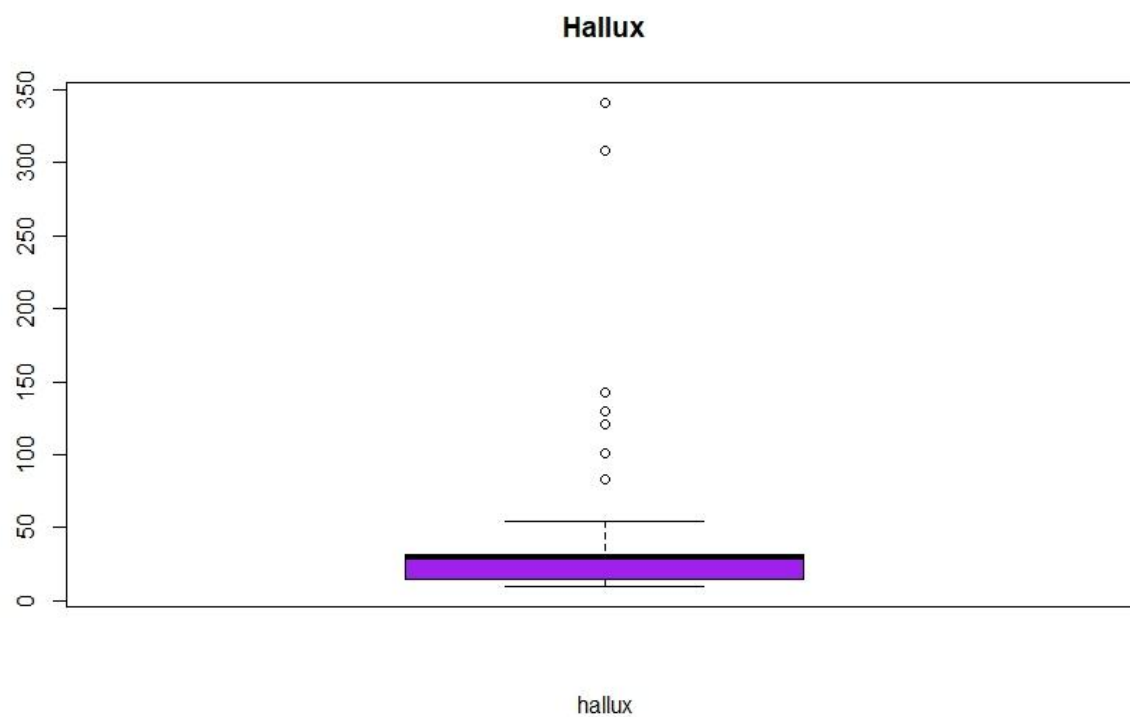
- 1) Which species of hawks grew to maturity (adulthood)?
- 2) Which species of hawks migrated south in the month of November?
- 3) Which species of hawks has a lengthier hallux (killing talon)?
- 4) Does the time of capture have anything to do with the maturity of species of hawks?



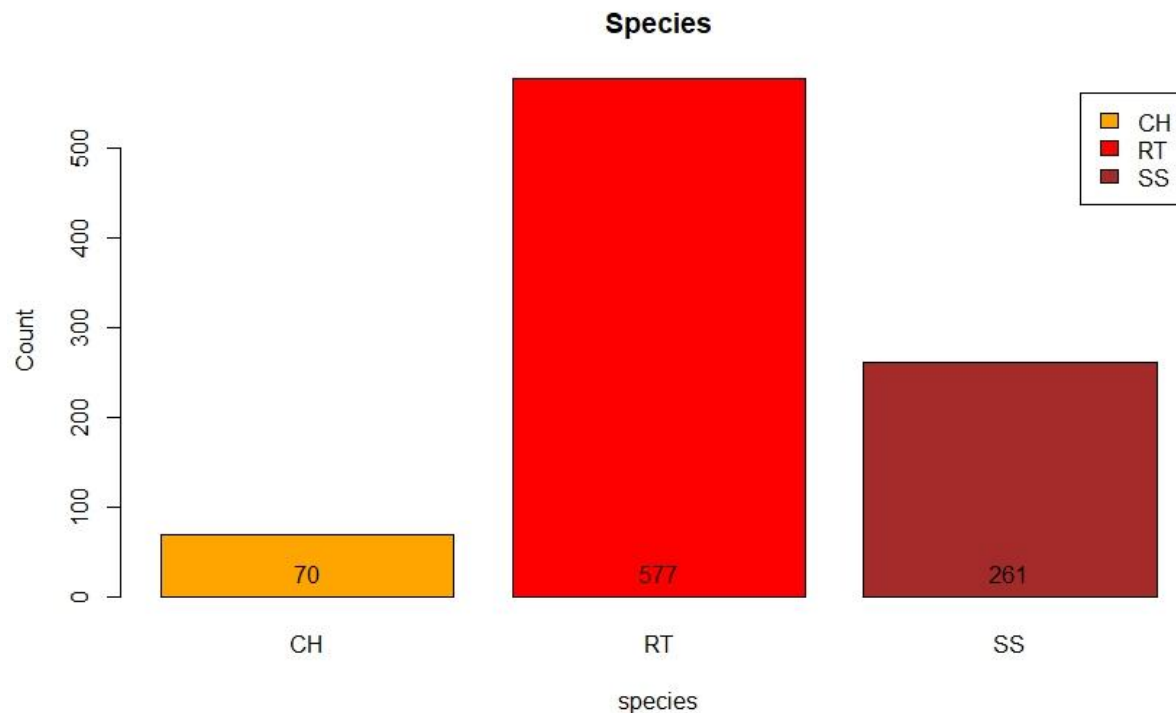
A bar chart was made for the age variable based off the hawks data set; there is more immature hawks rather than adult.



A bar chart was made for the month variable based off the hawks data set; there is more hawks present in the month of October compared to others.



A boxplot was made for the hallux variable based off the hawks data set; there is outliers which will still be included (i.e., not removed from the original dataset).



A bar chart was made for the species variable based off the hawks data set; there is more red-tailed hawks compared to others.

### Assumptions

- I.** A Red-tailed hawk is the most species recorded, hence, will be the species to grow to maturity the most.
- II.** Due to the Sharp-shinned hawk being identified from Cornell Lab of Ornithology for being the hawk to migrate the most in November, this hawk will be the most to take part in migration in the month of November (Sharp-shinned Hawk).
- III.** Due to the Red-tailed hawk being the largest out of the three hawk species recorded, it will have a lengthier hallux (or killing talon).
- IV.** If a hawk is immature, then it will tend to be captured more during afternoon times along with a Red-tailed hawk being the most prominent out of the three.



## **MODELING/METHODS**

To perform this data analysis of the varying specific measurements, clustering models will be built for age, month, & hallux versus the species of hawks while a regression model will be built on capture time, age, species of hawks versus the hallux.

## **DEPLOYMENT/RESULTS**

After building clustering models for age, month, & hallux versus the species of hawks as well as a regression model for capture time, age, species of hawks versus the hallux, a performance check on the models will be executed to deliberate whether these models correspond to the hypotheses.

## **SUMMARY & CONCLUSIONS**

Since the hawks dataset is structurally formatted in a way where there is some data preparation or wrangling that needs to be done, the more legwork will be building the models based off the business questions proposed to the business problem of which measurements contribute to the survival of the winged animal. Following the CRISP-DM process, after the models have been built, a performance check of whether the models are up to par for answering the business problem will be administered. Lastly, an understanding of what the data analysis of the hawks dataset will be executed.

## References

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## **Appendices**

### **Appendix A**

#### **Hawk**

The article glosses over what a hawk is and partially compares them to eagles and owls. It further describes the descriptions of a hawk as well as provides interesting facts about different hawk species. It continues with the habitat of a hawk, the distribution of them, and their diet. The next topics discussed were about hawks and their interaction with humans as well as domestication and should a hawk be a pet. The last subjects were about the keeping of a hawk, their behavior, and the reproduction of the animal.

## **Appendix B**

### **What Eats Hawks: [The Shocking Truth]**

The article discusses what eat hawks followed by a hawks location as related to its natural prey and predators. It continues about the hawk being considered top of the food chain for birds of prey with their eggs only being liable. It concludes with pertinent facts about the hawk.