Assignment 1: Limb Measurement Analysis

Noah Gandl Black

2025-01-07

GitHub Repository

#Data Generation and Volume Estimation

```
source("dataGenerato.R")
source("volumeEstimato.R")
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

#Load and sort Data

```
library(dplyr)
measurements <- read.csv("measurements.csv")

# Sort by species, observer, and volume
sorted_data <- measurements %>%
  arrange(Species, Observer, Volume)
head(sorted_data)
```

```
##    Species Limb_width Limb_length  Observer    Volume
## 1 Species1  0.8004011   10.019796 Observer1  5.041551
## 2 Species1  1.4532931   11.784972 Observer1 19.549014
## 3 Species1  1.9556573    7.223509 Observer1 21.698196
## 4 Species1  2.6883049   12.183713 Observer1 69.155478
## 5 Species1  0.7525823   11.846258 Observer2  5.269617
## 6 Species1  1.3612746    7.055682 Observer2 10.268816
```

#Average Volume by Species

```r
avg_volume <- measurements %>%
  group_by(Species) %>%
  summarize(Average_Volume = mean(Volume, na.rm = TRUE))
avg_volume
```

```
## # A tibble: 5 x 2
##   Species  Average_Volume
##   <chr>             <dbl>
## 1 Species1           30.1
## 2 Species2           34.7
## 3 Species3           38.0
## 4 Species4           34.1
## 5 Species5           31.6
```

#Observations by Species and Observer

```r
obs_count <- measurements %>%
  group_by(Species, Observer) %>%
  summarize(Observations = n())
```

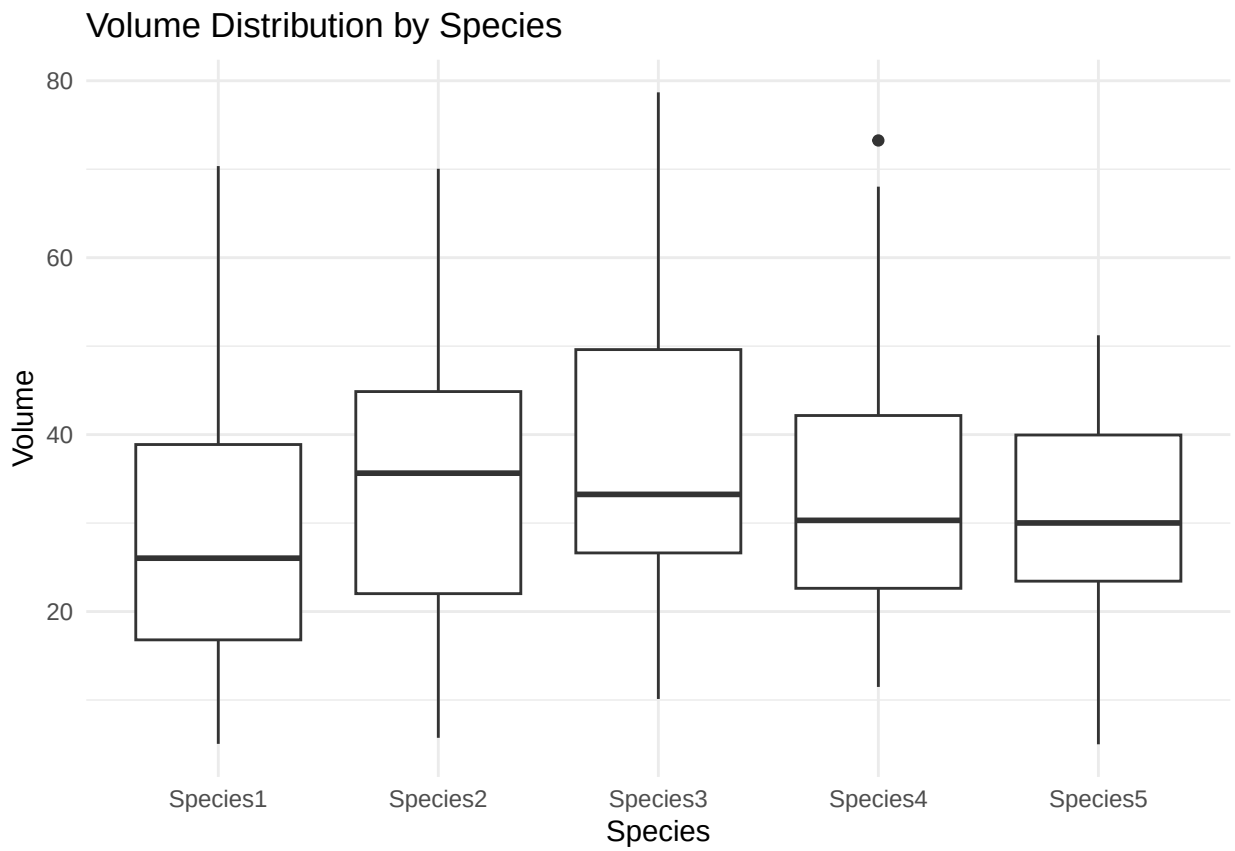
```
## `summarise()` has grouped output by 'Species'. You can override using the
## `.groups` argument.
```

```r
obs_count
```

```
## # A tibble: 15 x 3
## # Groups:   Species [5]
##    Species  Observer  Observations
##    <chr>    <chr>            <int>
##  1 Species1 Observer1            4
##  2 Species1 Observer2            9
##  3 Species1 Observer3            8
##  4 Species2 Observer1            6
##  5 Species2 Observer2            8
##  6 Species2 Observer3            6
##  7 Species3 Observer1            5
##  8 Species3 Observer2            9
##  9 Species3 Observer3            9
## 10 Species4 Observer1            5
## 11 Species4 Observer2            2
## 12 Species4 Observer3           10
## 13 Species5 Observer1            3
## 14 Species5 Observer2            7
## 15 Species5 Observer3            9
```

#Box Plot of Volume by Species

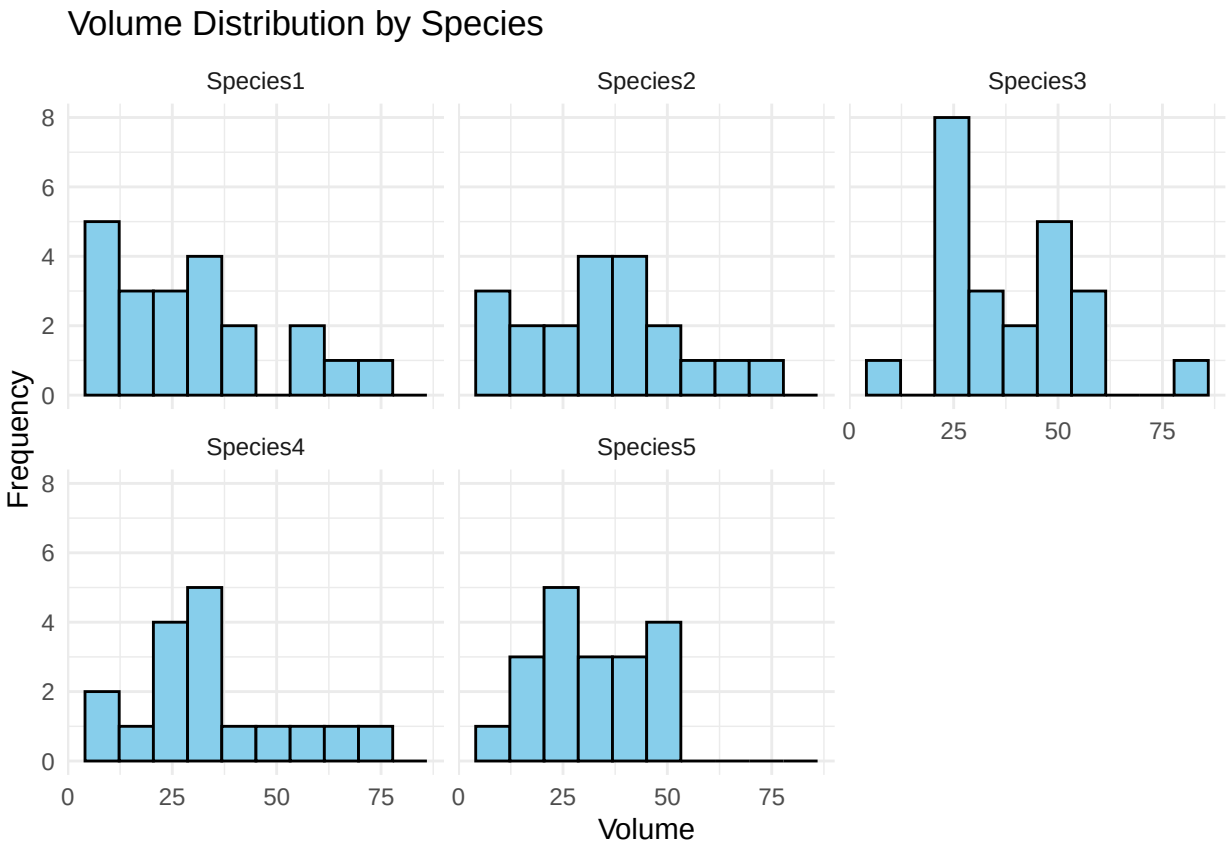
```r
library(ggplot2)
ggplot(measurements, aes(x = Species, y = Volume)) +
  geom_boxplot() +
  labs(title = "Volume Distribution by Species",
       x = "Species", y = "Volume") + theme_minimal()
```



#Histograms of Volume by Species

```
library(tidyr)

long_data <- measurements %>%
  pivot_longer(cols = Volume, names_to = "Metric", values_to = "Value")
ggplot(long_data, aes(x = Value)) +
  geom_histogram(bins = 10, fill = "skyblue", color = "black") +
  facet_wrap(~Species) +
  labs(title = "Volume Distribution by Species",
       x = "Volume", y = "Frequency") + theme_minimal()
```


Volume Distribution by Species
Species1
Species2
Species3
Species4
Species5
Frequency
Volume
0
2
4
6
8
0
25
50
75