Assignment 1

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2025-09-03

#Part 1 #1 Creating a species vector and randomly sample it 100 times

```
set.seed(1)
species<- c("cat", "dog", "whale", "dolphin", "shark")
sample(species, size = 100, replace = TRUE)
```

```
##   [1] "cat"     "dolphin" "cat"     "dog"     "shark"   "whale"   "dog"
##   [8] "whale"   "whale"   "cat"     "shark"   "shark"   "dog"     "dog"
##  [15] "cat"     "shark"   "shark"   "cat"     "cat"     "shark"   "shark"
##  [22] "dog"     "dog"     "cat"     "dolphin" "cat"     "dolphin" "whale"
##  [29] "dog"     "dog"     "dolphin" "dolphin" "dolphin" "dog"     "dolphin"
##  [36] "cat"     "cat"     "dolphin" "cat"     "dog"     "whale"   "dog"
##  [43] "dog"     "shark"   "dog"     "cat"     "whale"   "whale"   "dolphin"
##  [50] "whale"   "cat"     "dolphin" "shark"   "cat"     "cat"     "dolphin"
##  [57] "shark"   "shark"   "dolphin" "shark"   "dolphin" "dolphin" "cat"
##  [64] "shark"   "shark"   "cat"     "cat"     "whale"   "dog"     "dog"
##  [71] "whale"   "dog"     "dolphin" "whale"   "shark"   "dog"     "dog"
##  [78] "cat"     "whale"   "whale"   "dog"     "dog"     "shark"   "dog"
##  [85] "shark"   "dolphin" "shark"   "dolphin" "cat"     "whale"   "dog"
##  [92] "whale"   "whale"   "cat"     "shark"   "dolphin" "dolphin" "cat"
##  [99] "shark"   "shark"
```

#2 Creating a width vector and using a log distribution to avoid negatives or zeros

```
set.seed(1)
Limb_width<- c(1:100)
rlnorm(100, meanlog = 0, sdlog =1)
```

```
##   [1]  0.5344838  1.2015872  0.4336018  4.9297132  1.3902836  0.4402254
##   [7]  1.6281250  2.0924271  1.7785196  0.7368371  4.5348008  1.4767493
##  [13]  0.5372775  0.1091863  3.0800041  0.9560610  0.9839401  2.5698209
##  [19]  2.2732743  1.8110401  2.5067256  2.1861375  1.0774154  0.1367841
##  [25]  1.8586041  0.9454174  0.8557342  0.2297526  0.6199292  1.5188319
##  [31]  3.8910520  0.9023185  1.4735458  0.9476168  0.2523194  0.6603439
##  [37]  0.6741586  0.9424114  3.0042422  2.1450776  0.8482977  0.7761871
##  [43]  2.0076470  1.7448406  0.5022006  0.4928772  1.4399119  2.1566000
##  [49]  0.8937348  2.4135718  1.4890017  0.5422509  1.4065216  0.3232391
##  [55]  4.1913535  7.2456399  0.6926562  0.3519963  1.7677713  0.8736682
##  [61] 11.0410237  0.9615199  1.9931960  1.0283979  0.4755548  1.2077901
##  [67]  0.1644813  4.3299451  1.1656202  8.7811877  1.6088337  0.4916705
##  [73]  1.8417687  0.3929403  0.2854657  1.3383617  0.6419198  1.0011060
##  [79]  1.0771744  0.5545929  0.5662788  0.8735599  3.2481545  0.2179332
##  [85]  1.8111214  1.3950781  2.8953322  0.7377252  1.4477618  1.3061695
##  [91]  0.5812816  3.3463420  3.1912179  2.0141830  4.8882455  1.7480247
##  [97]  0.2789864  0.5636818  0.2938715  0.6228805
```

#3 Created a length vector and used a normal distribution

```
set.seed(1)
Limb_length<- rnorm(100, mean = 50, sd = 10)
Limb_length
```

```
##   [1] 43.73546 51.83643 41.64371 65.95281 53.29508 41.79532 54.87429 57.38325
##   [9] 55.75781 46.94612 65.11781 53.89843 43.78759 27.85300 61.24931 49.55066
##  [17] 49.83810 59.43836 58.21221 55.93901 59.18977 57.82136 50.74565 30.10648
##  [25] 56.19826 49.43871 48.44204 35.29248 45.21850 54.17942 63.58680 48.97212
##  [33] 53.87672 49.46195 36.22940 45.85005 46.05710 49.40687 61.00025 57.63176
##  [41] 48.35476 47.46638 56.96963 55.56663 43.11244 42.92505 53.64582 57.68533
##  [49] 48.87654 58.81108 53.98106 43.87974 53.41120 38.70637 64.33024 69.80400
##  [57] 46.32779 39.55865 55.69720 48.64945 74.01618 49.60760 56.89739 50.28002
##  [65] 42.56727 51.88792 31.95041 64.65555 51.53253 71.72612 54.75510 42.90054
##  [73] 56.10726 40.65902 37.46367 52.91446 45.56708 50.01105 50.74341 44.10479
##  [81] 44.31331 48.64821 61.78087 34.76433 55.93946 53.32950 60.63100 46.95816
##  [89] 53.70019 52.67099 44.57480 62.07868 61.60403 57.00214 65.86833 55.58486
##  [97] 37.23408 44.26735 37.75387 45.26599
```

#4 Created a names vector with 100 sample

```
set.seed(1)
Observer<- c("Maia", "Peter", "Jade")
Observers<- sample(Observer, size = 100, replace = TRUE)
Observers
```

```
##   [1] "Maia"  "Jade"  "Maia"  "Peter" "Maia"  "Jade"  "Jade"  "Peter" "Peter"
##  [10] "Jade"  "Jade"  "Maia"  "Maia"  "Maia"  "Peter" "Peter" "Peter" "Peter"
##  [19] "Jade"  "Maia"  "Jade"  "Maia"  "Maia"  "Maia"  "Maia"  "Peter" "Maia"
##  [28] "Maia"  "Peter" "Peter" "Peter" "Maia"  "Jade"  "Maia"  "Jade"  "Peter"
##  [37] "Peter" "Peter" "Peter" "Jade"  "Peter" "Maia"  "Jade"  "Peter" "Maia"
##  [46] "Maia"  "Jade"  "Peter" "Peter" "Jade"  "Jade"  "Peter" "Peter" "Peter"
##  [55] "Peter" "Maia"  "Peter" "Peter" "Peter" "Peter" "Maia"  "Jade"  "Jade"
##  [64] "Peter" "Jade"  "Jade"  "Peter" "Jade"  "Jade"  "Maia"  "Maia"  "Maia"
##  [73] "Maia"  "Jade"  "Peter" "Jade"  "Maia"  "Maia"  "Peter" "Maia"  "Maia"
##  [82] "Maia"  "Maia"  "Jade"  "Peter" "Maia"  "Maia"  "Jade"  "Jade"  "Jade"
##  [91] "Peter" "Peter" "Peter" "Jade"  "Peter" "Peter" "Jade"  "Jade"  "Jade"
## [100] "Maia"
```

#5 Created a data frame with all the vectors and turned it into csv file

```
measurements<-data.frame(species, Limb_width, Limb_length, Observers)
write.csv(measurements,file= "measurements", row.names = F)
head(measurements)
```

```
##   species Limb_width Limb_length Observers
## 1     cat          1    43.73546      Maia
## 2     dog          2    51.83643      Jade
## 3   whale          3    41.64371      Maia
## 4 dolphin          4    65.95281     Peter
## 5   shark          5    53.29508      Maia
## 6     cat          6    41.79532      Jade
```

#Part 2

```
#upload library
library(dplyr)
```

```
##
## 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
```

```
#upload data from r script 1
Data1<- read.csv("measurements.csv")
Data1
```

```
##     species Limb_width Limb_length Observers
## 1       cat          1    43.73546      Maia
## 2       dog          2    51.83643      Jade
## 3     whale          3    41.64371      Maia
## 4   dolphin          4    65.95281     Peter
## 5     shark          5    53.29508      Maia
## 6       cat          6    41.79532      Jade
## 7       dog          7    54.87429      Jade
## 8     whale          8    57.38325     Peter
## 9   dolphin          9    55.75781     Peter
## 10    shark         10    46.94612      Jade
## 11      cat         11    65.11781      Jade
## 12      dog         12    53.89843      Maia
## 13    whale         13    43.78759      Maia
## 14  dolphin         14    27.85300      Maia
## 15    shark         15    61.24931     Peter
## 16      cat         16    49.55066     Peter
## 17      dog         17    49.83810     Peter
## 18    whale         18    59.43836     Peter
## 19  dolphin         19    58.21221      Jade
## 20    shark         20    55.93901      Maia
## 21      cat         21    59.18977      Jade
## 22      dog         22    57.82136      Maia
## 23    whale         23    50.74565      Maia
## 24  dolphin         24    30.10648      Maia
## 25    shark         25    56.19826      Maia
## 26      cat         26    49.43871     Peter
## 27      dog         27    48.44204      Maia
## 28    whale         28    35.29248      Maia
## 29  dolphin         29    45.21850     Peter
## 30    shark         30    54.17942     Peter
## 31      cat         31    63.58680     Peter
## 32      dog         32    48.97212      Maia
## 33    whale         33    53.87672      Jade
## 34  dolphin         34    49.46195      Maia
## 35    shark         35    36.22940      Jade
## 36      cat         36    45.85005     Peter
## 37      dog         37    46.05710     Peter
## 38    whale         38    49.40687     Peter
## 39  dolphin         39    61.00025     Peter
## 40    shark         40    57.63176      Jade
## 41      cat         41    48.35476     Peter
## 42      dog         42    47.46638      Maia
## 43    whale         43    56.96963      Jade
## 44  dolphin         44    55.56663     Peter
## 45    shark         45    43.11244      Maia
## 46      cat         46    42.92505      Maia
## 47      dog         47    53.64582      Jade
## 48    whale         48    57.68533     Peter
## 49  dolphin         49    48.87654     Peter
## 50    shark         50    58.81108      Jade
## 51      cat         51    53.98106      Jade
```

```
## 52      dog         52    43.87974     Peter
## 53    whale         53    53.41120     Peter
## 54  dolphin         54    38.70637     Peter
## 55    shark         55    64.33024     Peter
## 56      cat         56    69.80400      Maia
## 57      dog         57    46.32779     Peter
## 58    whale         58    39.55865     Peter
## 59  dolphin         59    55.69720     Peter
## 60    shark         60    48.64945     Peter
## 61      cat         61    74.01618      Maia
## 62      dog         62    49.60760      Jade
## 63    whale         63    56.89739      Jade
## 64  dolphin         64    50.28002     Peter
## 65    shark         65    42.56727      Jade
## 66      cat         66    51.88792      Jade
## 67      dog         67    31.95041     Peter
## 68    whale         68    64.65555      Jade
## 69  dolphin         69    51.53253      Jade
## 70    shark         70    71.72612      Maia
## 71      cat         71    54.75510      Maia
## 72      dog         72    42.90054      Maia
## 73    whale         73    56.10726      Maia
## 74  dolphin         74    40.65902      Jade
## 75    shark         75    37.46367     Peter
## 76      cat         76    52.91446      Jade
## 77      dog         77    45.56708      Maia
## 78    whale         78    50.01105      Maia
## 79  dolphin         79    50.74341     Peter
## 80    shark         80    44.10479      Maia
## 81      cat         81    44.31331      Maia
## 82      dog         82    48.64821      Maia
## 83    whale         83    61.78087      Maia
## 84  dolphin         84    34.76433      Jade
## 85    shark         85    55.93946     Peter
## 86      cat         86    53.32950      Maia
## 87      dog         87    60.63100      Maia
## 88    whale         88    46.95816      Jade
## 89  dolphin         89    53.70019      Jade
## 90    shark         90    52.67099      Jade
## 91      cat         91    44.57480     Peter
## 92      dog         92    62.07868     Peter
## 93    whale         93    61.60403     Peter
## 94  dolphin         94    57.00214      Jade
## 95    shark         95    65.86833     Peter
## 96      cat         96    55.58486     Peter
## 97      dog         97    37.23408      Jade
## 98    whale         98    44.26735      Jade
## 99  dolphin         99    37.75387      Jade
## 100   shark        100    45.26599      Maia
```

```
#add volume column
Data1<- Data1 %>%
  mutate(Volume= Limb_width*Limb_length)
Data1
```

```
##     species Limb_width Limb_length Observers     Volume
## 1       cat          1    43.73546      Maia   43.73546
## 2       dog          2    51.83643      Jade  103.67287
## 3     whale          3    41.64371      Maia  124.93114
## 4   dolphin          4    65.95281     Peter  263.81123
## 5     shark          5    53.29508      Maia  266.47539
## 6       cat          6    41.79532      Jade  250.77190
## 7       dog          7    54.87429      Jade  384.12003
## 8     whale          8    57.38325     Peter  459.06598
## 9   dolphin          9    55.75781     Peter  501.82032
## 10    shark         10    46.94612      Jade  469.46116
## 11      cat         11    65.11781      Jade  716.29593
## 12      dog         12    53.89843      Maia  646.78119
## 13    whale         13    43.78759      Maia  569.23872
## 14  dolphin         14    27.85300      Maia  389.94202
## 15    shark         15    61.24931     Peter  918.73964
## 16      cat         16    49.55066     Peter  792.81062
## 17      dog         17    49.83810     Peter  847.24766
## 18    whale         18    59.43836     Peter 1069.89052
## 19  dolphin         19    58.21221      Jade 1106.03203
## 20    shark         20    55.93901      Maia 1118.78026
## 21      cat         21    59.18977      Jade 1242.98525
## 22      dog         22    57.82136      Maia 1272.06999
## 23    whale         23    50.74565      Maia 1167.14995
## 24  dolphin         24    30.10648      Maia  722.55559
## 25    shark         25    56.19826      Maia 1404.95644
## 26      cat         26    49.43871     Peter 1285.40653
## 27      dog         27    48.44204      Maia 1307.93521
## 28    whale         28    35.29248      Maia  988.18933
## 29  dolphin         29    45.21850     Peter 1311.33648
## 30    shark         30    54.17942     Peter 1625.38247
## 31      cat         31    63.58680     Peter 1971.19066
## 32      dog         32    48.97212      Maia 1567.10793
## 33    whale         33    53.87672      Jade 1777.93163
## 34  dolphin         34    49.46195      Maia 1681.70629
## 35    shark         35    36.22940      Jade 1268.02916
## 36      cat         36    45.85005     Peter 1650.60196
## 37      dog         37    46.05710     Peter 1704.11272
## 38    whale         38    49.40687     Peter 1877.46091
## 39  dolphin         39    61.00025     Peter 2379.00990
## 40    shark         40    57.63176      Jade 2305.27030
## 41      cat         41    48.35476     Peter 1982.54533
## 42      dog         42    47.46638      Maia 1993.58809
## 43    whale         43    56.96963      Jade 2449.69425
## 44  dolphin         44    55.56663     Peter 2444.93181
## 45    shark         45    43.11244      Maia 1940.05994
## 46      cat         46    42.92505      Maia 1974.55223
## 47      dog         47    53.64582      Jade 2521.35352
## 48    whale         48    57.68533     Peter 2768.89580
## 49  dolphin         49    48.87654     Peter 2394.95036
## 50    shark         50    58.81108      Jade 2940.55386
## 51      cat         51    53.98106      Jade 2753.03400
```

```
## 52      dog         52    43.87974     Peter 2281.74628
## 53    whale         53    53.41120     Peter 2830.79344
## 54  dolphin         54    38.70637     Peter 2090.14393
## 55    shark         55    64.33024     Peter 3538.16304
## 56      cat         56    69.80400      Maia 3909.02394
## 57      dog         57    46.32779     Peter 2640.68376
## 58    whale         58    39.55865     Peter 2294.40192
## 59  dolphin         59    55.69720     Peter 3286.13458
## 60    shark         60    48.64945     Peter 2918.96724
## 61      cat         61    74.01618      Maia 4514.98683
## 62      dog         62    49.60760      Jade 3075.67120
## 63    whale         63    56.89739      Jade 3584.53580
## 64  dolphin         64    50.28002     Peter 3217.92138
## 65    shark         65    42.56727      Jade 2766.87241
## 66      cat         66    51.88792      Jade 3424.60292
## 67      dog         67    31.95041     Peter 2140.67772
## 68    whale         68    64.65555      Jade 4396.57731
## 69  dolphin         69    51.53253      Jade 3555.74480
## 70    shark         70    71.72612      Maia 5020.82817
## 71      cat         71    54.75510      Maia 3887.61177
## 72      dog         72    42.90054      Maia 3088.83857
## 73    whale         73    56.10726      Maia 4095.83024
## 74  dolphin         74    40.65902      Jade 3008.76775
## 75    shark         75    37.46367     Peter 2809.77495
## 76      cat         76    52.91446      Jade 4021.49914
## 77      dog         77    45.56708      Maia 3508.66526
## 78    whale         78    50.01105      Maia 3900.86217
## 79  dolphin         79    50.74341     Peter 4008.72965
## 80    shark         80    44.10479      Maia 3528.38324
## 81      cat         81    44.31331      Maia 3589.37833
## 82      dog         82    48.64821      Maia 3989.15354
## 83    whale         83    61.78087      Maia 5127.81221
## 84  dolphin         84    34.76433      Jade 2920.20389
## 85    shark         85    55.93946     Peter 4754.85426
## 86      cat         86    53.32950      Maia 4586.33732
## 87      dog         87    60.63100      Maia 5274.89686
## 88    whale         88    46.95816      Jade 4132.31815
## 89  dolphin         89    53.70019      Jade 4779.31674
## 90    shark         90    52.67099      Jade 4740.38891
## 91      cat         91    44.57480     Peter 4056.30677
## 92      dog         92    62.07868     Peter 5711.23838
## 93    whale         93    61.60403     Peter 5729.17443
## 94  dolphin         94    57.00214      Jade 5358.20083
## 95    shark         95    65.86833     Peter 6257.49178
## 96      cat         96    55.58486     Peter 5336.14697
## 97      dog         97    37.23408      Jade 3611.70556
## 98    whale         98    44.26735      Jade 4338.19989
## 99  dolphin         99    37.75387      Jade 3737.63351
## 100   shark        100    45.26599      Maia 4526.59936
```

```
#overwrite new data
write.csv(Data1, "meansurements.csv", row.names = F)
```

#sort data by species, observer and volume

```
Data1<-Data1 %>%
  arrange(species, Observers, Volume)
head(Data1)
```

```
##   species Limb_width Limb_length Observers    Volume
## 1     cat          6    41.79532      Jade  250.7719
## 2     cat         11    65.11781      Jade  716.2959
## 3     cat         21    59.18977      Jade 1242.9852
## 4     cat         51    53.98106      Jade 2753.0340
## 5     cat         66    51.88792      Jade 3424.6029
## 6     cat         76    52.91446      Jade 4021.4991
```

#average volume for each species

```
average<-Data1 %>%
  group_by(species)
average
```

```
## # A tibble: 100 × 5
## # Groups:   species [5]
##    species Limb_width Limb_length Observers Volume
##    <chr>        <int>       <dbl> <chr>      <dbl>
##  1 cat              6        41.8 Jade       251.
##  2 cat             11        65.1 Jade       716.
##  3 cat             21        59.2 Jade      1243.
##  4 cat             51        54.0 Jade      2753.
##  5 cat             66        51.9 Jade      3425.
##  6 cat             76        52.9 Jade      4021.
##  7 cat              1        43.7 Maia        43.7
##  8 cat             46        42.9 Maia      1975.
##  9 cat             81        44.3 Maia      3589.
## 10 cat             71        54.8 Maia      3888.
## # ℹ 90 more rows
```

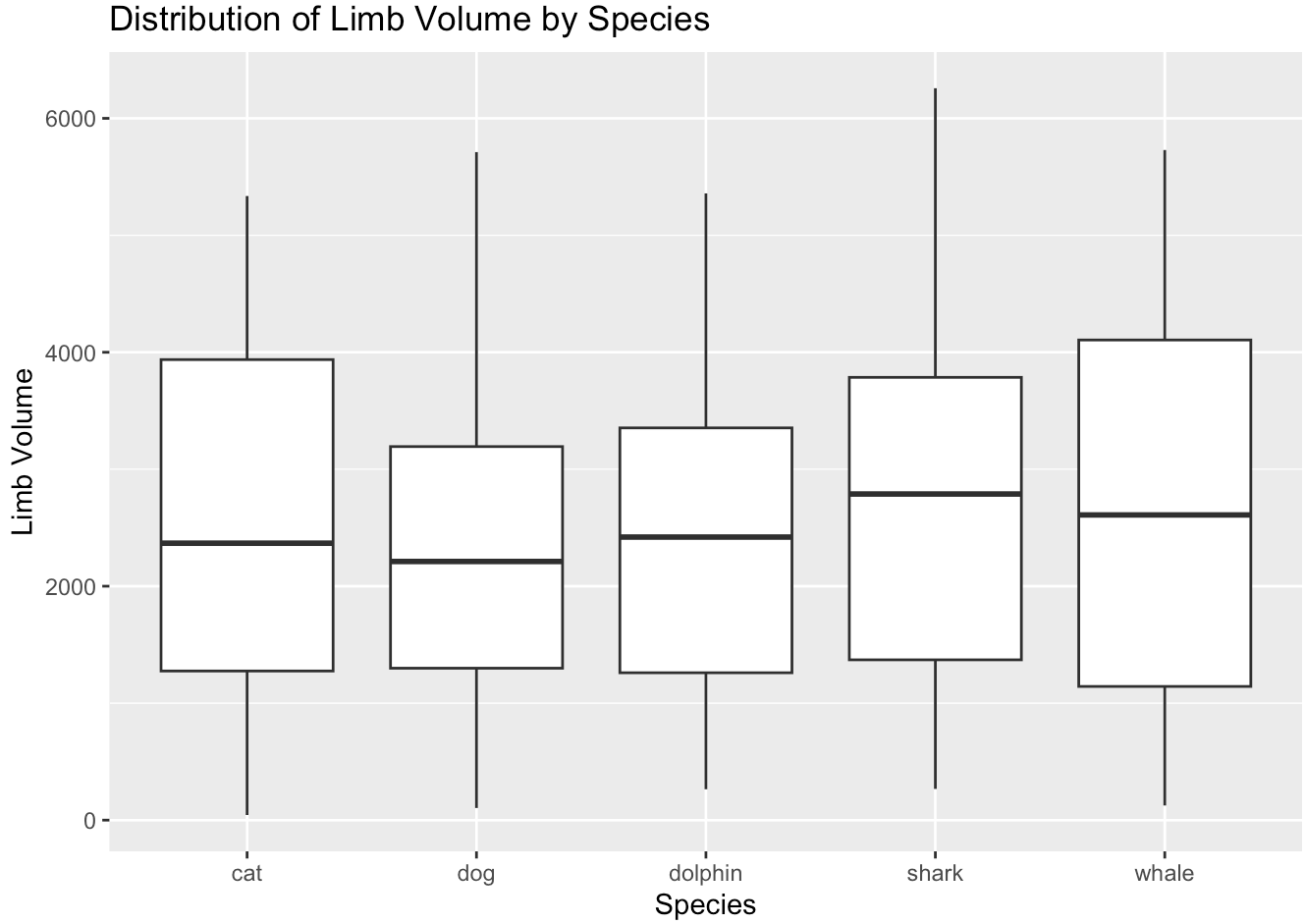
#table for number of observations

```
nobservations<- Data1 %>%
  group_by(species, Observers)
nobservations
```

```
## # A tibble: 100 × 5
## # Groups:   species, Observers [15]
##    species Limb_width Limb_length Observers Volume
##    <chr>        <int>       <dbl> <chr>      <dbl>
##  1 cat              6        41.8 Jade       251.
##  2 cat             11        65.1 Jade       716.
##  3 cat             21        59.2 Jade      1243.
##  4 cat             51        54.0 Jade      2753.
##  5 cat             66        51.9 Jade      3425.
##  6 cat             76        52.9 Jade      4021.
##  7 cat              1        43.7 Maia        43.7
##  8 cat             46        42.9 Maia      1975.
##  9 cat             81        44.3 Maia      3589.
## 10 cat             71        54.8 Maia      3888.
## # ℹ 90 more rows
```

#boxplot

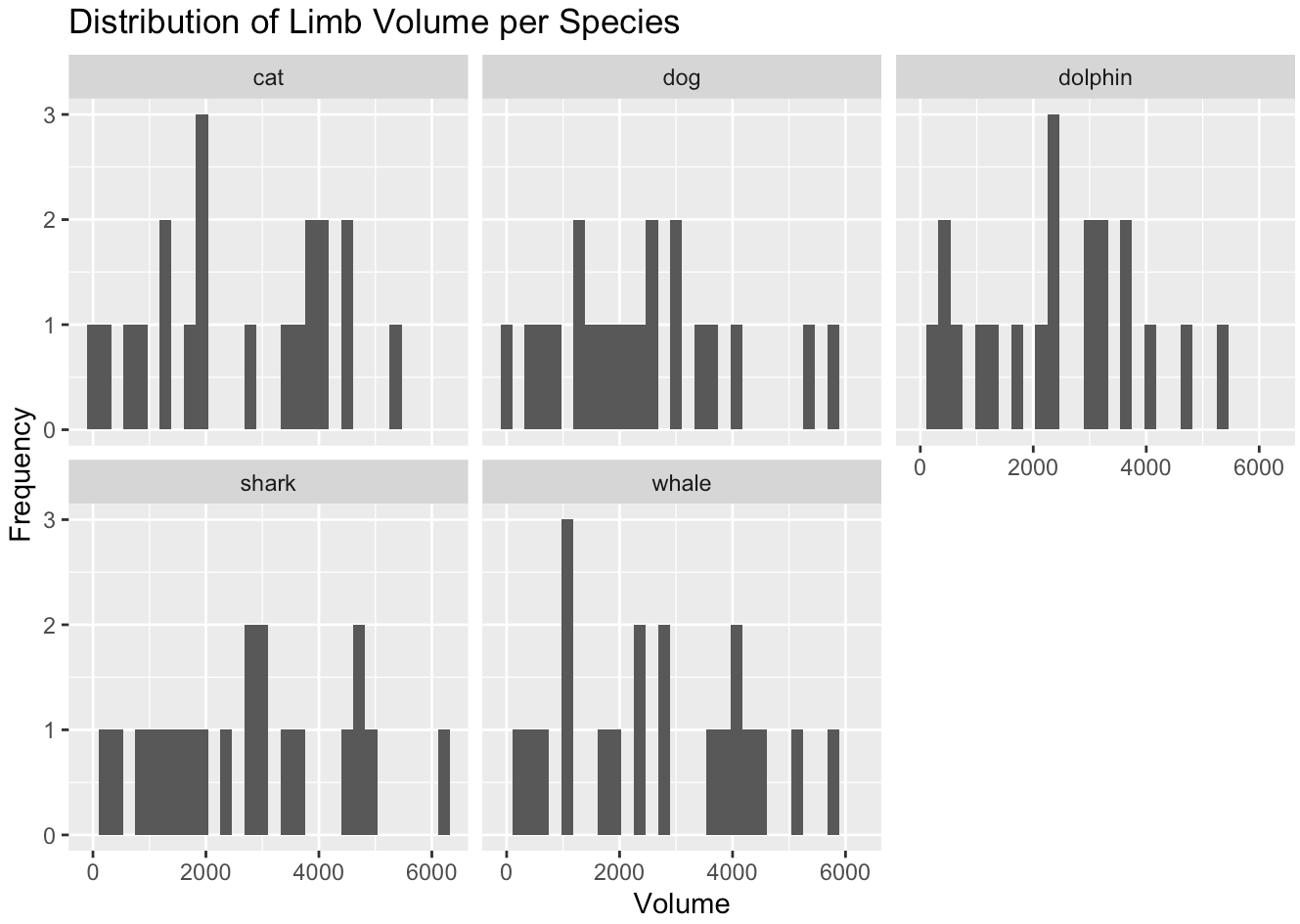
```
library(ggplot2)
ggplot(data = Data1, aes(x= species, y= Volume)) +geom_boxplot() +labs(title = "Distribu
tion of Limb Volume by Species", x= "Species", y= "Limb Volume")
```



#multipanel plot

```
ggplot(data = Data1, aes(x= Volume)) +geom_histogram() +labs(title = "Distribution of Li
mb Volume per Species", x= "Volume", y= "Frequency") +facet_wrap(~species)
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```




```
#facet_wrap for seperate histogram plots
```