Data Analysis Project
Presidency university

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Introduction:

My project is basically on brain size for different species.The size of the brain is a frequent topic of study within the fileds of anatomy and evolution.Brain size can be measured by weight.Brain size usually increases with body size,Large animals have larger brains than smaller animals.But the relationship is not linear.Some small mammal like mice may have a brain/body ratio similar to humans,while elephants have a comparatively lower brain .The bigger an animals brain the greater its intelligence.The largest mammalian brain belongs to the sperm whale,one of the biggest cetaceans in the sea.The sperm whales head comprises 25 to 35 percent of its entire body length.Humans make the list of largest brains by possessing a brain that can weigh up to 3.1 pounds.A Modern human brain can- 1.store many decades worth of information 2. Collect and process information.Animals with large brains are considered to be more intelligent and more successful than those with smaller brains.Researchers have now provided the first experimental eveidence that large brains provide an evolutionary advantage.A big powerful brain has obvious advantages but it also carries hidden cost and for many species a big brain now put them at greater risk of extinction.A study published in August 2016 found that about 60% of the biggest mammals on earth are classified as threatened by the International Union for conservation of Nature(IUCN).

Data analysis:

Exploratory Data analysis:

After reading the data in R we get there are 5 variable :

1."name of the species"- which is factor .
2."gestation period(days)" -which is integer
3."brain weight (gms)" -which is numeric
4."body weight(kg)"-which is numeric
5."litter size"-which is numeric.

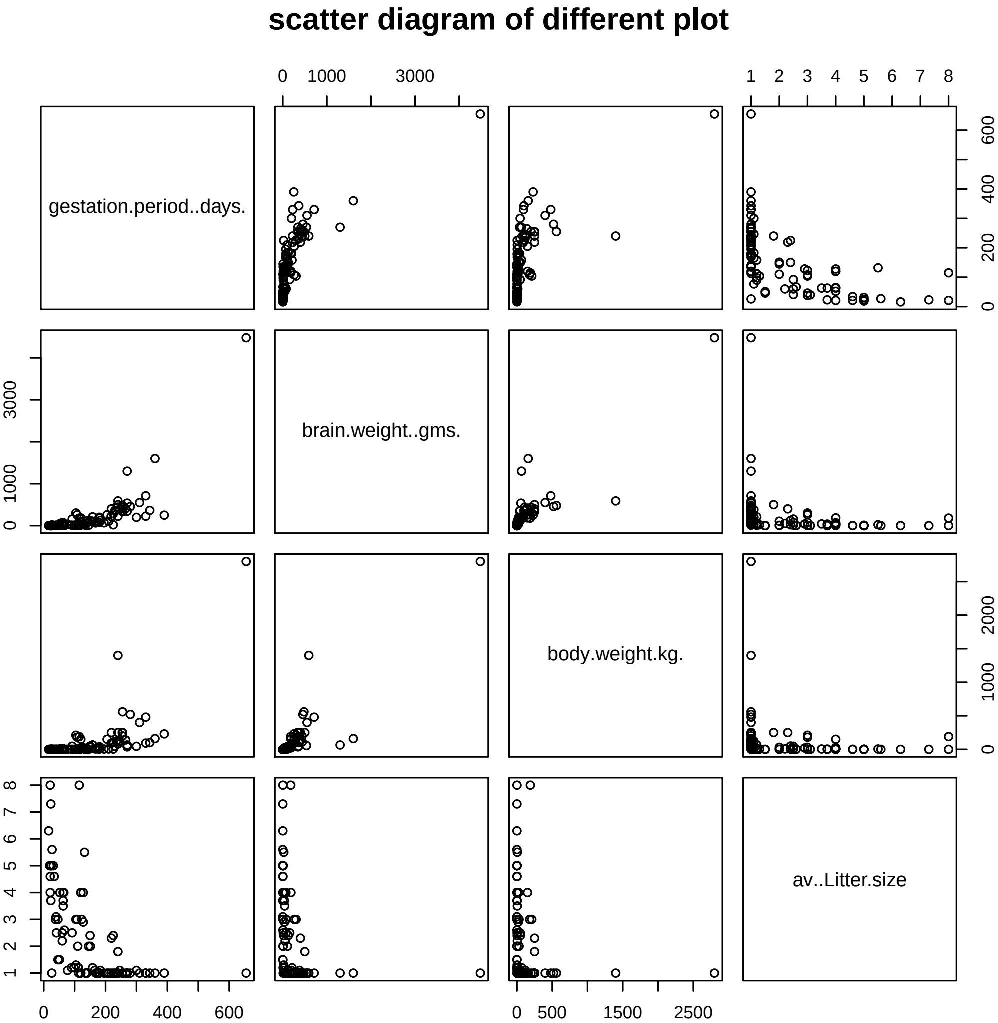
Then by using 'summary' measure we see the statistical measure of the variable(like mean,median,max etc).In case of body weight and brain weight the maximum value is very high.So they can be highly correlated.

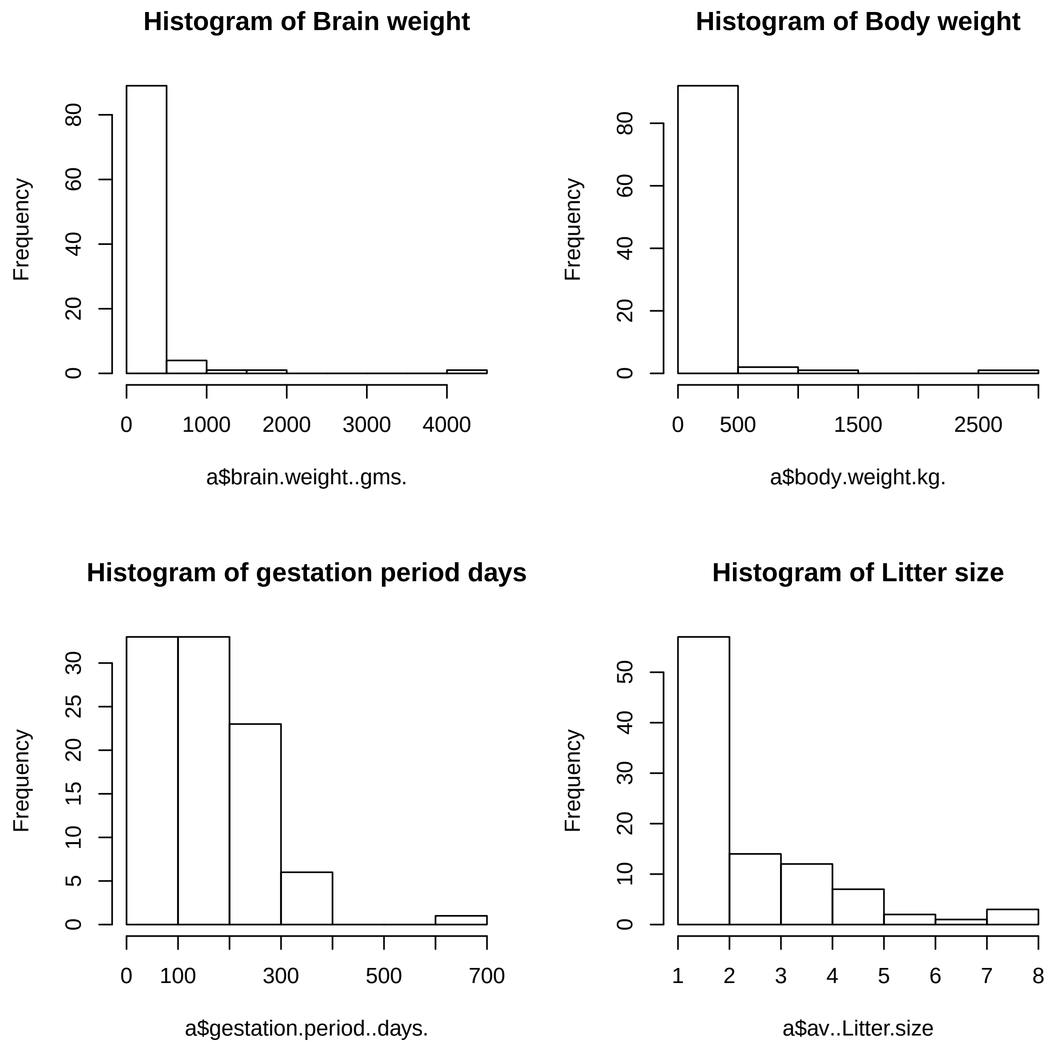
by using 'cor' function we get the highest correlation which is 0.8640269 between body weight and brain weight.From this we can conclude that brain weight and body weight are highly correlated .

We get that the african elephant has the highest correlation between body weight and brain weight .A man has also very high correlation between the two variable which is obvious.The house mouse and rat has lowest correlation as their body weight is very small .

We plot the multiple scatter plot and get some idea about the variables.We see that for the animal like elephant,dolphin gestation period days is very long so for the lower brain weight animal Gestation period days is short which is an advantage of smaller size brain.

Body weight and brain weight this two variable is very high positively skewed.


scatter diagram of different plot
gestation.period..days.
brain.weight..gms.
body.weight.kg.
av..Litter.size



Inferential data analysis:

Based on the exploratory data analysis in this part we do some inferential analysis.Using 'lm' command we see that regreesion model between the brain weight and body weight.Then by 'summary' we see that the R-squared of .7465 which means approximately 75% of the variation in the mammal size can be explained by our model,that is it can be explained by brain weight and body weight.Here we can see that our F-statistic and the p value for an overall test of significance of our model.Here our null hypothesis is all the model coefficient are 0.We can also see the Residual standard error this gives us the idea of how far observed mammal size are from the predicted or fitted mammal size.The intercept of -14.60963 is the estimated mean observed value when all independent values are 0.

We can see that the slope for brain weight is 0.56142 this is the effect of brain weight on mammal size adjusting or controlling for

Body weight.We can also see here the hypothesis test that slope equal 0 here.The high collinearity between the two variables means that we should not directly interpret the slopes,slope of brain.weight..gms. as the effect of brain weight on mammal size adjusting for body weight .Using 'confint' command we can also see that confidence interval of brain weight.From there we can conclude that 95% confident the true slope for brain weight between 0.4944249 to 0.6284085 .

Conclusion and Discussion:

Based on the above analysis we conclude that most of the variation in the Mammal size can be explained by our regression model between brain weight and body weight.Regarding The fact we see that A normal people have higher brain size.This is the reason that brain size of some mammals is larger than expected for their body size.This is the case of large primates,such as gorilla and of whales,dolphins and elephants.

R codes:

```
a=read.table("C:\\Users\\sekhar\\Desktop\\R project\\mammalsize1.csv",sep=",",header
View(a)
names(a)
class(a[,1])
class(a[,2])
class(a[,3])
class(a[,4])
class(a[,5])
dim(a)
summary(a)
par(mfrow=c(2,2))
hist(a$body.weight.kg.,main="Histogram of Body weight")
hist(a$brain.weight..gms.,main="Histogram of Brain weight")
hist(a$av..Litter.size,main="Histogram of Litter size")
hist(a$gestation.period..days.,main="Histogram of gestation period days")
c=a[,-1]
c
d=cor(c)
d[lower.tri(d,diag=TRUE)]=0
e=sort(abs(d),decreasing=T)
e[1]
e[2]
pairs(~ gestation.period..days.+ brain.weight..gms. + body.weight.kg.+ av..Litter.si
```

```
f=lm( body.weight.kg.~brain.weight..gms. ,data=b)
summary(f)
g=lm(brain.weight..gms.~body.weight.kg.,data=b)
summary(g)
cor(b[,3],b[,4],method="pearson")
confint(f)
x=lm(gestation.period..days.~.,data=c)
x
```

Bibliography:

To get some idea about the fact of regression model,correlation coefficient I see some books as reference like

1.Fundamentals of Statistics,Goon A.M.,Gupta M.K

2.Scheffe,H,Linear models

3.Stapleton,j.H:Linear Statistical Models.

I also take help from some articles and some biological books to get some knowledge about the brain size of different animals.

1.Chaddock L,kim js(2010) A neuroimaging investigation of the association between fitness Brain research 1385:172-183

2.Willerman L,Rutledge JN,Biger GD(1991) in vivo brain and intelligence.intelligence 15:223-228

Acknowledgement:

I want to thank A.K.G sir to give me this project and help me to learn some interesting result about the brain size of different animal.I learn many important things related to this topic .

Thank you sir.