Individual Project: Data analysis and statistics with R

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30/04/2021

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1.0. Introduction:

The data set that I am using is taken from *https://moodle.essex.ac.uk/course/view.php?id=15074&section=8*. Name of the csv file is **mammals_sleep.csv**.

```
This dataset has biological information  related to sleep time in a day on 83 mammals,
which can be used to find  relation between the characteristics of mammals and their sleeping times.
I am going to perform hypothesis testing and linear regression in this report.
```

2.0. Methods:

2.1. Cleaning data

```
Dataset has NA values which can mislead the result.
```

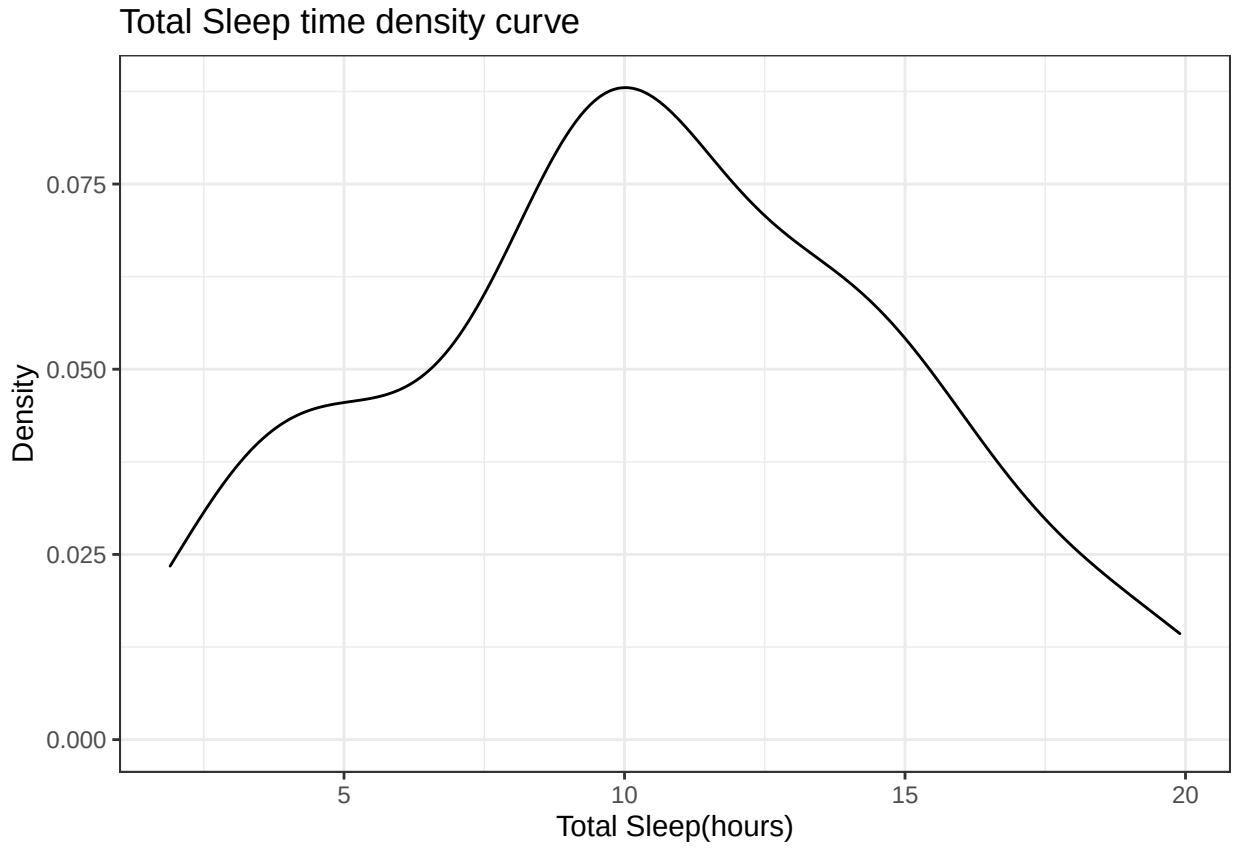
Following columns contain NA values:

vore,conservation,sleep_rem,sleep_cycle and brainwt

```
I have removed this NA values as per the involved processes.
```

2.2. Analysing Sleep time density distribution

Below graph shows Sleep time density distribution:



- *Giraffe* has minimum sleep hours of *1.9* whereas *Little brown bat* sleeps for maximum hours of *19.9*.
- *10.43* hours is found to be average sleep time of mammals.

2.1. Analysing summary statistics of Remaining sleep and Awake time:

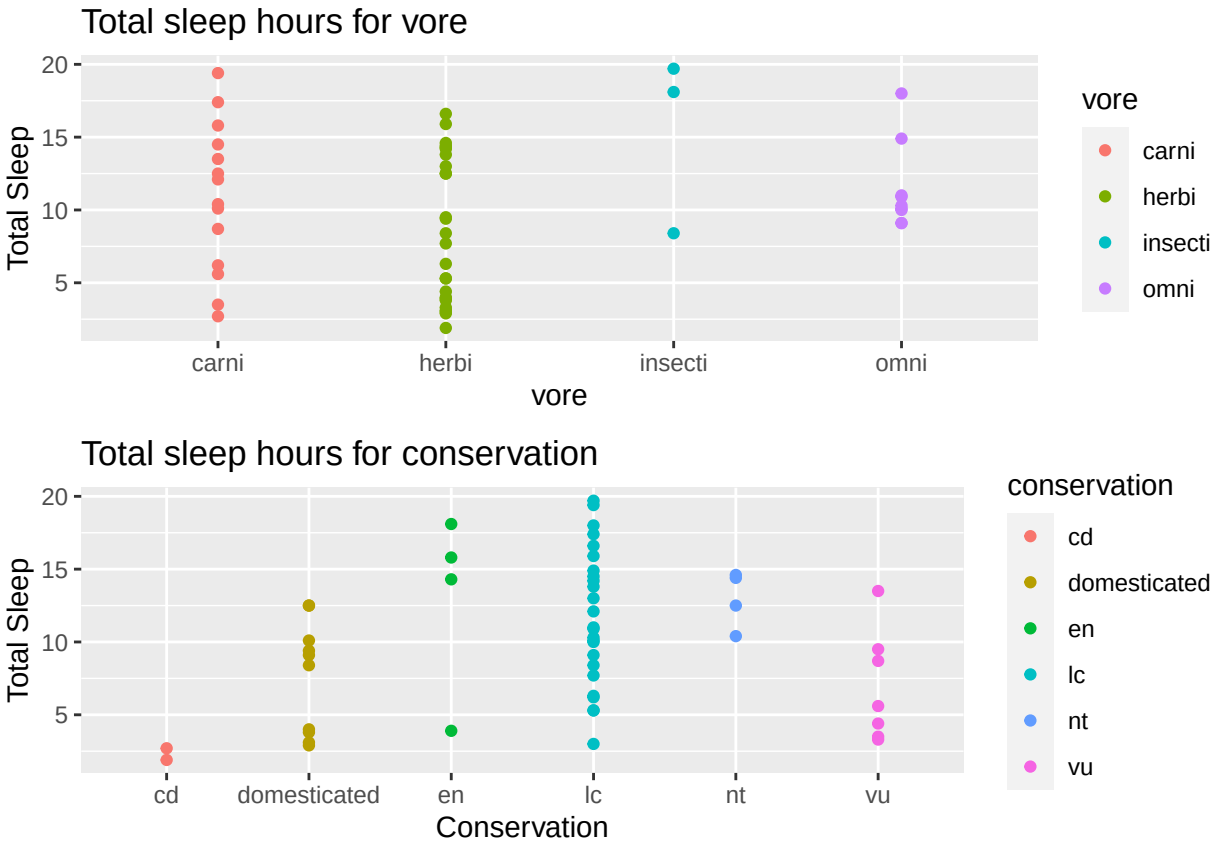
Following tables show summary statistics of remaining sleep time and awake time of mammals:

	Min.	X1st.Qu.	Median	Mean	X3rd.Qu.	Max.
Remaining Sleep hours	0.1	0.9	1.5	1.87541	2.4	6.6

	Min.	X1st.Qu.	Median	Mean	X3rd.Qu.	Max.
Awake hours	4.1	10.25	13.9	13.56747	16.15	22.1

2.2.Analysing Sleep time distribution over vores and conservation types

There are different types of vores and conservation types present in dataset. Given graph shows sleep time distribution for these types



It can be seen from graphs that Sleeping time of Carnivores and LC(Least concern) conservation type mammals are well distributed over range of 0-20 hours.

3.0. Results:

3.1. Hypothesis Testing

I have performed hypothesis testing wrt Sleep time and vores of mammals.

H0: Mean sleep time is equal for two vores(omni and carni)

```
    Welch Two Sample t-test

data:  omni and carni
t = 0.43411, df = 30.129, p-value = 0.6673
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -2.022401  3.114506
sample estimates:
mean of x mean of y
 10.92500  10.37895
```

As per the test result above, there is evidence against H0(p-value is relatively higher) so *Null hypothesis saying(Mean sleep time is equal for two vores(omni and carni)) can not be rejected.*

3.2. Linear Regression

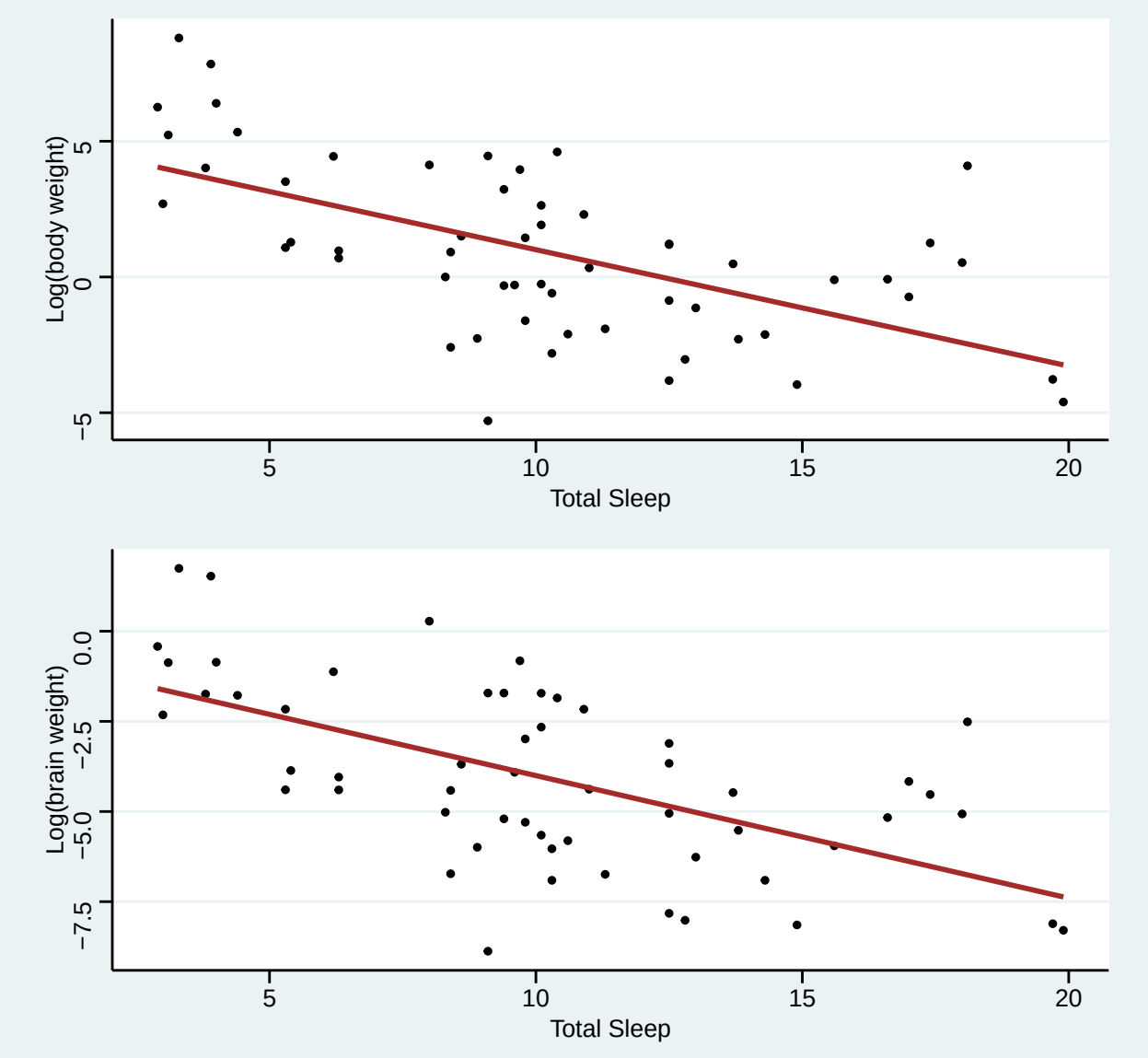
Linear Regression between Total Sleep and (brain weight and body weight): I have taken Log of Brain weight and Body weight values.

First of all Checking covariance between them:

1. `Covariance between Total Sleep and Body Weight is -0.5942205`
2. `Covariance between Total Sleep and Brain Weight is -0.5944555`

```
Both covariance values are relatively strong .So Linear regression can be
performed here.(Negative values are anti-correlation, sleep time is more than body or brain weight)
```

Now performing Linear Regression,



Calculating MAE for models

- MAE for Linear regression model between Total Sleep and Body Weight is *2.8*
- MAE for Linear regression model between Total Sleep and Brain Weight is *2.94*

  Both MAE values are relatively smallest which indicates that Linear regression model is good fit for this variables.

4.0. Conclusion:

- *Giraffe* has minimum sleep hours of *1.9*.
- *Little brown bat* sleeps for maximum hours of *19.9*.
- *10.43* is found to be average sleep time of mammals.
- *0.1* hours is minimum remaining sleep whereas *6.6* hours is maximum remaining sleep.
- *1.88* hours is the average remaining sleep time of mammals.
- Awake time for mammals ranges from *4.1* hours to *22.1* hours ,having mean time of *13.57* hours.
- Sleeping time of *Carnivores and LC(Least concern)* mammals are well distributed over range of 0-20 hours
- Mean sleep time is relatively similar for two vores(omni and carni) of mammals.
- *Linear regression* model is good fit for Total Sleep and (brain weight and body weight).

5.0. References:

- Dataset: https://moodle.essex.ac.uk/mod/resource/view.php?id=805364.
- CSV File : mammals_sleep.csv