BIG DATA ANALYTICS (CSCI -720)

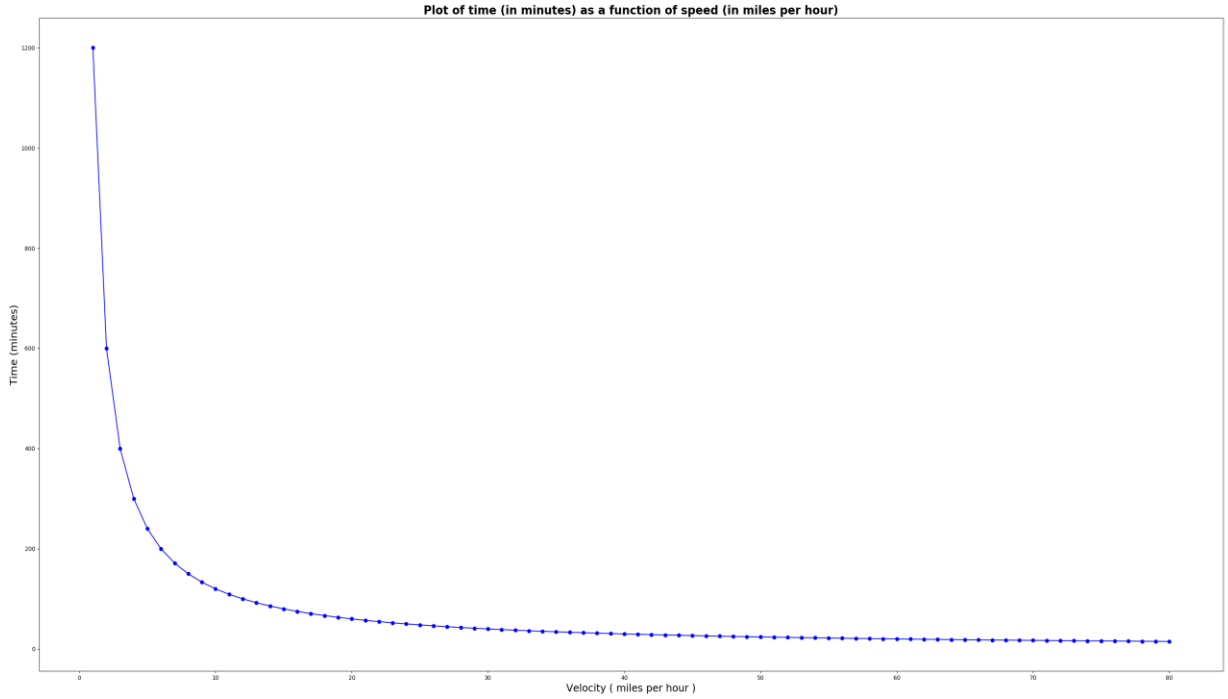
Homework-0 **Name: Rajkumar Lenin Pillai**

Question-1

Solution:

The code for generating the plot is present in q1.py file.

The plot of time that it takes to get to work (in minutes), as a function of speed (in miles per hour):



From the above plot it can be observed that as the velocity increases the time required to get to work decreases.

The formula used to compute the time is as follows:-

Distance = Velocity x Time

So, Time = Distance / Velocity

The Distance is given as 20 miles and the velocity ranges from 1 mph to 80 mph

For each value of velocity from 1 mph to 80 mph the time is computed as :-

Time =20 / Velocity_value

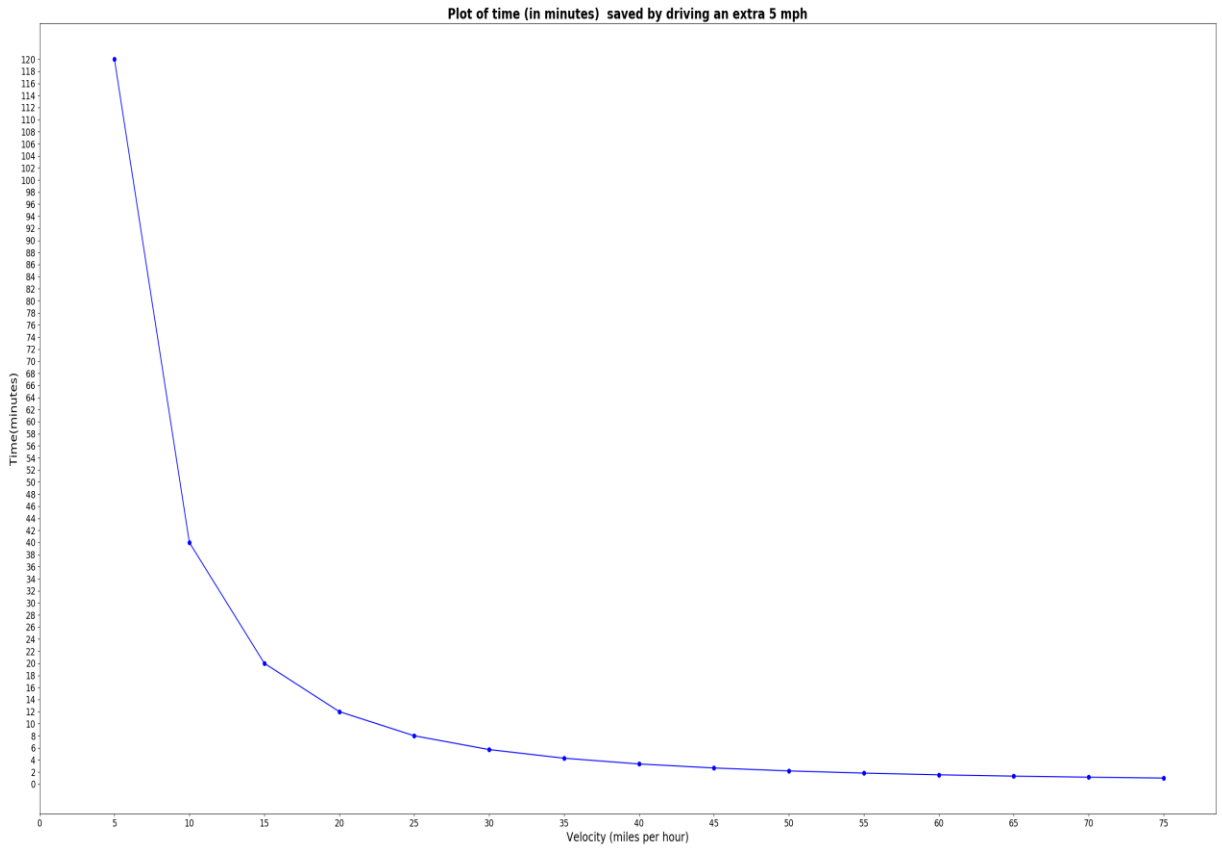
To calculate the time in minutes the above obtained value of time for each velocity is multiplied by 60.

Question-2

Solution:

The code for generating the plot is present in q2.py file.

Plot of time (in minutes) saved by driving an extra 5 mph:



From the above plot it can be observed that as the velocity increases the time that is saved approaches to zero. After 40 miles per hour increasing the velocity to travel 20 miles distance is not required as the time saved is almost negligible and also increases the risk of driving at higher speed.

The formula used to compute the time is as follows:-

Distance = Velocity x Time

So, Time = Distance / Velocity

The Distance is given as 20 miles and the velocity ranges from 5 mph to 75 mph

But as mentioned in the question the time calculated for each value of the velocity must be 5 more than the value of the velocity.

So, Time = Distance / Velocity_value +5

To calculate the time in minutes the above obtained value of time for each velocity is multiplied by 60.

So, (Time = Distance /(Velocity_value +5)) * 60

But we have to find the time that is saved by driving extra 5 mph. So the saved time is calculated as:-

Saved_Time = (Time required to drive 20 miles without driving extra 5 mph) – (Time required to drive 20 miles driving at extra 5 mph speed)

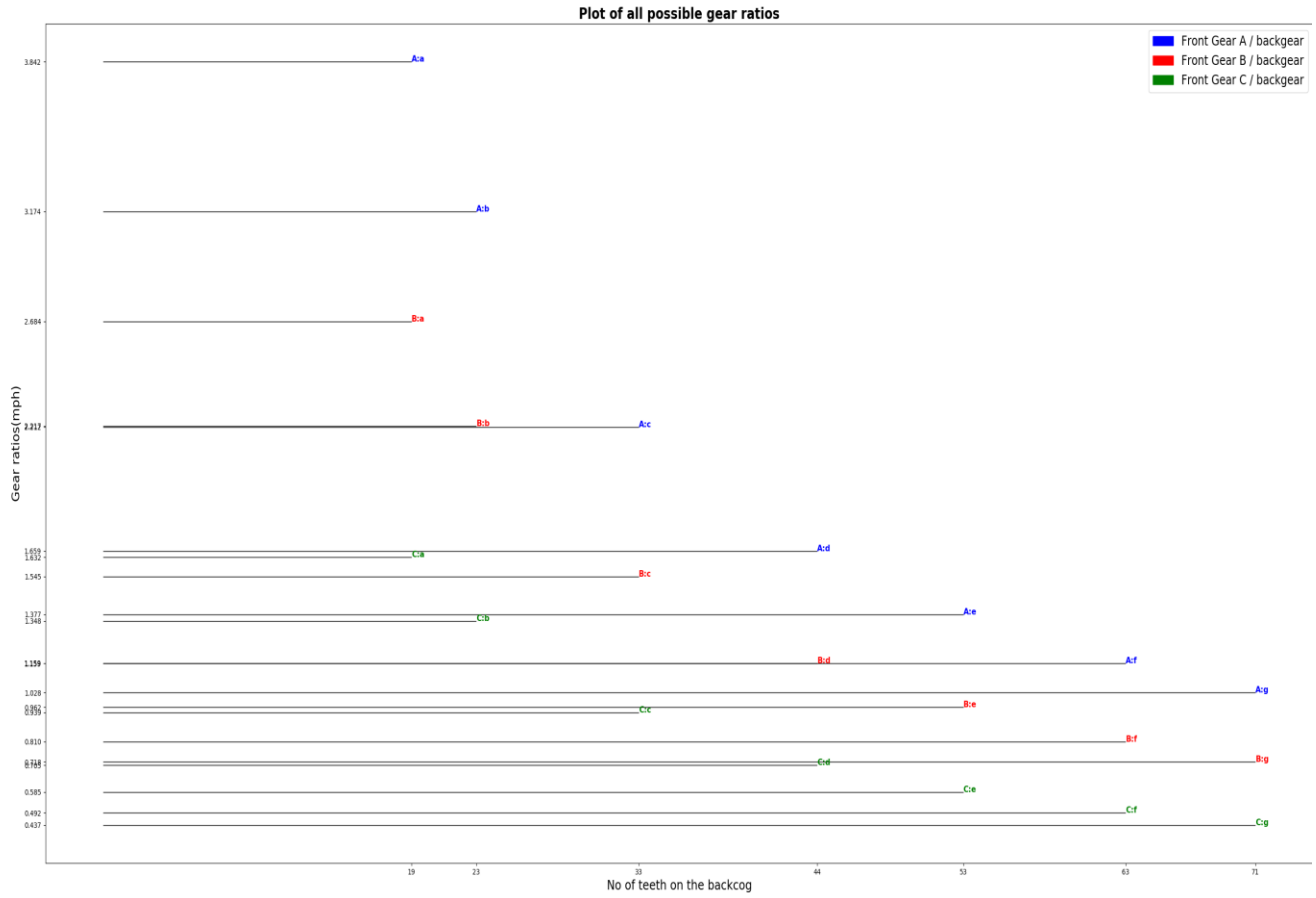
Saved_Time = [(Distance /Velocity_value) * 60] - [(Distance /(Velocity_value +5))) * 60]

Question-3

Solution:

The code for generating the plot is present in q3.py file.

Plot of all possible gear ratios :



For the above plot the Gear_Ratios are calculated by formula :-

Gear_Ratio= No of teeth on front gear / No of teeth on back gear .

The ‘blue’ color depicts all possible combination of gear ratios with front gear ‘A’.

The ‘red color depicts all possible combination of gear ratios with front gear ‘B’.

The ‘green color depicts all possible combination of gear ratios with front gear ‘C’.

The front gear ‘A’ has the highest no of teeth among other front gears. The Back gear ‘a’ has the smallest no of teeth among other back gears. It can be observed from the above plot that the gear ratio of B : a is less than A:a and A:b but greater than A:c , A:d, A:e , A:f and A:g. This shows that it is not necessary that using Front Gear with largest no of teeth along with any back gears will result in higher gear ratio than using the next smaller Front gear with any Back gears. So we cannot say that using

biggest gear on front will always result in high gear ratio to achieve a higher speed. But we can observe from the above plot that using biggest gear on the front with smallest gear on back will result in high gear ratio and so we can move fast.

Question-4

Solution:-

Conclusions of this exercise:-

1. In question 1 the relationship of time taken to travel v/s the velocity are inversely proportional in which the time required to cover the distance decreases as we increase the speed

2. Increasing speed by an extra 5mph beyond a certain limit does not necessarily save time to travel the same distance as compared to driving without extra miles per hour. We can observe that from graph in question 2 where increasing velocity beyond 40mph to travel 20 miles does not really save much time and the car becomes less stable so it is not needed to travel at higher speeds to reach early if the distance to be covered is small.

3. Using the biggest gear on front with any combination of back gear does not necessarily promise high gear ratio to achieve higher speed.

4. The plotting of data using matplotlib of python was learned from this exercise and it can used to plot the results to work with a new data. Also, understanding from data reveals how some assumptions about everyday activity may be wrong.