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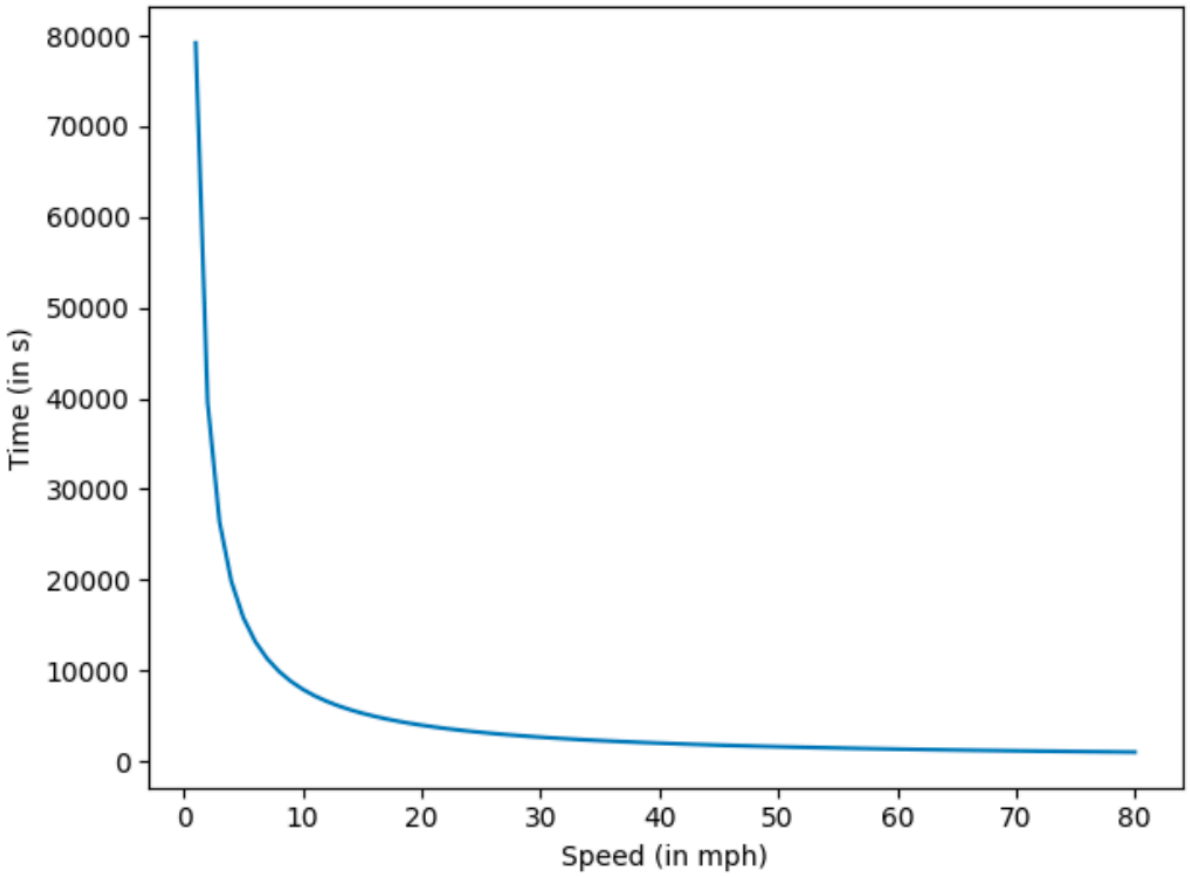
Home Work 0

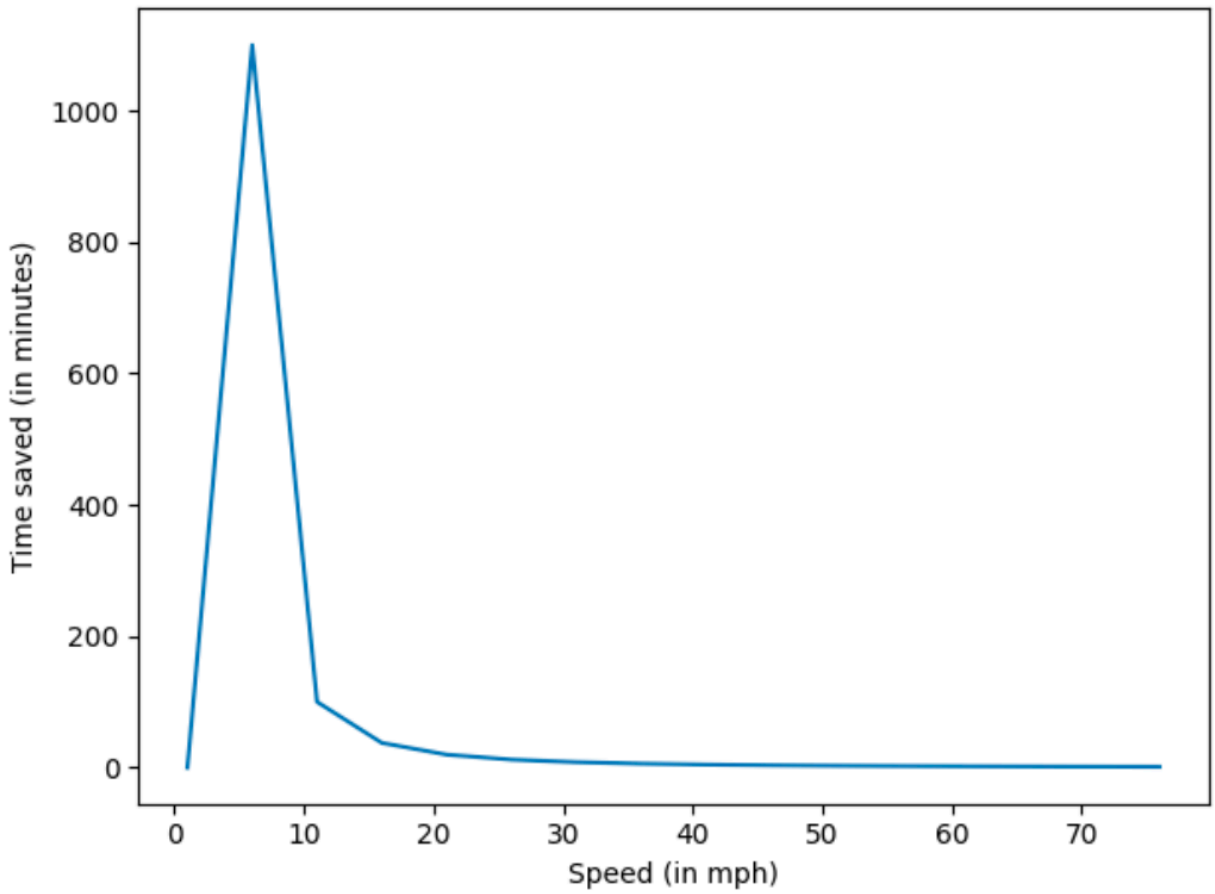
CSCI - 720 Big Data Analytics

Task 1. Assume I drive 22 miles to work. I can drive 1 mph to 80 mph. Plot the time that it takes me to get to work (in seconds), as a function of my speed (in miles per hour).



From the above graph we observe that the faster a person drives does not necessarily imply that he/she would save more time. If we look at the time difference between driving at a speed of 50 mph versus driving at 60 mph, we notice that the time difference isn't significant.

Task 2. Then, for each increment of 5mph, plot how much time (in minutes) I save by driving an extra 5 mph.

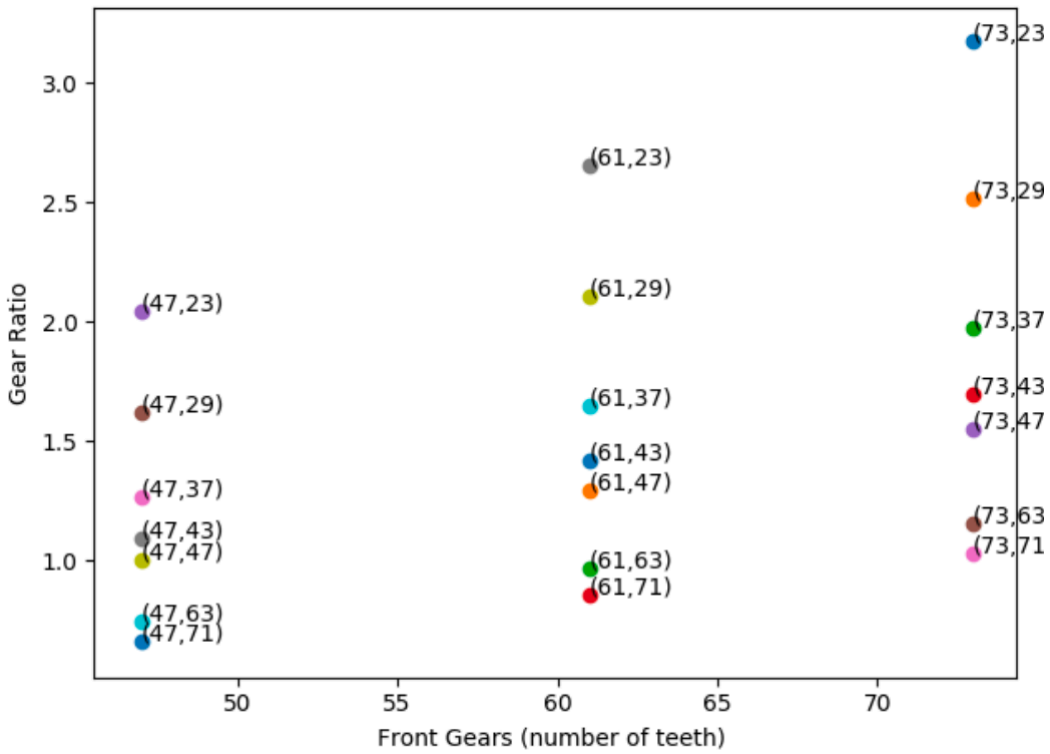


From the above graph we observe that the time saved by increasing the speed by 5mph is not uniform. We notice a significant increase in the time saved when the speed is increased from 1mph to 6mph, but, when the speed increases from 6mph through 11mph the net time saved decreases and the decrease continues till about 30mph and seems to flatline post that until 80 mph.

Task 3. Assume that the front gears on my bicycle are labeled A, B, C, *largest* to smallest. (From the outside to the inside.) The back gears on my bicycle are a,b,c,d,e,f,g, *smallest* to *largest*. (Again, from the outside to the inside.) A gear ratio here is the number of teeth on the front gear divided by the number of teeth on the back gear. Find a way to plot or graph the gear ratios for all possible gear combinations so that we can see how the gear ratios relate to each other.

Front Gear	A	B	C
Number of teeth	73	61	47

Back Gear	a	b	c	d	e	f	g
Number of teeth	23	29	37	43	47	63	71



From the above graph we notice the gear ratios for the combination of the front gears versus the back gear. The observations we can see are :-

- The combination of 73 teeth front gear and 23 teeth back gear is ideal for flat roads. It takes effort to get it moving but once moving, you can move forward quickly.
- The combination of 47 teeth front gear and 71 teeth back gear is ideal for uphill climbs allowing you to spin the wheels quickly.
- Another important observation we see is, for certain combinations we would get similar gear ratios and the conditions would be similar, such as, 47 teeth on the front gear an 29 teeth on the back gear, 61 teeth on the front gear an 37 teeth on the back gear and 73 teeth on the front gear an 43 teeth on the back gear,

Task 4. Why did you choose this method for data visualization? Did you use a number line? Did you try other methods? What suggested this technique?

The scatter plot helps us clearly visualize the gear ratios for the different combinations.

No, I did not use a number line.

I did try using a line plot and a bar plot apart from the scatter plot, however, I did not see any improvement in the visualizations and could not draw any new inference.