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CS301

<div align="center">CS301 Project: Individual Contribution 3</div>

See the project repo at https://github.com/flexadecimal/cs301-project - specifically, 'deliverables.ipnyb'.

For the third part of our project, we answered the questions we defined in our first deliverable. I divided up the three questions for the three other group members, and assisted them when they had trouble. Solutions to these questions required filtering by mods, so I wrote additional supporting code to filter by mods.

For question 1, no special assumptions had to be made – for both 1/8th and 1/2 mile analyses, it turned out that both of the top performing runs were from the same user, JRink, albeit with different mods. JRink's 1/2 mile top performer used race fuel and a different turbo, while the 1/8th mile run used pump gas.

For question 2, two of the runs (from the same user) used a special type of fuel called e95 – 95% ethanol/5% diesel mix, commonly used in buses. We were not able to find a retail price for e95, so the common price of $3/gallon for diesel fuel was substituted. Overall, it was shown that e85, 85% ethanol/15% gasoline fuel, was the best value fuel. Interestingly, race fuel provides the most power, but it is very expensive, so it is not a great value as far as power per dollar. However, this makes sense, because people pay the premium for the maximum, not for best value. For a fairer, more rigorous comparison, you would want to compare on a stricter specification – ideally, same boost level and engine displacement. However, the nature of our dataset is such that that would be too restrictive, so we opted to use ranges to have enough rows to compare by. We also made the assumption that unspecified fuel type was pump gas, which seems to be a reasonable assumption since most trials in our dataset, and most cars in general, run on pump gas.

For question 3, we did not have to make any additional assumptions on the data. However, there are only 2 trials in the original data set that use a t4 turbo (t4 being a turbo class, one of t4, td04, and td05 in our dataset). These two trials don't use stock engine components, so they were not included – top 10 lag analysis was performed for td04 and td05-class turbos.