

English vs Math Performance in the USA

A Comparative Analysis of Subject
Performance for Future Funding in the US
Education Programme



Introduction

Problem Statement

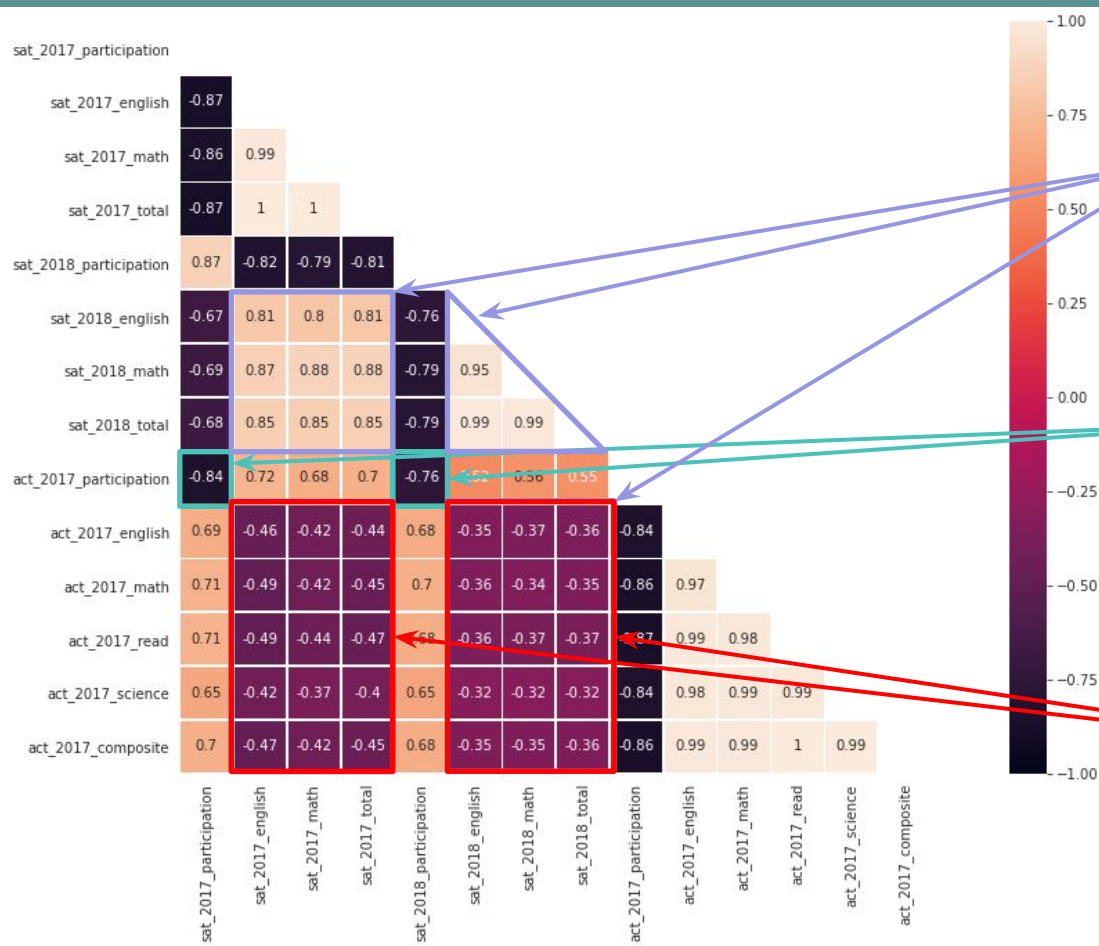
Resources allocation for education in the USA can often be limited. When additional funding is provided, determining which areas of education to target to provide the most improvement can help streamline and optimise the process to ensure the best return.

In this project, we seek to look at the performance by students across the USA to determine if performance in English or Math is poorer and which may benefit from more funding.

Analysis

- Because the ACT has 2 segments testing Reading and English, which are a subsections of the SAT English test, the two were combined into a single score.
- Normalisation of scores were done within the highest and lowest achieved scores of the exam and time period to account for cohort differences and exam difficulty, rather than the max and min score (200-800 for SATs and 1-36 for ACTs).

Correlations Between Results



Correlation between scores are high for both SATs and ACTs but that is unsurprising. Students who study hard for one exam are likely to study hard for the other, and vice versa.

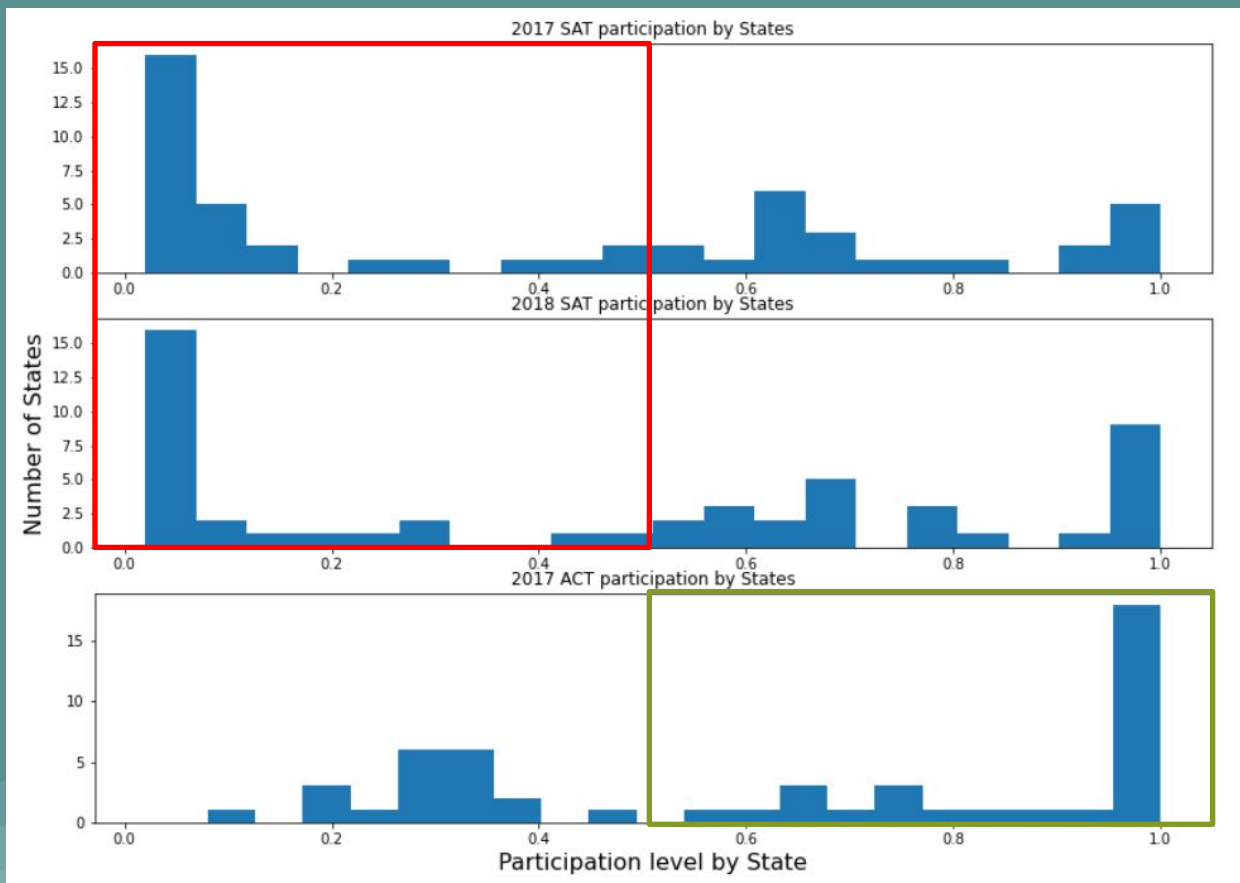
Attendance for SAT participation is negatively correlated with ACT participation, suggesting that students who attend one exam, are unlikely to attend the other.

ACT score negative correlation suggests that different groups of students take the exams within a state, or that the students who take both are a small enough group that it does not affect the overall average much

Use of both subsets of examination data is a good way to include as much of the student body as possible.

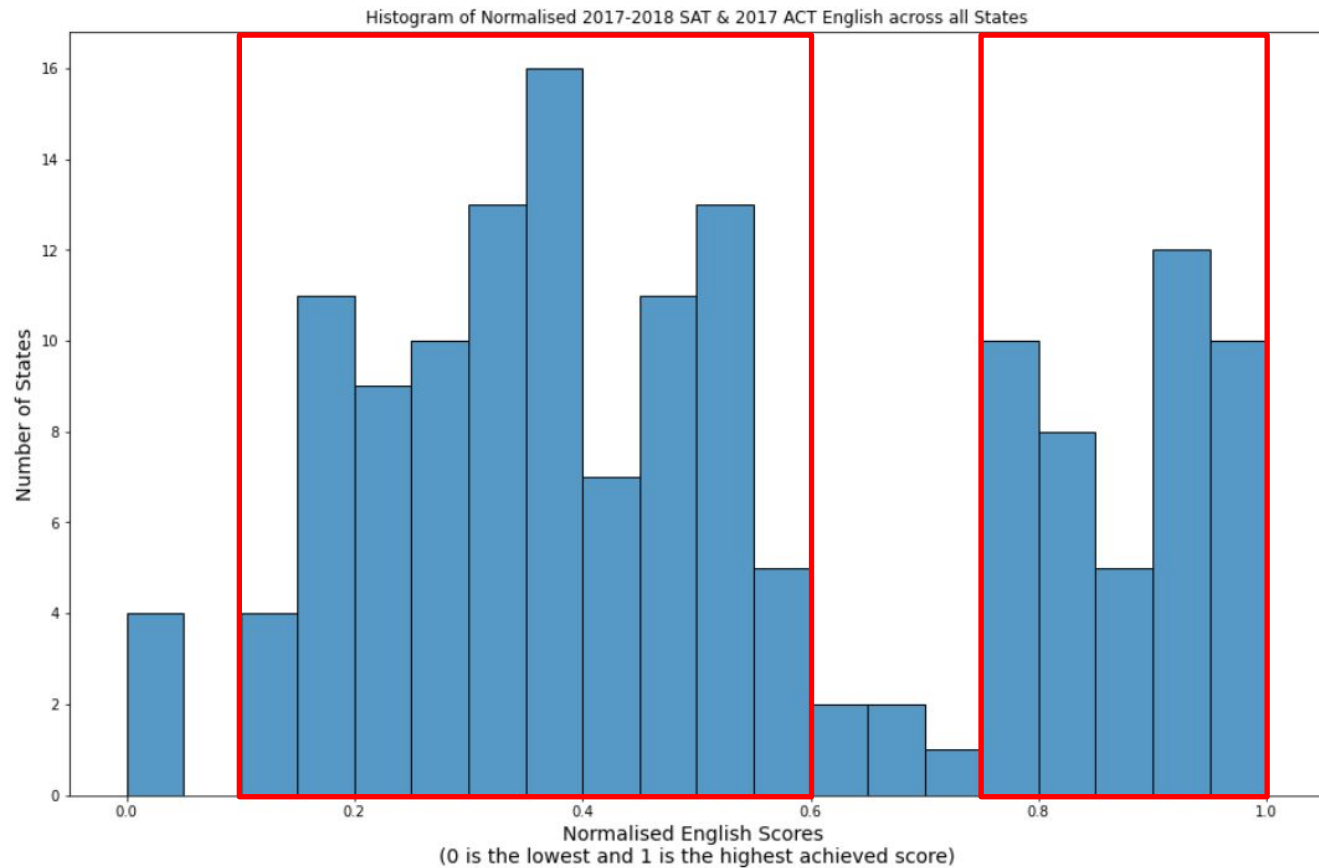
Exam Participation by State

SAT participation in amongst the states was much lower for both years, with the majority of states have less than 50% participation.



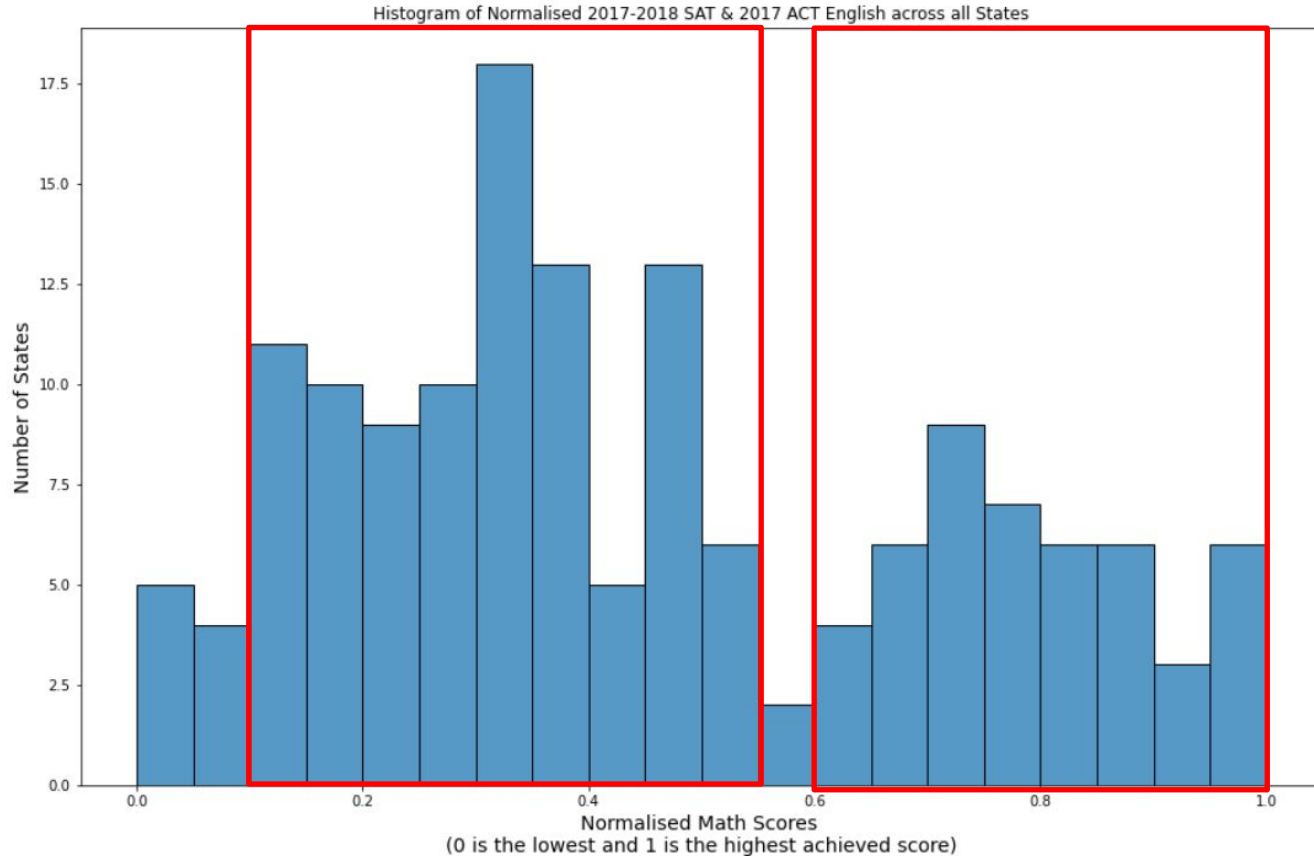
In contrast, ACT participation was much higher with a majority of states having more than 50% of students taking the exam.

Normalised English Scores



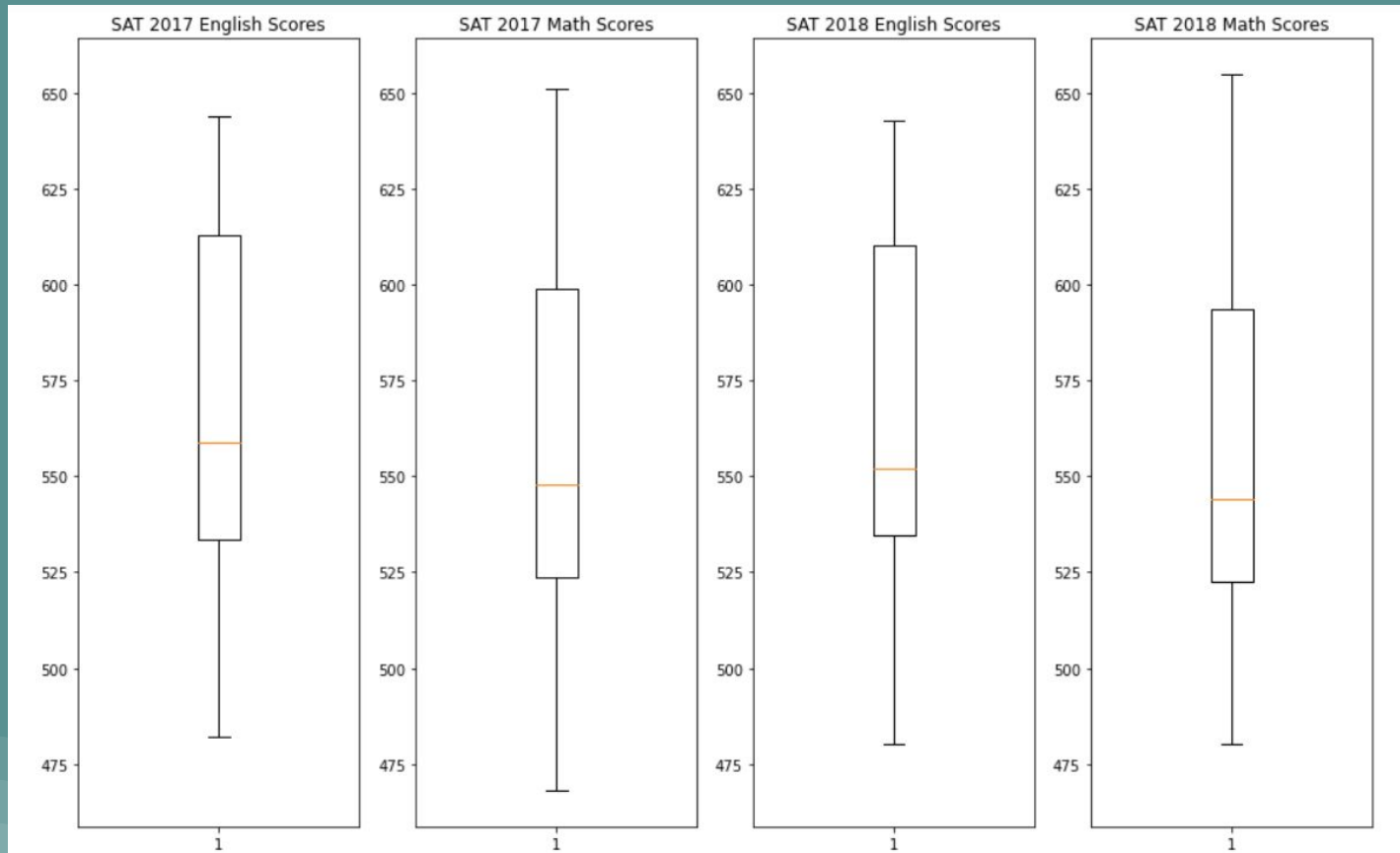
English scores do show two fairly distinct bodies of students, 1 group occupying the middle, and 1 group towards the top quartile.

Normalised Math Scores



While Math scores also show two bodies of students, the two groups are much closer than the English scores and the peak towards the upper quartile is much flatter.

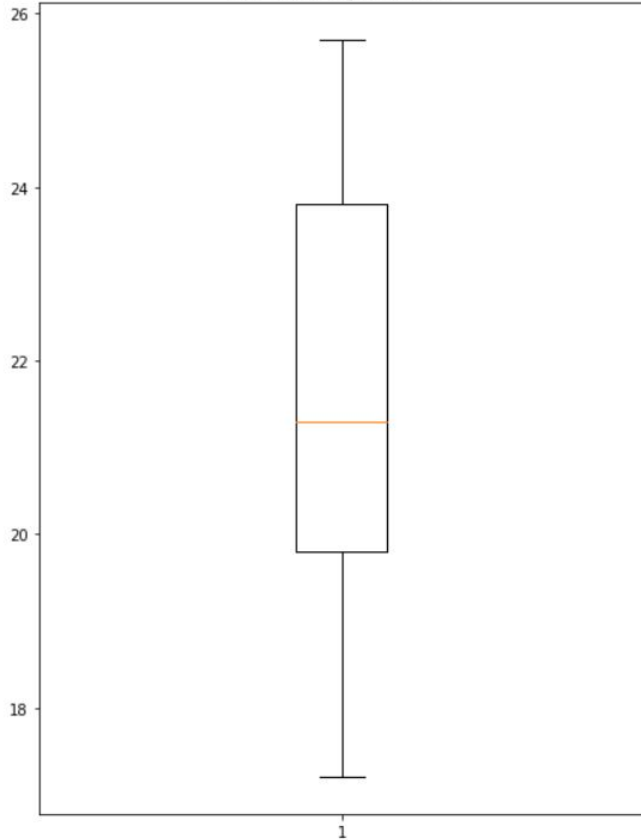
English vs Math Mean SAT Scores 2017 & 2018



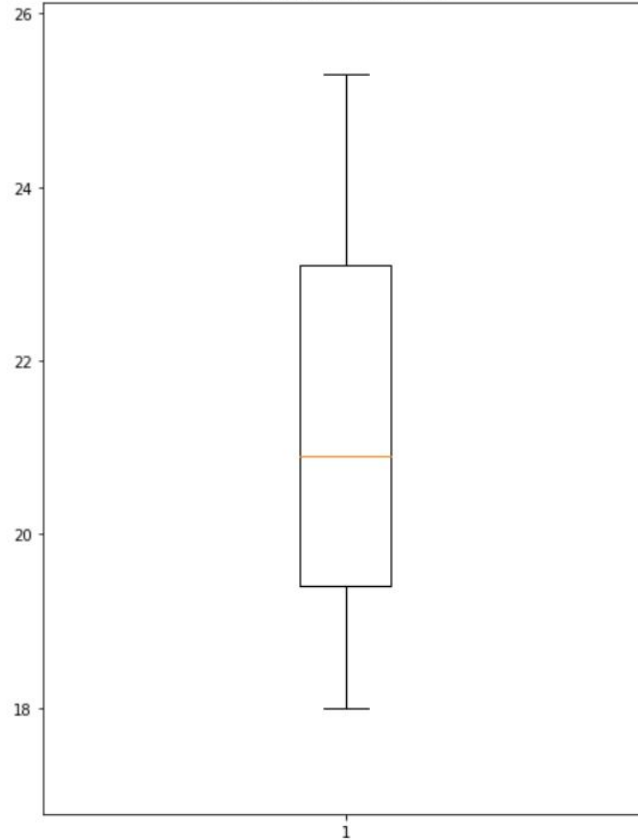
Comparing across the SAT exams, we can see that the mean scores for the Math exams are lower than the mean scores for the English exams

English vs Math Mean ACT Scores

ACT 2017 English Scores



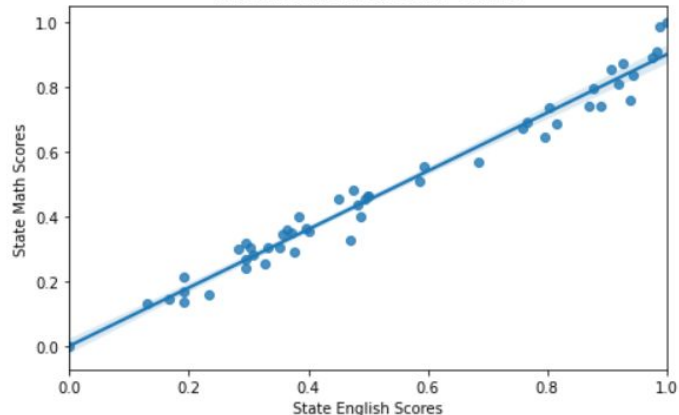
ACT 2017 Math Scores



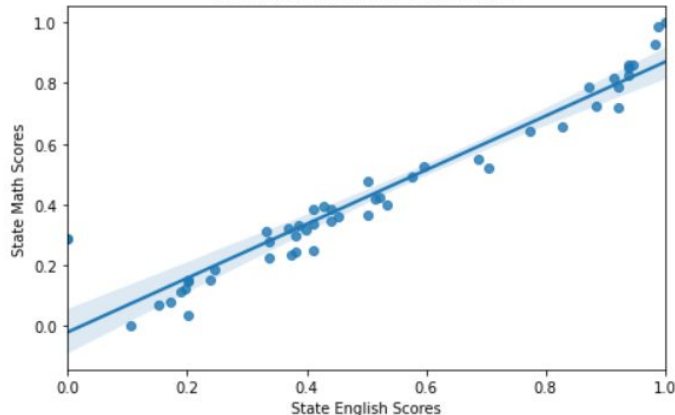
Comparing across the ACT exams, we can similarly see that the mean scores for the Math exams are also lower than the mean scores for the English exams.

SAT and ACT Exam Volatility

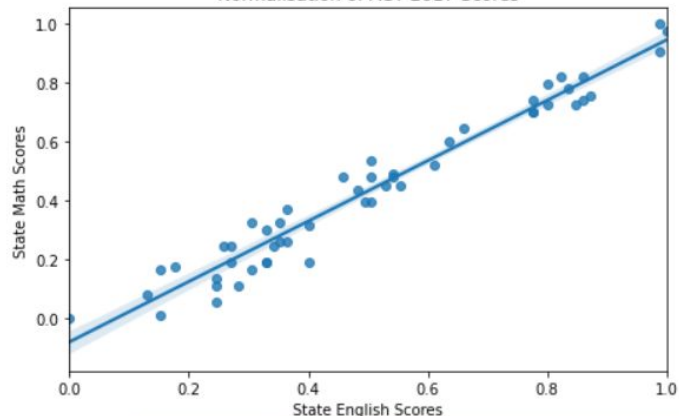
Normalisation of SAT 2017 Scores



Normalisation of SAT 2018 Scores



Normalisation of ACT 2017 Scores



Volatility across the SATs was much lower than volatility within the ACT exam results.

There are several explanations for why this might be so:

1. The increased participation by States in the ACTs could be a reason why there is a much larger variation in performance.
2. Alternatively, because the SAT format was changed in 2016, graders may be scoring more conservatively while the rubric is new

Conclusions and Recommendations

Scoring

- Students in States tend to do more poorly in Math than they do in English.
- We also do see States have a more similar standard in Math but have a much larger variation in their performance in English
- As a results, although we would like to provide an area for all of the US to look into, with the poorest performing States, it might be advisable for them to consider funding their English programme instead to catch up to the mean

Preference between SATs and ACTs

- Students do tend to prefer the ACTs but that may be because the SATs changed their format in 2016 and students preferentially selected a rubric that would be more reliable.

Influence of Participation Rates

- One important additional metric we could use would be the addition of student populations in different States, as States such as California may have a much larger student body population even with a small participation percentage, compared to Rhode Island. Comparing them on a state level is like Senate representation.