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students get  
ready.

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**DSI Project 1: SAT & ACT Standardized Test Analysis**  
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# Background: Who are we, NICHE?



## Niche.com

Niche connects people to their future schools, neighborhoods, and workplaces.

Internet · Pittsburgh, PA · 5,521 followers

See all 197 employees on LinkedIn

✓ Following

Visit website 

More

## 2020-21 Rankings

Niche combines rigorous analysis with authentic reviews to highlight the best schools, companies, and neighborhoods.



Best Schools & Districts

K-12 Rankings



Best Colleges

College Rankings



Best Places to Live

Place Rankings

## Pros

**“Market Leader in connecting colleges and schools with students and families”**

**“Helps Million of students and families find and enroll in the right school for them”**

## Cons (Future Plan)

**“Collaborate with College Board (SAT) or ACT in order to provide a scholarship to students who are aiming to apply universities by using standardized test scores (SAT/ACT) ”**



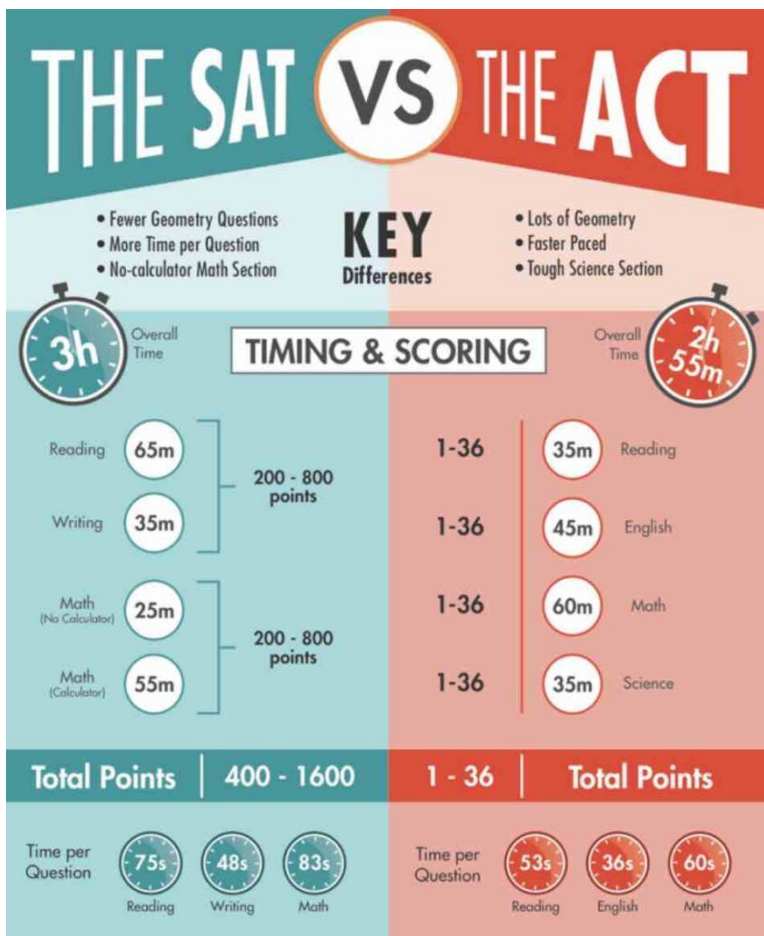
## Project Objective:

Help **Niche company** gaining more brand awareness by collaborating a new project “**University Scholarship**” with Global Standardized Test Organization like **SAT** or **ACT**, to provide an examination fee and give a free education consulting to scholarship students

## Problem statement:

- To analyze the **SAT** and **ACT** Tests taken in **2017, 2018 and 2019**
- To analyze **the trend of aggregated scores** and **participation rates** for each state in United States.
- To provide recommendations to **Data Analytic team** and **Marketing team** whether or not to choose collaborating with **SAT** or **ACT** to help them **improve participation rates** for future tests and also increase both **brand awarenesses**

# What're difference between SAT and ACT test?



	SAT	ACT
Section	<ul style="list-style-type: none"><li>Math</li><li>Evidence-Based Reading</li></ul>	<ul style="list-style-type: none"><li>Math</li><li>Reading</li><li>English</li><li>Science</li></ul>
Scoring	200 - 800 per section 400 - 1600 Total score	1 - 36 per section 1 - 36 Composite score
Time	2 Hrs 55 Mins (Without writing)	3 Hrs (Without Essay)
Exam Fee	\$50.50 (without writing) \$67.00 (with writing)	\$47.50 (without essay) \$64.50 (with essay)

## **2017-2019 : Data Provided**

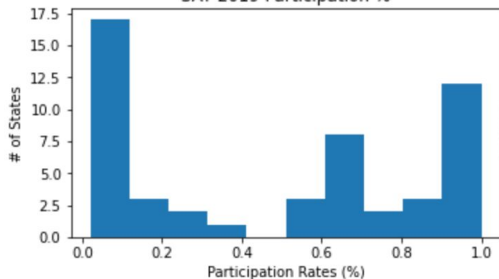
- SAT\_2017.csv
- SAT\_2018.csv
- SAT\_2019.csv
- ACT\_2017.csv
- ACT\_2018.csv
- ACT\_2018\_updated.csv
- ACT\_2019.csv

**SAT Features: States, Participation rate, Math score, Reading and Writing score, Total score**

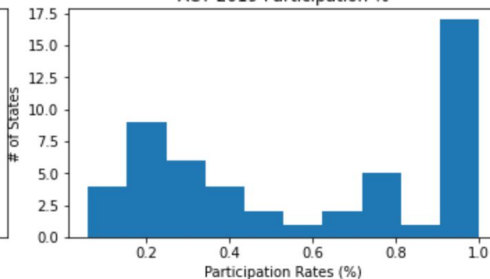
**ACT Features: States, Participation rate, Math score, English score, Science score, Total score**

# Overview - SAT & ACT 2017 - 2019 Participation rate(%)

SAT 2019 Participation %



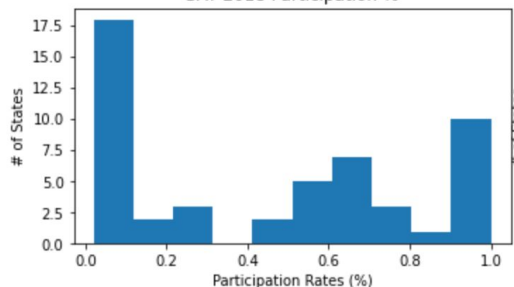
ACT 2019 Participation %



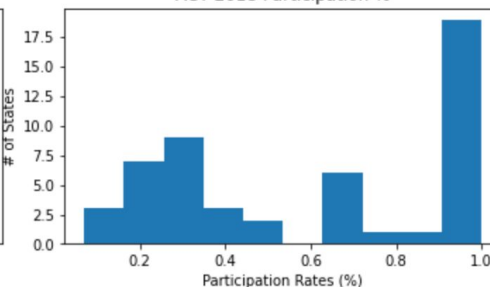
## SAT Overview

- SAT has a large group of very low-end participation rates (<10%)
- a cluster of states with participation in the 50–75% range
- and then a group of states with 100% participation.

SAT 2018 Participation %



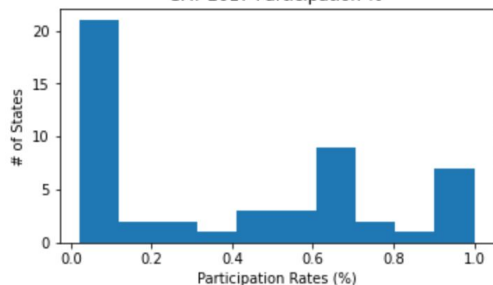
ACT 2018 Participation %



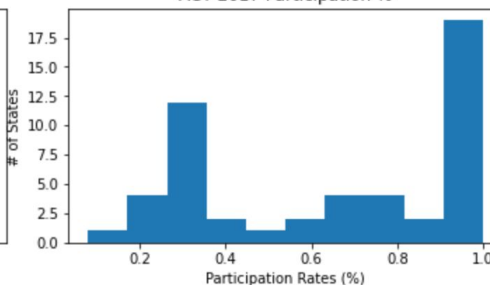
## ACT Overview

- The ACT, by contrast, has almost no states with lower than 10% participation,
- has a cluster of states in the 15–35% range, only a small number of states in the mid to high range,
- and then a large group of states with at or near 100% participation.
- In this way the three distributions almost mirror each other.

SAT 2017 Participation %

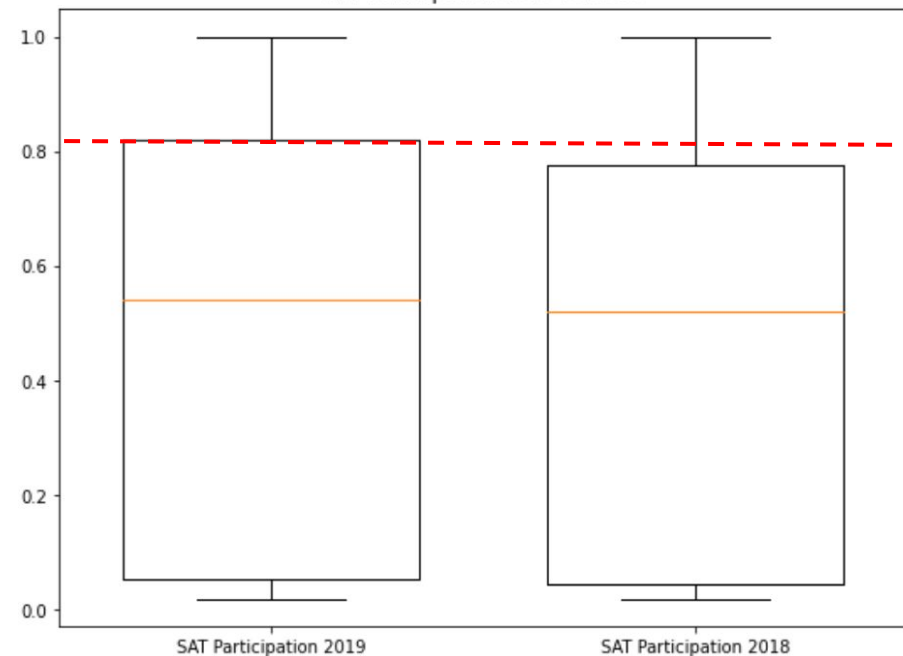


ACT 2017 Participation %

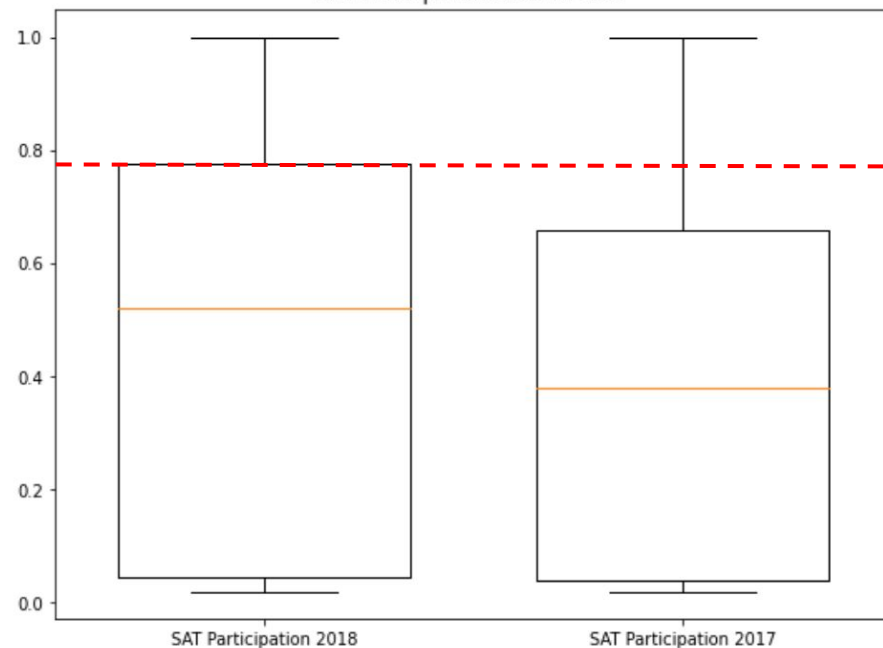


## SAT Participation rate significantly rose year-to-year

SAT Participation 2019 vs 2018



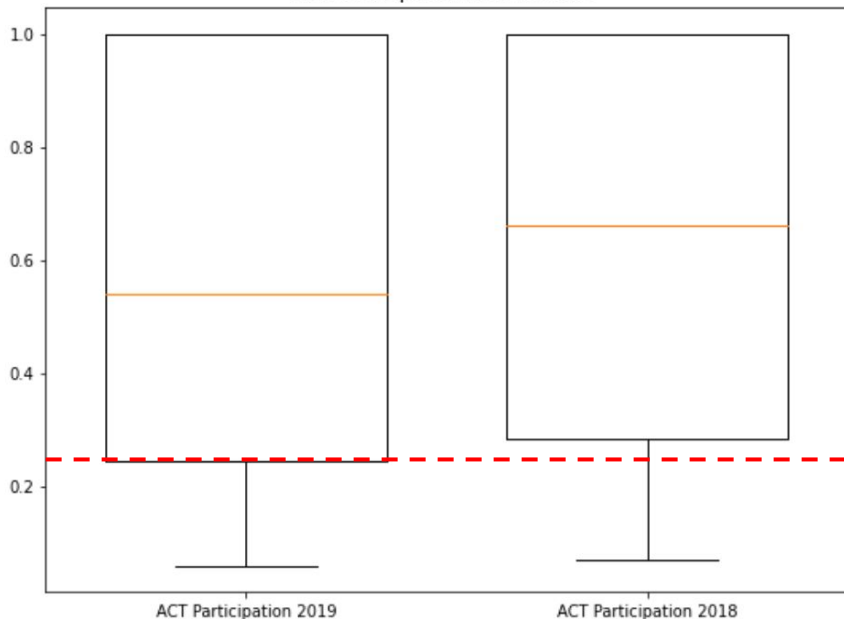
SAT Participation 2018 vs 2017



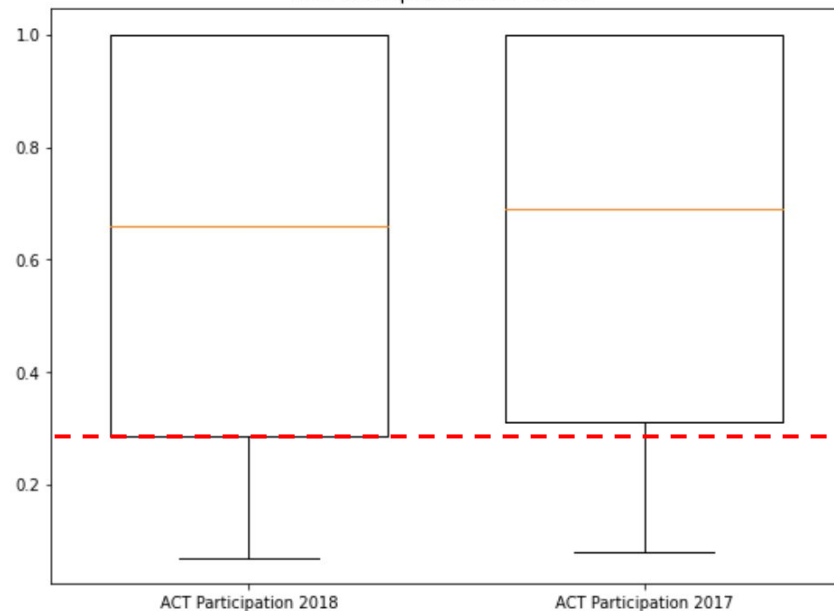


## ACT Participation slightly drops year-to-year

ACT Participation 2019 vs 2018

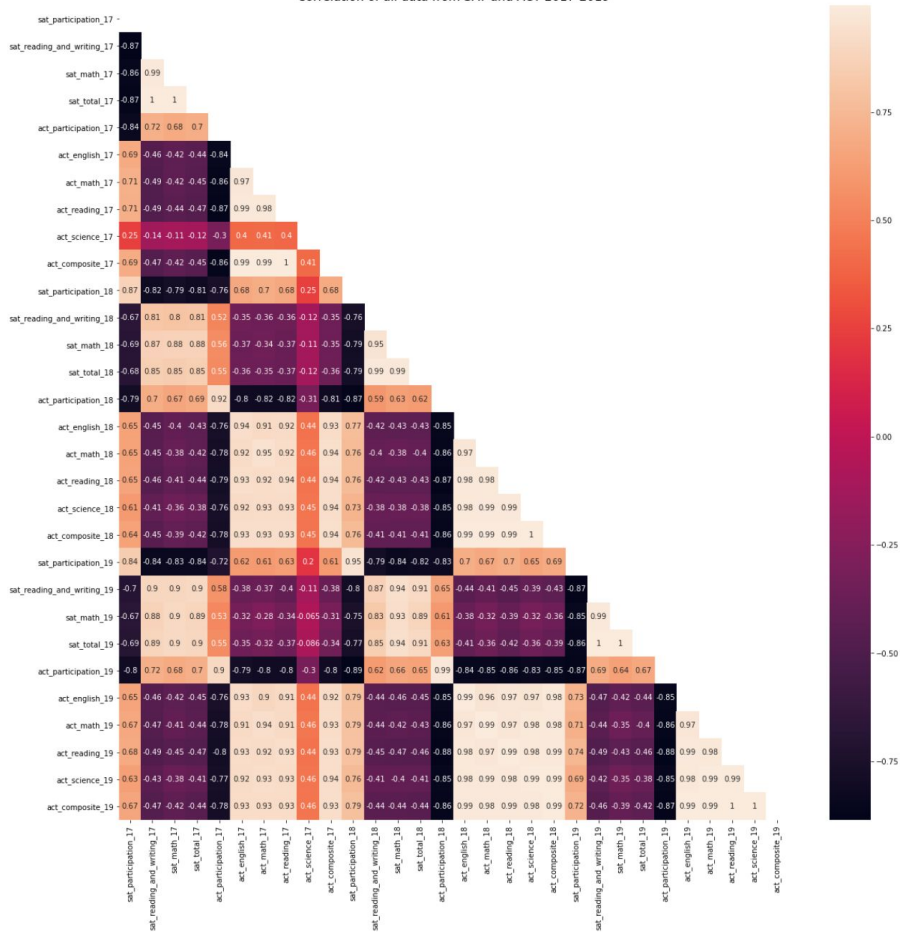


ACT Participation 2018 vs 2017



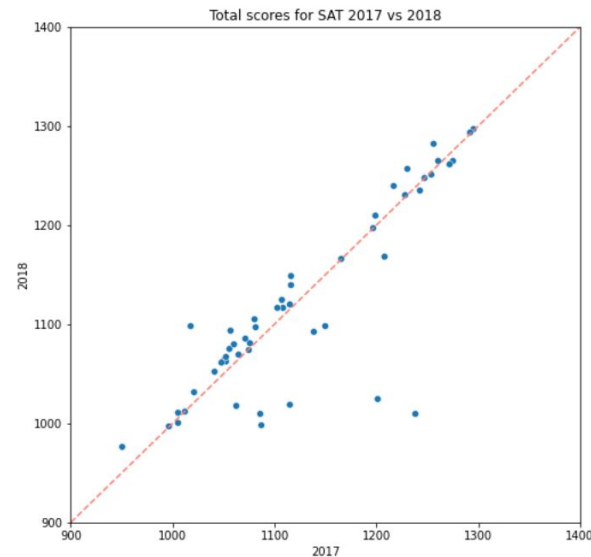
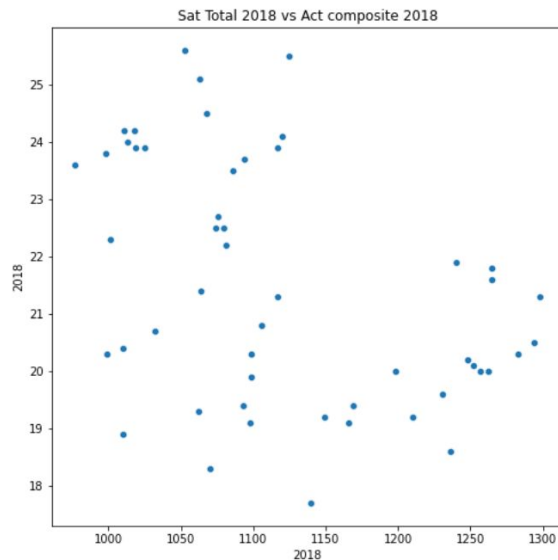
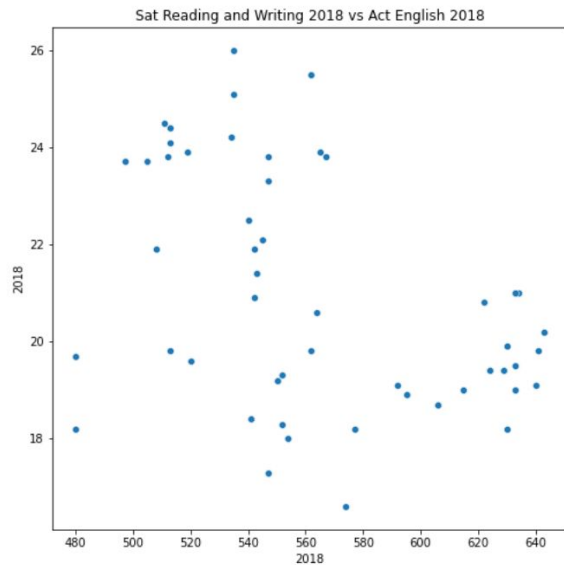
# Data Analysis - Heatmap correlation between each columns

Correlation of all data from SAT and ACT 2017-2019



- Mean scores on a given test are highly negatively correlated with participation rate on that test (-0.8).
- **Lower participation typically means higher mean scores**, and vice versa, due to higher achieving students on average taking the test.
- If a state performs well on the SAT because they have low participation or simply because they are higher achieving, it's likely they perform well on all sections.
- This holds across years too, as most states have similar profiles in 2019 as they did in 2018 and 2017. **“Participation rates for the same test across years are highly correlated.”**
- **Mean scores on sections of the SAT are moderately negatively correlated with mean scores on ACT, and vice versa.**
- **Participation rate on a given test is moderately positively correlated with scores on the opposite test (0.6).**
- This is simply due to **higher participation on SAT > lower participation on ACT > higher ACT scores**. So, **positive correlation between SAT participation and ACT scores.**

## Clearly demonstrate the relationship between participation rate and test scoring



- For both tests, **lower rates of participation correspond with higher mean score by state**. In the SAT plot, for instance, you can see the cluster of ACT-dominated states at top left where SAT participation is very low and mean scores are all >1200.
- The small subset of high achieving students that bother to take both tests are high scorers, and so these states have artificially higher score averages. The **downward slope of both graphs indicates the negative association between the variables**.

# Recommendations

- We need to collaborate with **“College Board/ SAT”** which has a very strong presence internationally because of these reasons;
  - **Upward trends of SAT Participation rate year-on-year (2017 - 2019 : 3.5% per year)**
  - **SAT has a large group of very low-end participation rates (<10%)**
  - **ACT Participation slightly drops year-to-year (2017 - 2019 : -3.5% per year)**
- and so College Board can use this as a strength and dominate more over ACT.
- Thus, Niche Marketing team and College Board should promote campaign of ‘University Scholarship Project’
- **at top 5 lowest participation states, including: North Dakota, Mississippi, Iowa, Wyoming, and South Dakota.**

