



# How to improve SAT participant

**Within 2010 – 2019 by Piyapon Pongsantisuk**

# Agenda

**01** **ACT / SAT**
Briefly know about ACT and SAT

**02** **Objective**
Why we need to analyze data?

**03** **What data tell us?**
Go through data what will show us? This part will show how to manage and represent data

**04** **Conclusion**
What is takeaway from the data? Any room for improvement?


The SATs and the ACTs are the two different tests that students are required to take for admittance to a US university. There was different in subject content, equipment, scoring, time, cost.

And in each state have different number of participant of test and how is going in past 3 year. Let’s look through it

# ACT V.S. SAT

| Test Format | | |
|---|---|---|
| Structure and Timing | SAT | ACT |
| Testing time | 3 hours<br>+ 50-minute essay (optional) | 2 hours 55 minutes<br>+ 40-minute essay (optional) |
| Structure | 3 tests + optional essay | 4 tests + optional writing test |
| Number of questions | 154 | 215 |
| Time per question | 1 minute, 10 seconds | 49 seconds |
| Score range | Composite 400–1600 (SAT Essay: reported in 3 dimensions, each 2–8) | Composite 1–36 (writing domain scores: 2–12) |
| Test components | Reading Test<br>65 minutes<br>52 questions<br>Writing and Language Test<br>35 minutes<br>44 questions<br>Math Test<br>80 minutes<br>58 questions | Reading Test<br>35 minutes<br>40 questions<br>English Test<br>45 minutes<br>75 questions<br>Math Test<br>60 minutes<br>60 questions<br>Science Test<br>35 minutes<br>40 questions |
| Cost | $47.50 without essay<br>$64.50 with essay | $46.00 without writing<br>$62.50 with writing |

# Objective of analyze data

- **To analyst data from past 3 years (2017 – 2019) how participation rate is going.**
- **How to increase the participants rate of SAT in different way.**
- **Is anything insight of these data that actually impact.**

# Data Dictionary

## Data dict merge_act

- Combine 3 year of participant and average score of act file together

| Feature | Type | Dataset | Description |
|---|---|---|---|
| state | object | act_2017.csv | Take name of state |
| participation_2017 | float64 | act_2017.csv | Number of participant compare to whole state of 2017 |
| composite_2017 | float64 | act_2017.csv | Average score of ACT of that state in 2017 |
| participation_2018 | float64 | act_2018.csv | Number of participant compare to whole state of 2018 |
| composite_2018 | float64 | act_2018.csv | Average score of ACT of that state in 2017 |
| participation_2019 | float64 | act_2019.csv | Number of participant compare to whole state of 2019 |
| composite_2019 | float64 | act_2019.csv | Average score of ACT of that state in 2017 |

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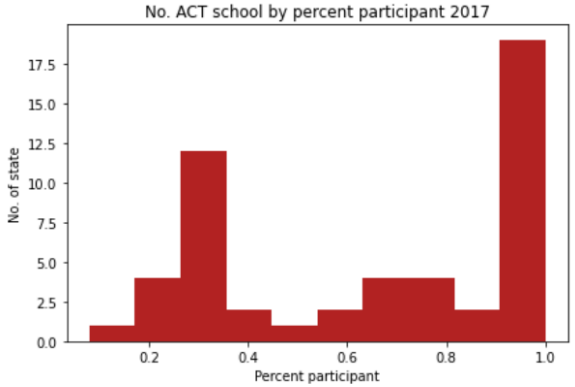
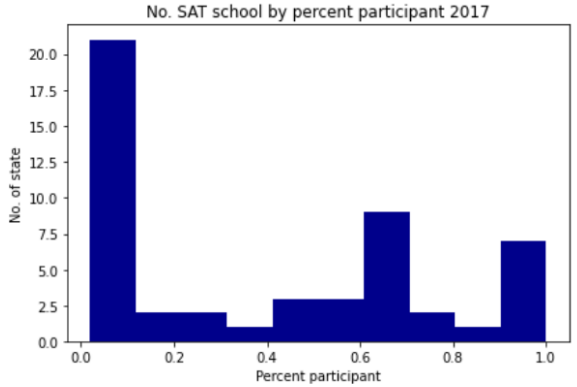
## Data dict merge_act

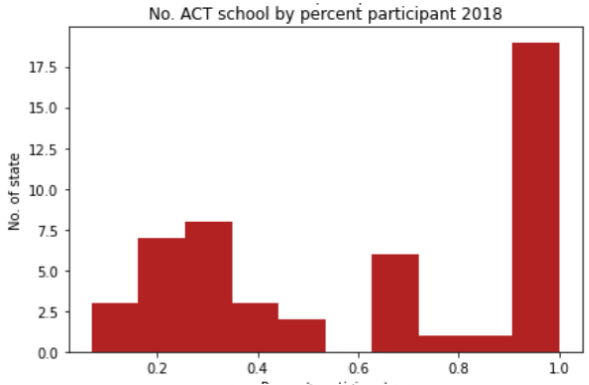
- Combine 3 year of participant and average score of sat file together

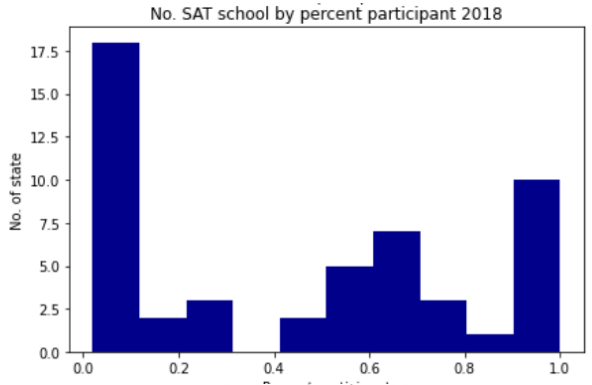
| Feature | Type | Dataset | Description |
|---|---|---|---|
| state | object | sat_2017.csv | Take name of state |
| participation_2017 | float64 | sat_2017.csv | Number of SAT participant compare to whole state of 2017 |
| total_2017 | float64 | sat_2017.csv | Average score of SAT of that state in 2017 |
| participation_2018 | float64 | sat_2018.csv | Number of SAT participant compare to whole state of 2018 |
| total_2018 | float64 | sat_2018.csv | Average score of SAT of that state in 2017 |
| participation_2019 | float64 | sat_2019.csv | Number of SAT participant compare to whole state of 2019 |
| total_2019 | float64 | sat_2019.csv | Average score of SAT of that state in 2017 |

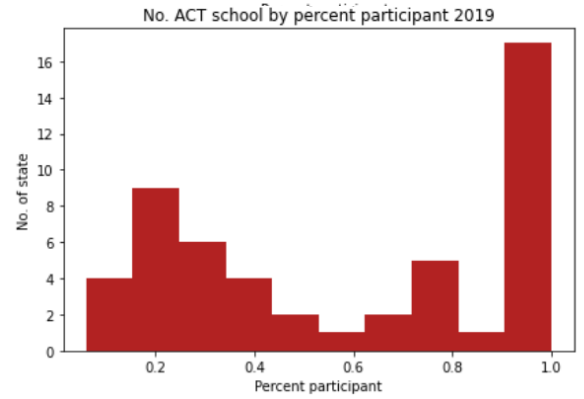
# Number of state participant in percent

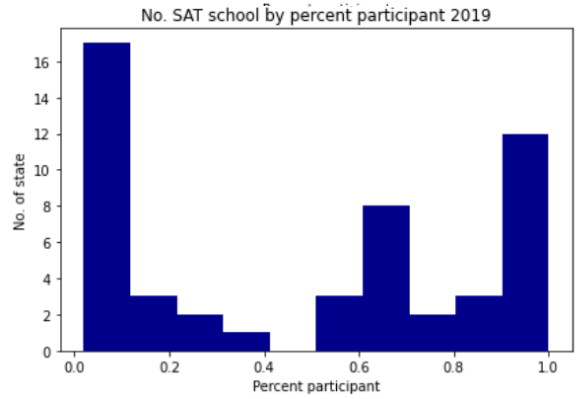


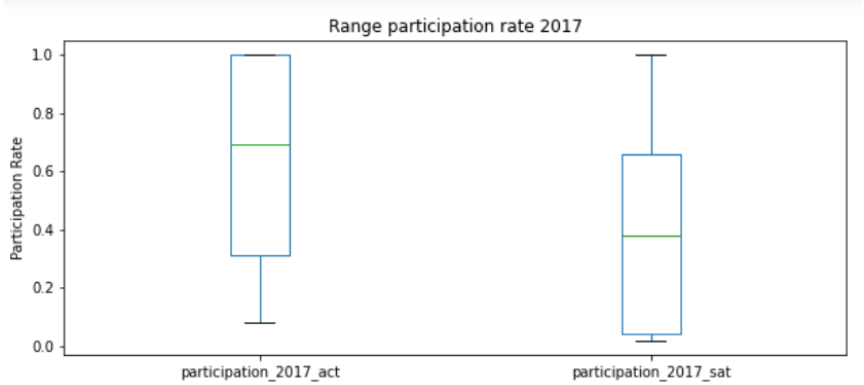



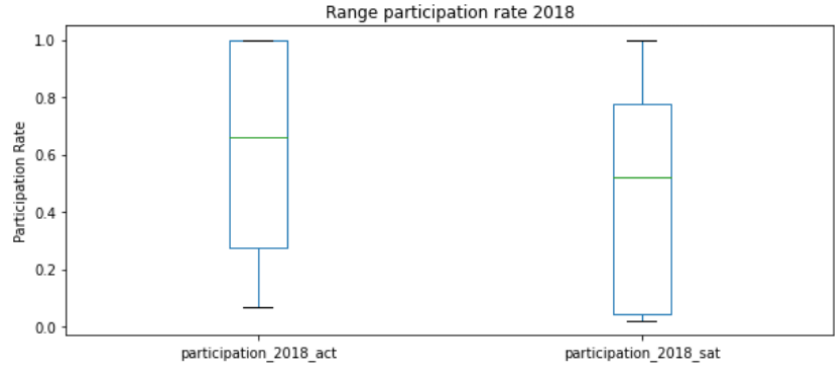



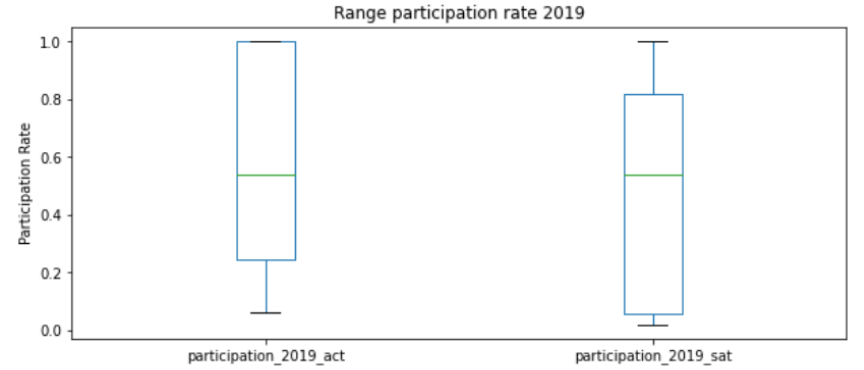

## As the distribution show

- Number of ACT participants higher than SAT
- There is 20 states in USA which participations percent lower than 20% - **why?**
- **While ACT participants have lots of state which participant is equal to 100%**

# Number of state participant in percent



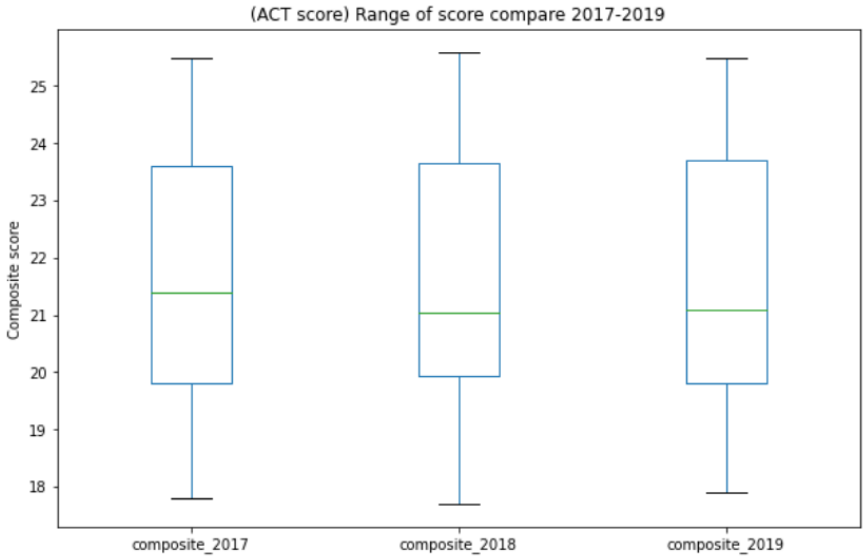



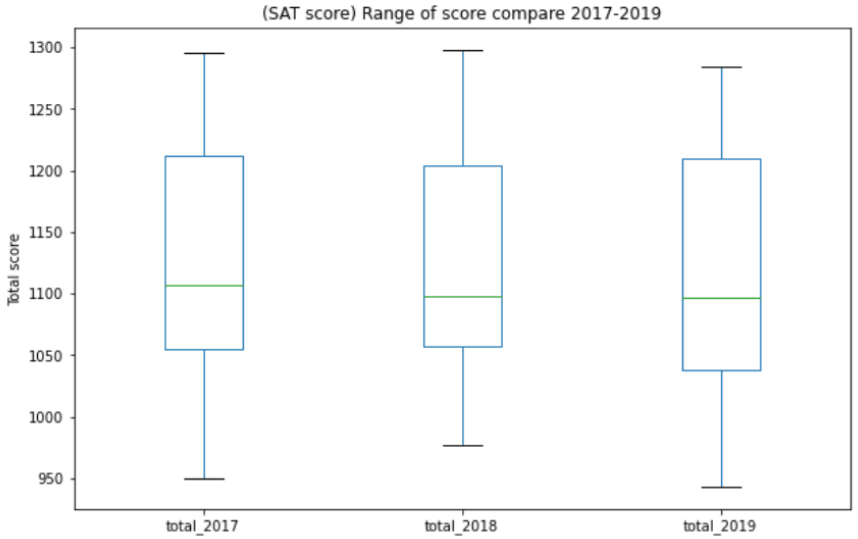

**Percentile of participant percent overall**
**ACT still higher than SAT in past 3 year**

# Score

## ACT composite score



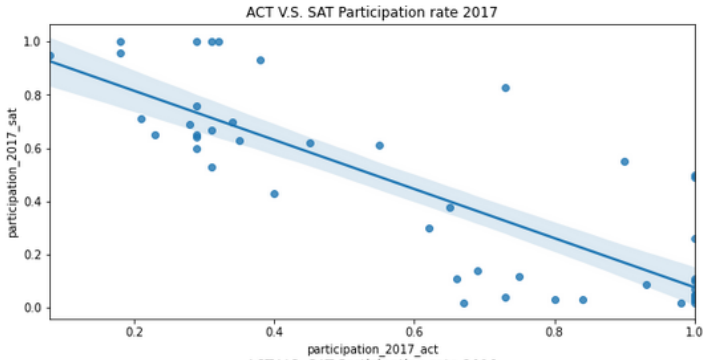

## SAT composite score




**How about the score range in each year is any significantly change?**

- **Range of average score can predict from previous year data**

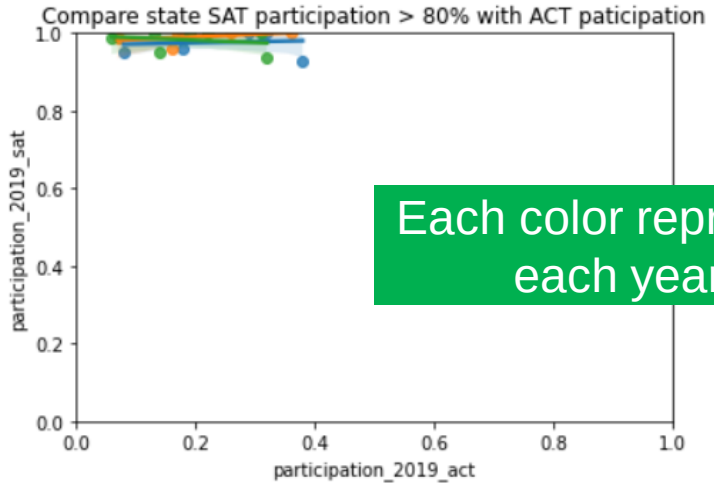
# Participation ACT V.S. SAT



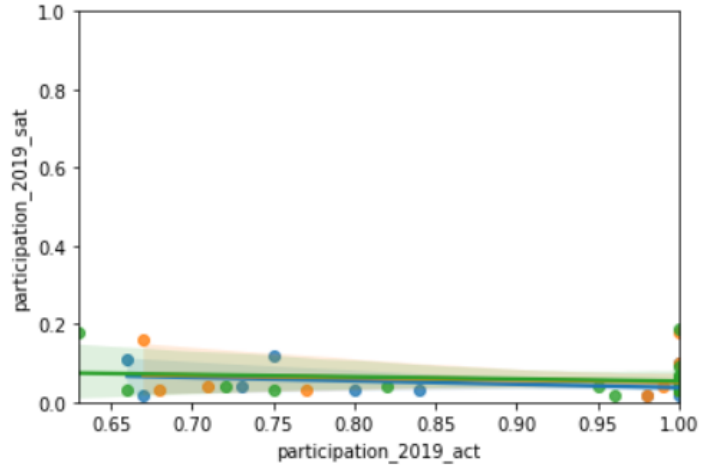

**It looks like it counter between ACT / SAT participant**

- **As the graph represent if that state have a high SAT participant, ACT participants will be low**
- **Otherwise, low SAT participant, ACT participants will be high**
- **Assume that student in each state focus on either ACT or SAT, not both**

# Participation ACT V.S. SAT




Each color represent each year




## So, I filter out participant in SAT more than 80%

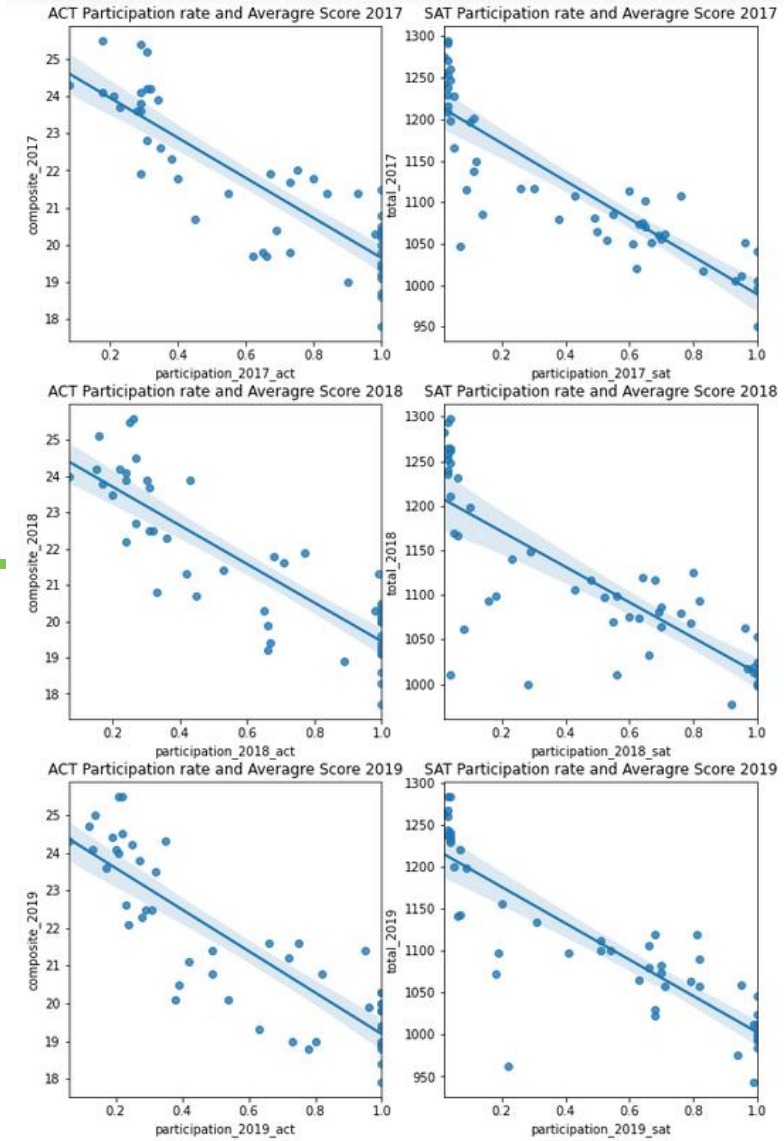
- State that have SAT participation more than 80% are Connecticut, Delaware, District of Columbia, Idaho, Maine, Michigan, New Hampshire
- Overall you can see the data is crowd past 3 years the higher participant of SAT the lower ACT

## And participant in SAT less than 20%

- State that have SAT participation less than 20% are Alabama , Arkansas, Iowa , Kansas, Kentucky, Louisiana, Minnesota , Mississippi, Missouri, Montana, Nebraska, New Mexico, North Dakota, Ohio, South Dakota, Tennessee, Utah, Wisconsin, Wyoming
- Overall you can see the data is crowd past 3 years the higher participant of SAT the lower ACT

**“Therefore, I assume hypothesis that student in each state focus on one test. In case we want to improve SAT participation we need to focus on lower SAT participation”**

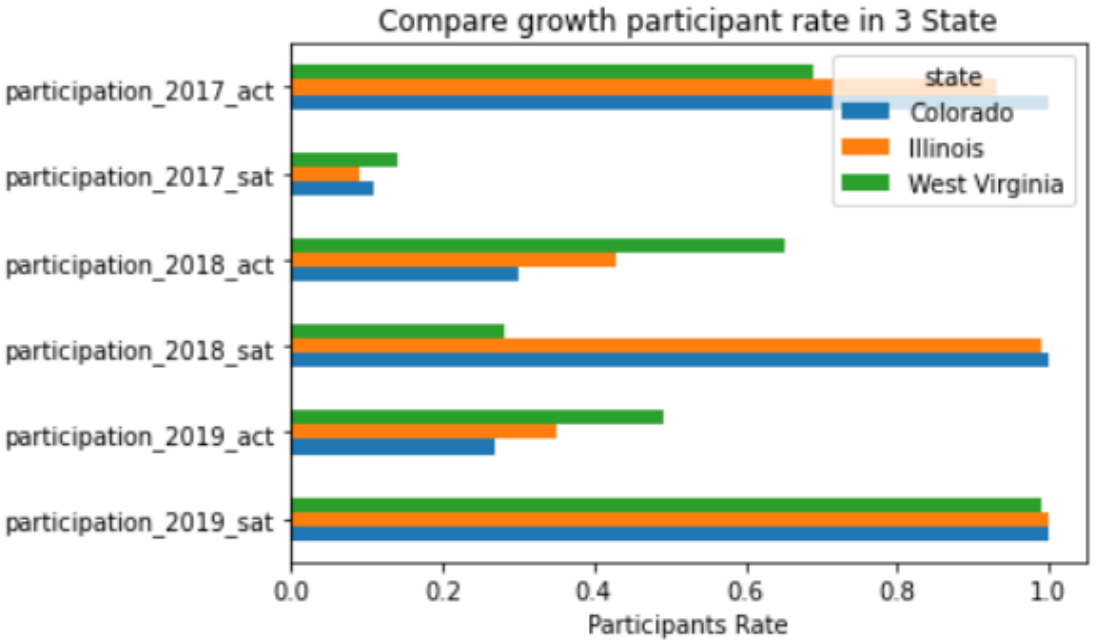
# Participation rate V.S. score




**One of very interesting is the lower participant, the higher the score**

- **Both test ACT and SAT when compare the score to participants is show participation rate and score walk by in opposite directions**
- **So, we can assume that it's negative co-relate or not?**

# Growth rate SAT participant




**State that have SAT participation less than 20% are Alabama , Arkansas, Iowa , Kansas, Kentucky, Louisiana, Minnesota , Mississippi, Missouri, Montana, Nebraska, New Mexico, North Dakota, Ohio, South Dakota, Tennessee, Utah, Wisconsin, Wyoming
**- Only Colorado, Illinois, and West Virginia have above 20% in following year while others still have low participant****

## 3 State which have growth rate in SAT

- Previous page I have show state which has lower than 20%
- Their was 3 state which have growth rate significantly is Colorado, Illinois, and West Virginia
- As you can see from my post hypothesis as the SAT participant in crease, ACT in these 3 state is drop
- But what cause this significantly growth?

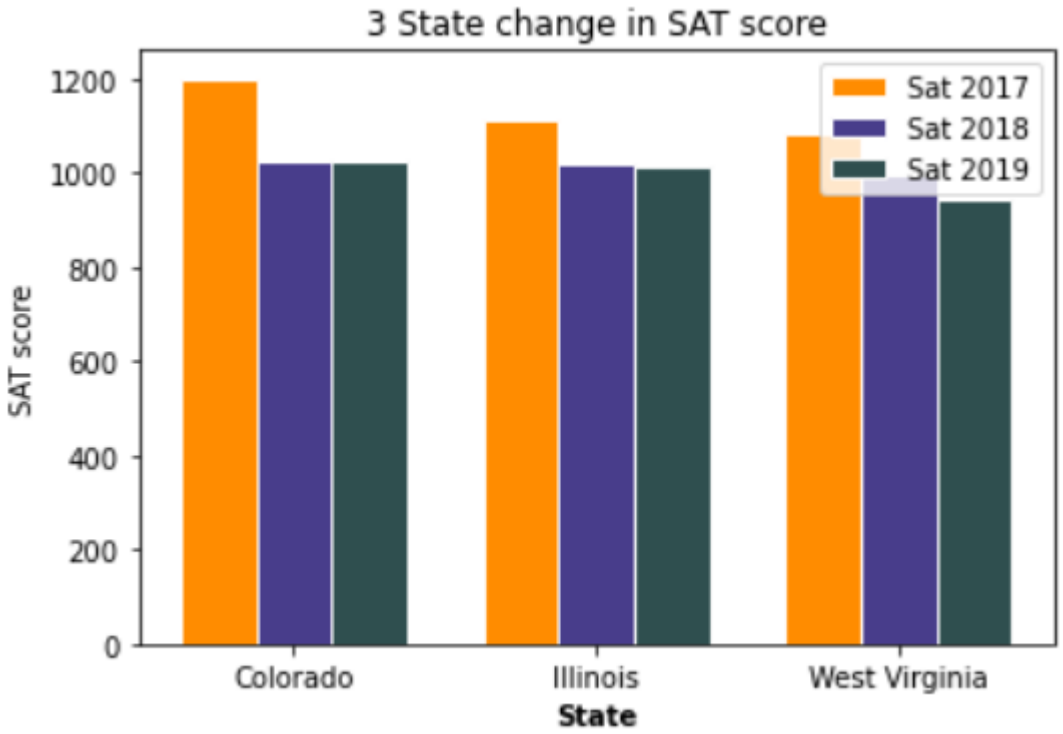
## From outside research

- Colorado:  As of the 2016-17 school year, all Colorado juniors in public schools will take SAT
- Illinois: 2016-17 school year, all Illinois juniors must take the SAT
- West Virginia: All juniors must take the SAT unless taking the West Virginia Alternative Summer Assessment.

**“One of our key stakeholder in improve SAT is college board in each state. And also fee that each college help to substitute for student”**

# Participation rate V.S. score

| state | total_2017 | total_2018 | total_2019 |
|---|---|---|---|
| Colorado | 1201.0 | 1025.0 | 1024.0 |
| Illinois | 1115.0 | 1019.0 | 1013.0 |
| West Virginia | 1086.0 | 999.0 | 943.0 |




**So, we can assume that it's negative co-relate or not?**

- Previously, we see the negative co-relation is that True?
- As you can see from 3 state we mentioned before. Although SAT participation percent grow significantly but average score is nearly same the year before (which have low SAT participant rate)
- Accordingly, **Participation rate and score is not relevant!!**
- Furthermore, I do outside research, The lowest participating states tend to send primarily their best students and have the highest scores. This results in bias

# Conclusion

**Conclusion**

1. **If you need to improve the participation, do focus on state that have participation lower than 20% they growth with significantly like Colorado, Illinois, West Virginia.**
    - Colorado,  Illinois, West Virginia state starting force juniors must take sat that's why it was increasing significantly(reference - https://blog.prepscholar.com/which-states-require-the-sat)
    - From data comparison you can see that state which has 100% participant is state that ***require*** SAT for junior year
2. **Negative co-relation between participant ACT and SAT is exactly true (relevant with negative co-relation)**
    - Most of student focus on testing either ACT or SAT. You can see from graph above if their is high participant in SAT, ACT will be lower
    - Recommendation: focus on low state to improve participant of SAT percentage
3. **Negative co-relation between percent of participant and score is "BIAS!!"**
    - Firstly I have look through 3 years dataset of participant both ACT and SAT, it seems that the more participant rate, the lower the score.
    - However, I look through Colorado,  Illinois, West Virginia which change from above the participant rate change differently but average score drop just a little.
    - Therefore, I do outside research and found out that ***these averages score are biased by participation rates***. The lowest participating states tend to send primarily their best students and get highest scores.

# Recommendation

**Recommendation for increasing SAT participation rate**

1. **Fee of test:** Make a contracted with the college board to administer the SAT to administer the SAT to high school for free. And also fee waivers condition
2. **Provide free material:** provide the material test of the previous year, so student can have more source to study and make interest in SAT test
3. **Provide the knowledge:** visiting high school to provide the advantage and give knowledge to high school student. It's much easier to convince them directly in face-to-face conversation. And we can also collecting data from student/teacher to improve the way we can communicate to them back.
4. **Focus on low participant first!:** As we can see from data if we focus by state we can improve this efficiency

**Ask more data for deeper insight!**

1. Number of school in each state
2. The fee substitute for ACT / SAT in each state


Thank You
For being a great audience!