



# DSI Project 1: Group 1

An analysis of SAT/ACT Participation and Scores (2017/18)

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# Problem statement:

*To improve student participation and expand the use of SAT in US college admissions, which state should the College Board be focusing its advocacy efforts to maximize SAT enrollment?*

# Presentation Outline



1. SAT/ACT data sets used
2. Exploratory Data Analysis (EDA)
3. Key findings
4. Recommendations

# Data Sets Used



## 1. List of data sets used (Internal)

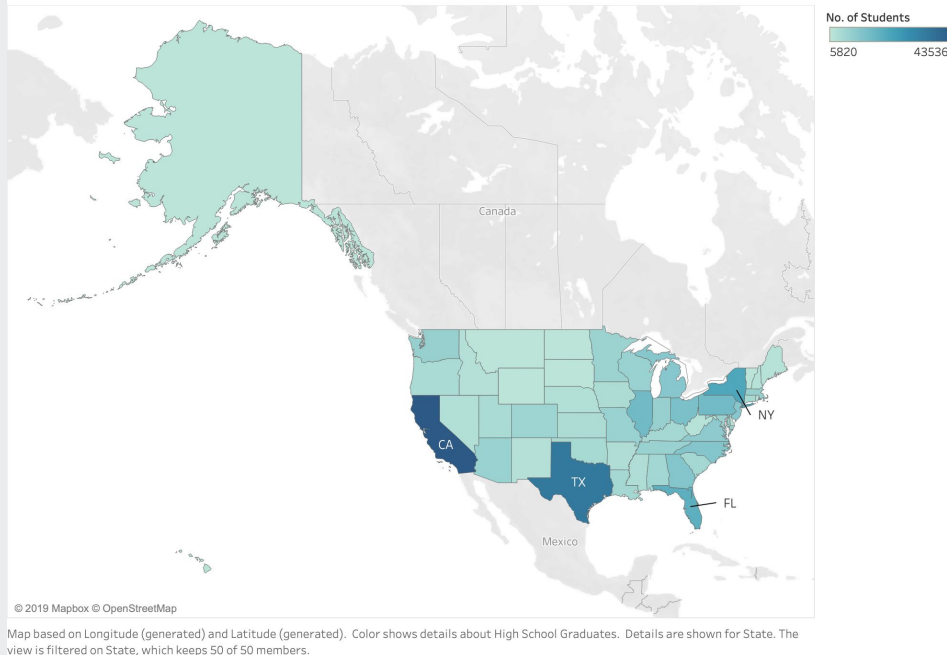
- *ACT 2017/2018*
- *SAT 2017/2018*

## 2. List of data sets used (External)

- *State student pop., No. who took SAT 2017/2018*
- *High-school student projections (2010-30)*

# Understanding the Market

Number of High School Students in 2018



## High-school student distribution across the US

High School Students

State	
California	435365
Texas	341613
New York	206830
Florida	181306
Illinois	146800
Pennsylvania	139053
Ohio	124473
Georgia	106727
North Carolina	106104
Michigan	104586
New Jersey	103598

## Top 10 states with the most high-school students

# EDA: *Untapped Student Potential (USP)*

Formula:

$$USP = S \times p$$

USP = Untapped Student Potential  
S = High School Student Population Size  
p = Percentage of High School Students  
who have not taken the SAT

## SAT 2018 Participation Data

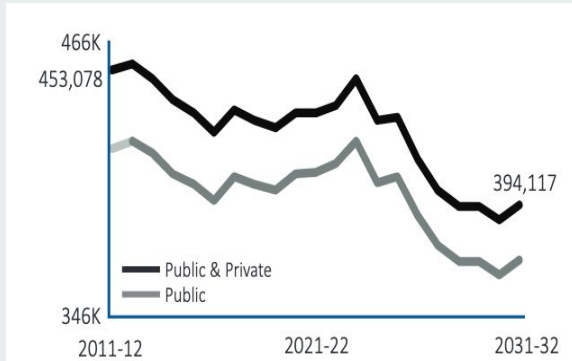
	No. of SAT Takers	No. of High School Students	Percentage Taken (%)	Percentage Not-Taken (%)
State				
California	262228	435365	60	40
Texas	226374	341613	66	34
New York	162551	206830	79	21
Florida	176746	181306	97	3
Illinois	145919	146800	99	1

S

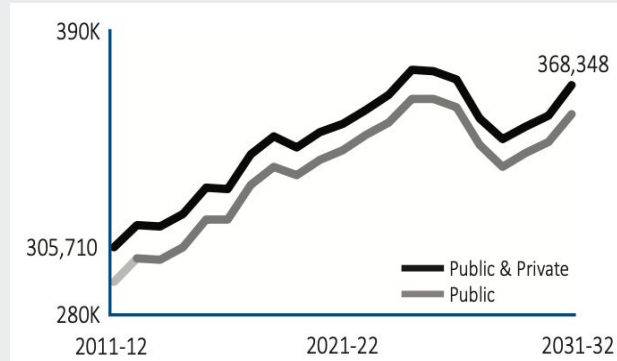
p

USP

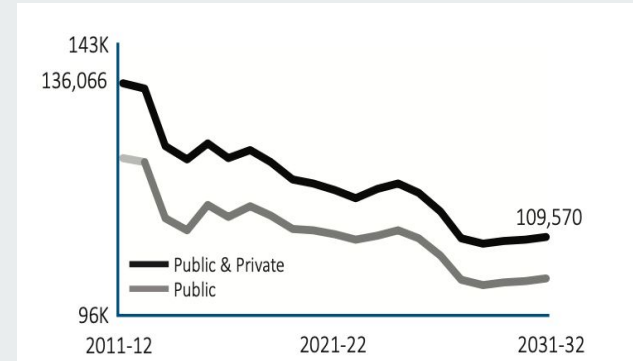
# EDA: *High-school student growth projections 2020-2030*



California



Texas



Ohio

## Observations:

- Number of high-school students from California and Texas is projected to remain high for the coming decade.



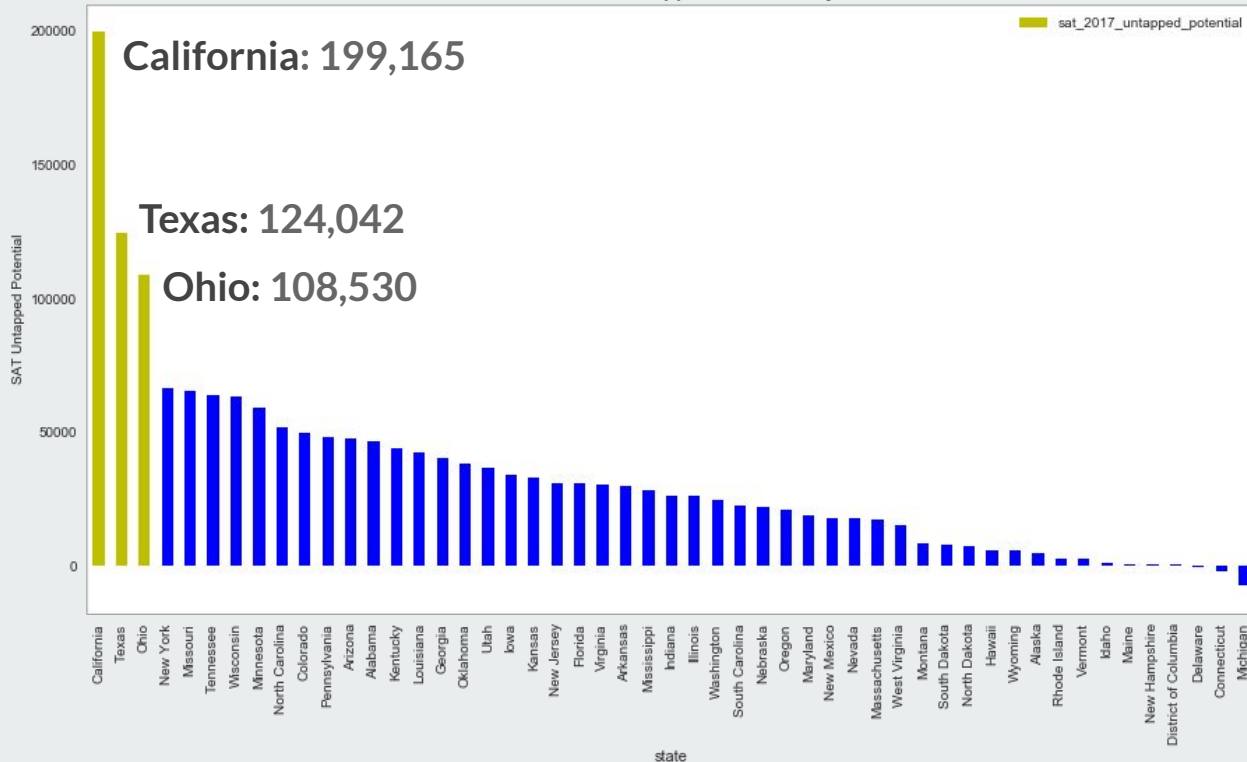
# EDA: California, Texas, Ohio

*Selected due to a high student population with sustained potential for SAT expansion within these states*



# EDA: *Measuring untapped student potential (2017)*

SAT 2017: Total Untapped Potential by State



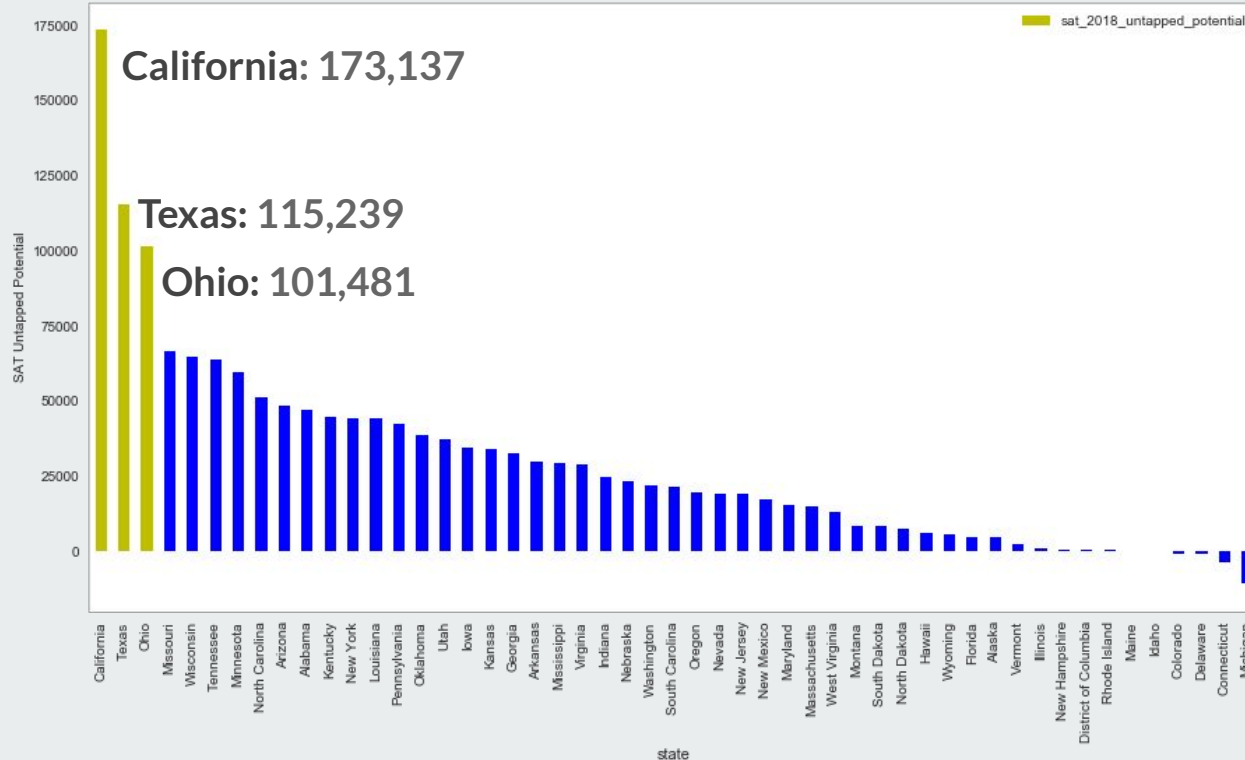
Formula:

$$USP = S \times p$$

USP = Untapped Student Potential  
S = High School Student Population Size  
p = Percentage of High School Students who have not taken the SAT

# EDA: *Measuring untapped student potential (2018)*

SAT 2018: Total Untapped Potential by State

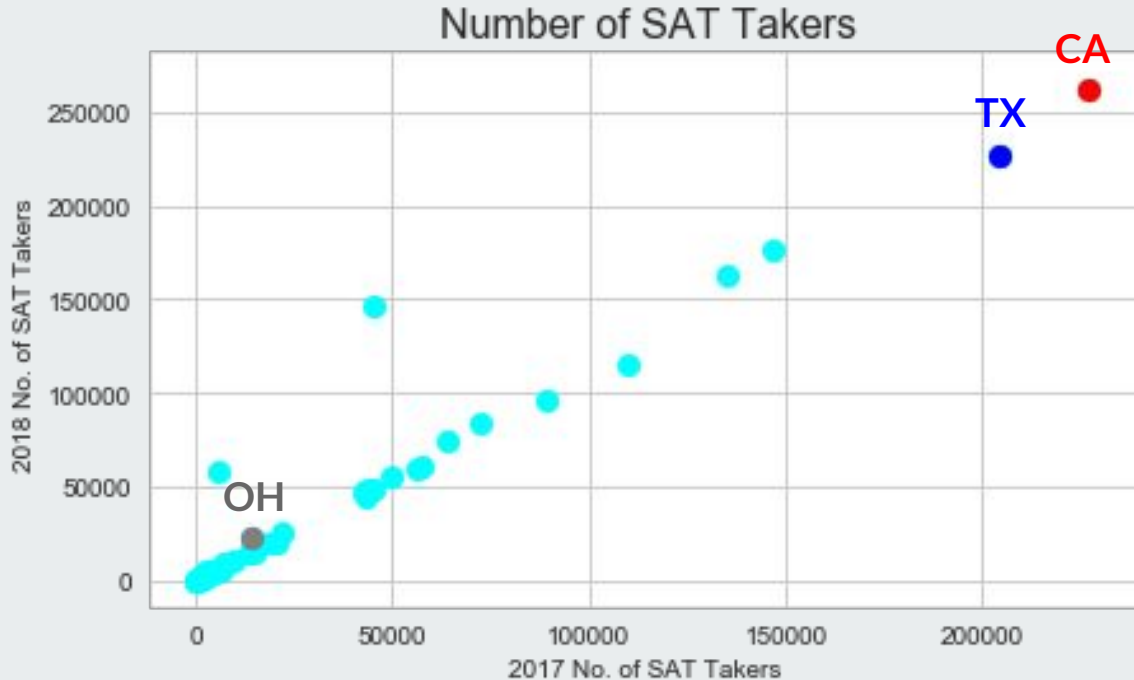


Formula:

$$USP = S \times p$$

USP = Untapped Student Potential  
S = High School Student Population Size  
p = Percentage of High School Students who have not taken the SAT

## EDA: *Correlation of SAT demand from 2017-18*

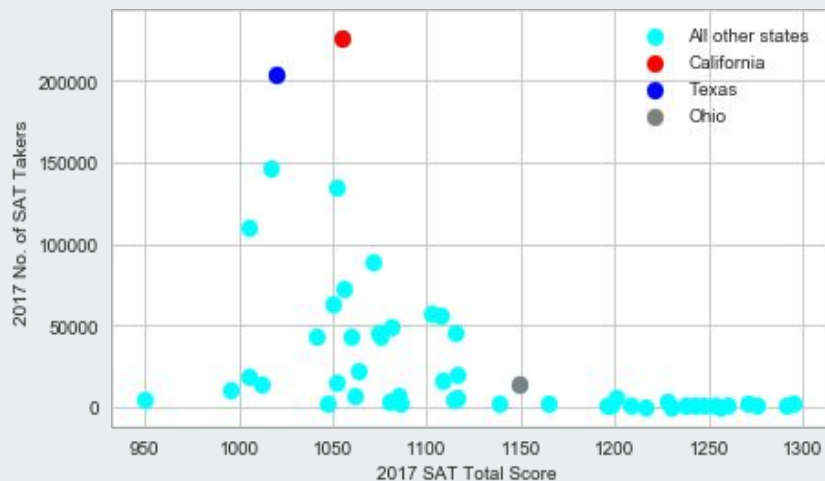


### Observations:

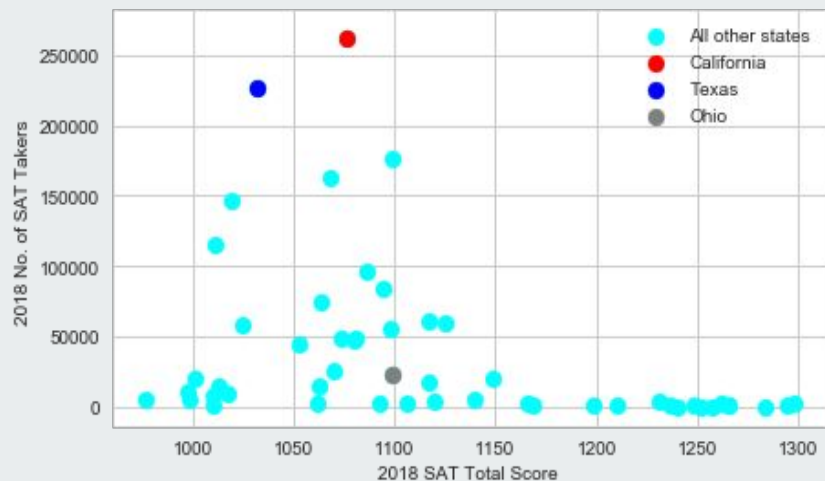
- A strong positive correlation between number of SAT takers in 2017 and 2018.
- **California:** Highest demand (in terms of absolute numbers) for the SAT.

# EDA: *Corr between SAT scores and # of test-takers for 2017-18*

2017



2018



**No correlation** between the number of SAT takers and their total score for all states, nor California

# EDA: *US state SAT scores across 2017-18*

## Observations:

### SAT 2017

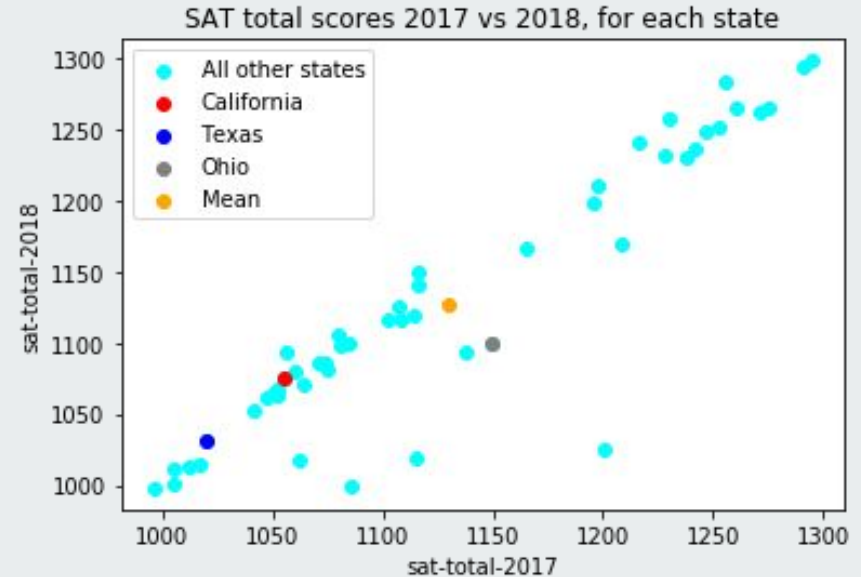
- National Avg: 1126
- California: 1055
- Texas: 1020
- Ohio: 1149

### SAT 2018

- National Avg: 1125
- California: 1076
- Texas: 1032
- Ohio: 1099

## Relevance:

1. California and Texas' SATs scores are lower generally lower than the US National average.
2. Understanding the reasons behind could help the formulation of possible solutions.



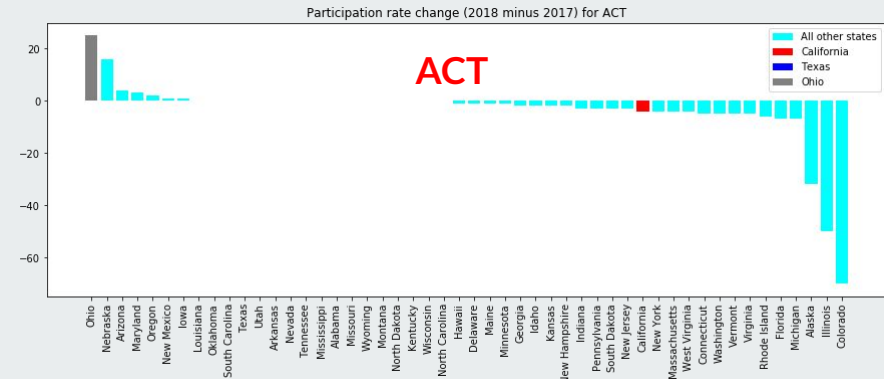
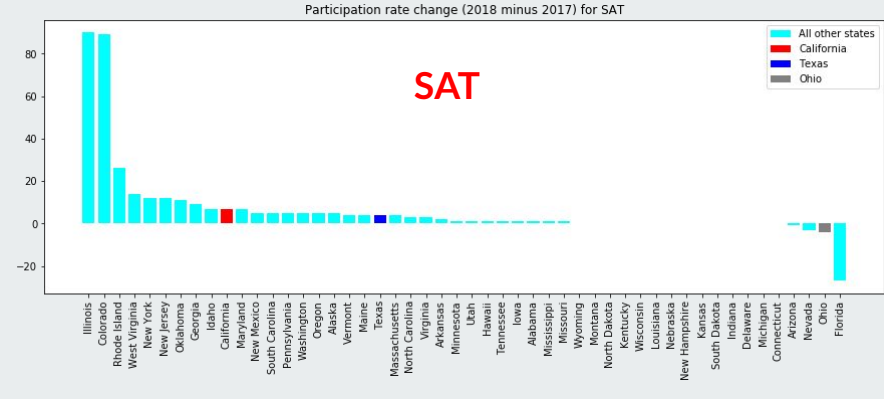
# EDA: *SAT/ACT Participation Changes from 2017-18*

## Observations:

- SAT: Slight increase in participation rates for California and Texas, but a drop for Ohio.
- ACT: Slight drop in participation rates for California, and an increase for Ohio. No change observed in Texas.

## Relevance:

- Investigating the causes behind these changes could aid policy formulation efforts.



# EDA: SAT Score changes from 2017-18

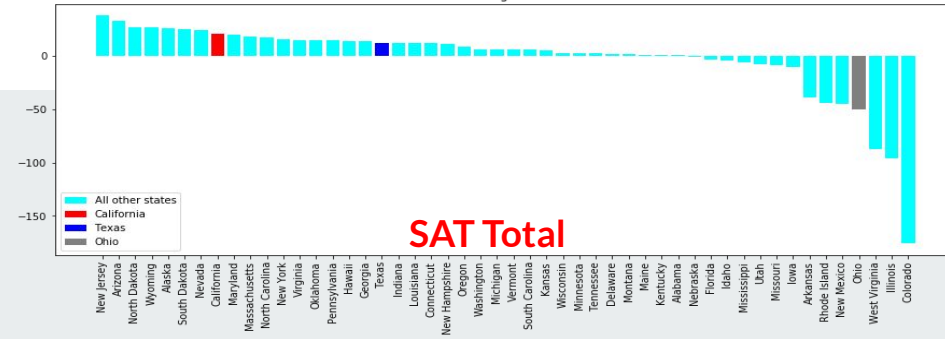
## Observations:

- Good increase in total, reading, math for California and then Texas.
- But sizeable drops for Ohio.

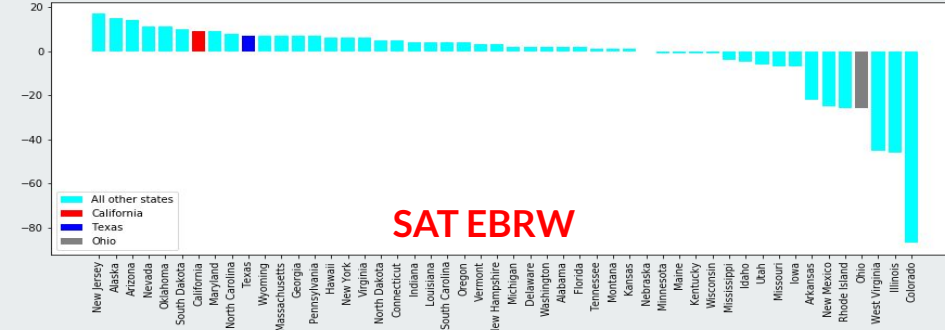
## Relevance:

- Are there areas in state's education policies which we can target to further improve scores?

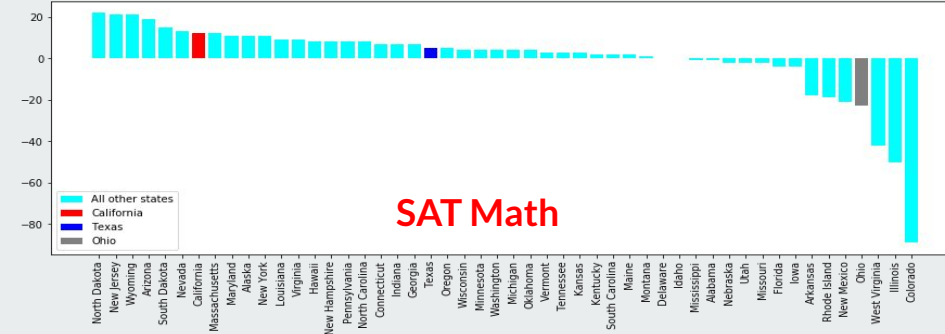
SAT total score change (2018 minus 2017)



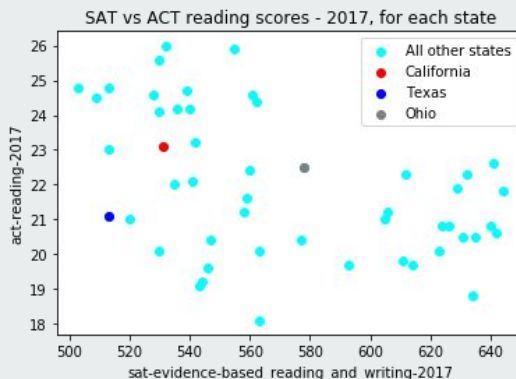
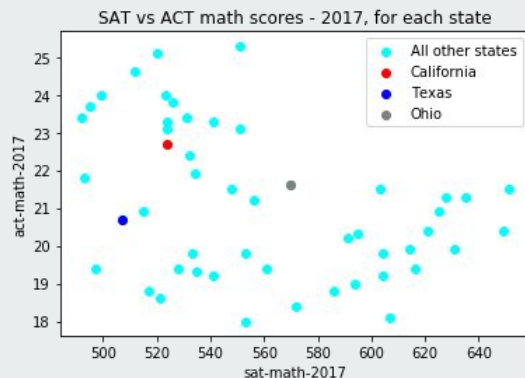
SAT reading score change (2018 minus 2017)



SAT math score change (2018 minus 2017)



# EDA: *SAT vs ACT scores across US states in 2017*



## Observations:

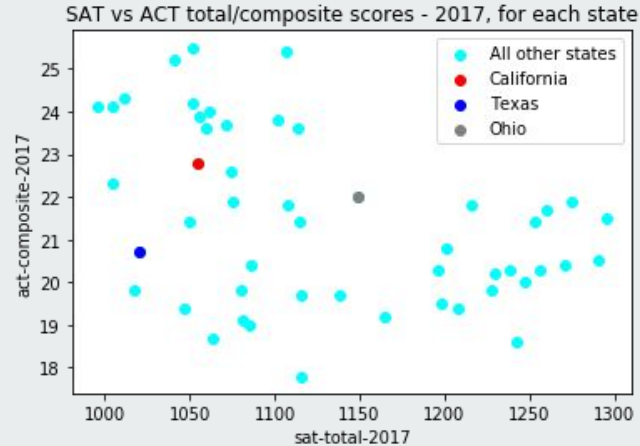
1. No correlation between ACT & SAT scores
2. For **California and Texas**, their **low SAT total scores are clearly due to their poor math AND reading/verbal scores**, relative to other states.

## Relevance:

Looks like if we want **to raise their participation rates**, we might have to first help boost **their math and reading/verbal scores**, and hence their confidence in taking the SAT tests, to raise participation rates



# EDA: *SAT vs ACT total/composite scores*



1. For **California and Texas**, they tend to do relatively poorly in **SATs**, vs other states.
2. In fact **California does better in ACTs** than in **SATs**.

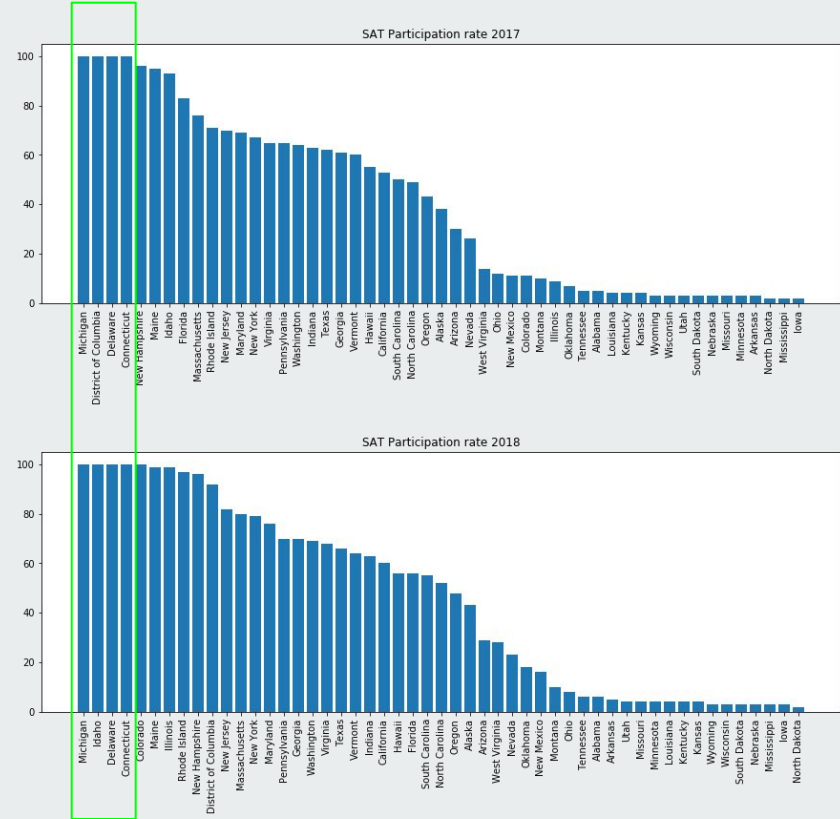
Looks like we have **much work to do**, to **poach** students over from ACTs to SATs

# EDA: *Highest SAT participation rates in 2017-18*

## Observations:

- Michigan, Delaware, Connecticut at 100%

Are they doing something right there?

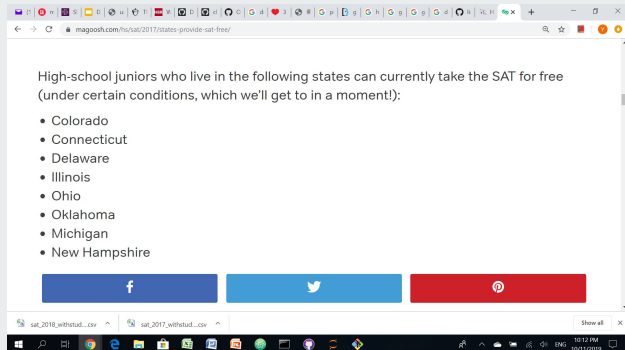


# EDA: *Highest increase in SAT participation rates from 2017 to 18*

Illinois, Colorado.

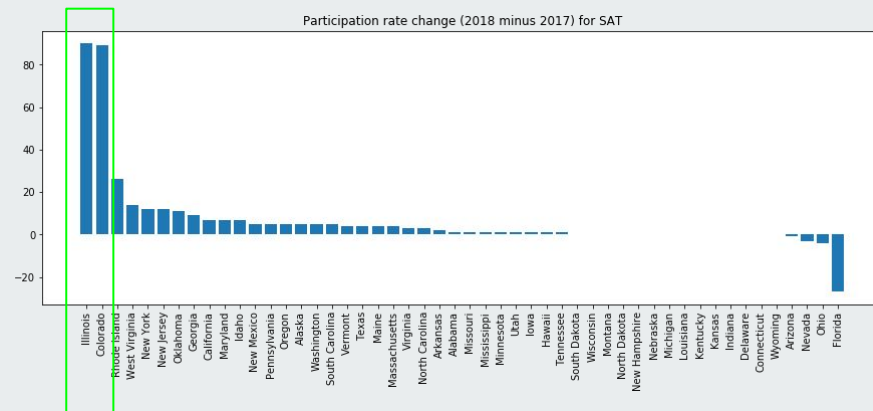
Are they doing something right there?

Indeed!



Free SAT testing

<https://magoosh.com/hs/sat/2017/states-provide-sat-free/>



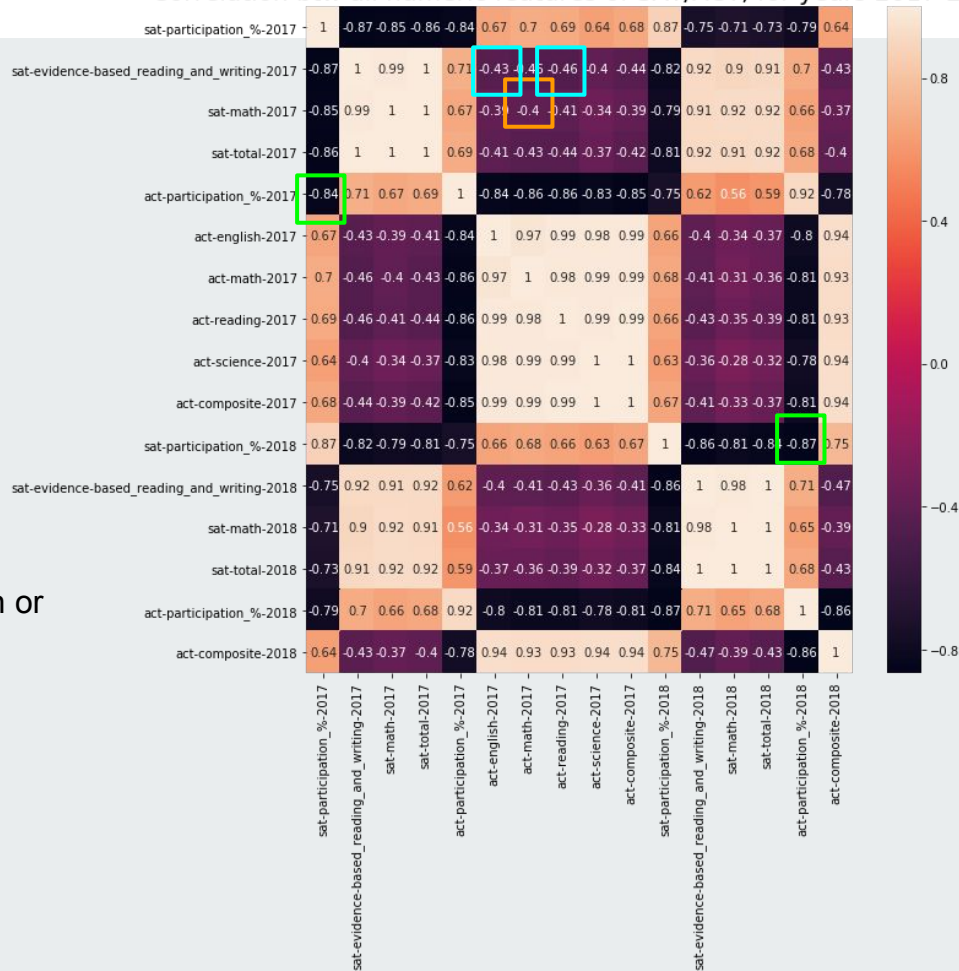
## Relevance:

1. Understanding the rationale behind the implementation of free or mandatory testing could help us in our solution formation.

# EDA: *Correlations*

1. SAT Participation rates tend to be inversely correlated to SAT Total scores (from sns.heatmap, 2017: -0.84, 2018: -0.87). Likewise for ACT (Green)
2. Doing well in SAT math, doesn't correlate to doing well in ACT math (see 2017's -0.4 corr score) (Orange)
3. Likewise, doing well in SAT reading/verbal, doesn't correlate to doing well in ACT english or reading (see 2017's -0.43 and -0.46 corr scores) (Cyan)

Correlation btw all numeric features of SAT/ACT, for years 2017-2018



# Key Takeaways: Target the state of California



1. It is proposed that the College Board focus SAT advocacy efforts for the **state of California**.
2. Based on current trends, and all things constant, the USP for California is expected to remain high.
3. SAT scores from California are generally lower than the US national mean.
4. A large majority of California high-school SAT takers send their SAT scores within California
5. 86% of in state California universities require SAT for admission

# Most students taking the SAT in California submit their results to in-state colleges

Institution	State	Type	Number of Students	% of Score Senders <sup>1</sup>
California State University Apply	CA	Public College	51,085	25.7%
University of California: Los Angeles	CA	Public College	36,347	18.3%
University of California: Irvine	CA	Public College	35,845	18.0%
California State University: Long Beach	CA	Public College	30,040	15.1%
San Diego State University	CA	Public College	29,618	14.9%
University of California: Davis	CA	Public College	26,040	13.1%
University of California: Berkeley	CA	Public College	25,835	13.0%
University of California: Santa Barbara	CA	Public College	25,534	12.8%
University of California: San Diego	CA	Public College	25,514	12.8%
University of Southern California	CA	Private College	24,685	12.4%
California Polytechnic State Univ San Luis Obispo	CA	Public College	23,434	11.8%
California State University: Fullerton	CA	Public College	23,250	11.7%
University of California: Riverside	CA	Public College	19,316	9.7%
San Jose State University	CA	Public College	17,779	8.9%
University of California: Santa Cruz	CA	Public College	17,523	8.8%
San Francisco State University	CA	Public College	16,370	8.2%
California State University: Los Angeles	CA	Public College	15,360	7.7%
California State University: Northridge	CA	Public College	14,715	7.4%
California State Polytechnic University: Pomona	CA	Public College	14,667	7.4%
California State University: Sacramento	CA	Public College	14,035	7.1%
Stanford University	CA	Private College	13,894	7.0%

# Recommendations



**Further studies into California state background/policies are necessary to identify the best course of action:**

- **California State Education Policy:**
  - College opportunities and student prep/assistance schemes?
  - Is there sufficient demand/need to implement mandatory SAT testing?
- **High-school Students Background:**
  - How receptive are California students towards college education?
  - How do their family backgrounds affect their career choices?
- **College Admission Policy:**
  - How do California state colleges rank students applications?
  - Are there College assistance schemes for underprivileged applicants?



# Thank You!

Questions?