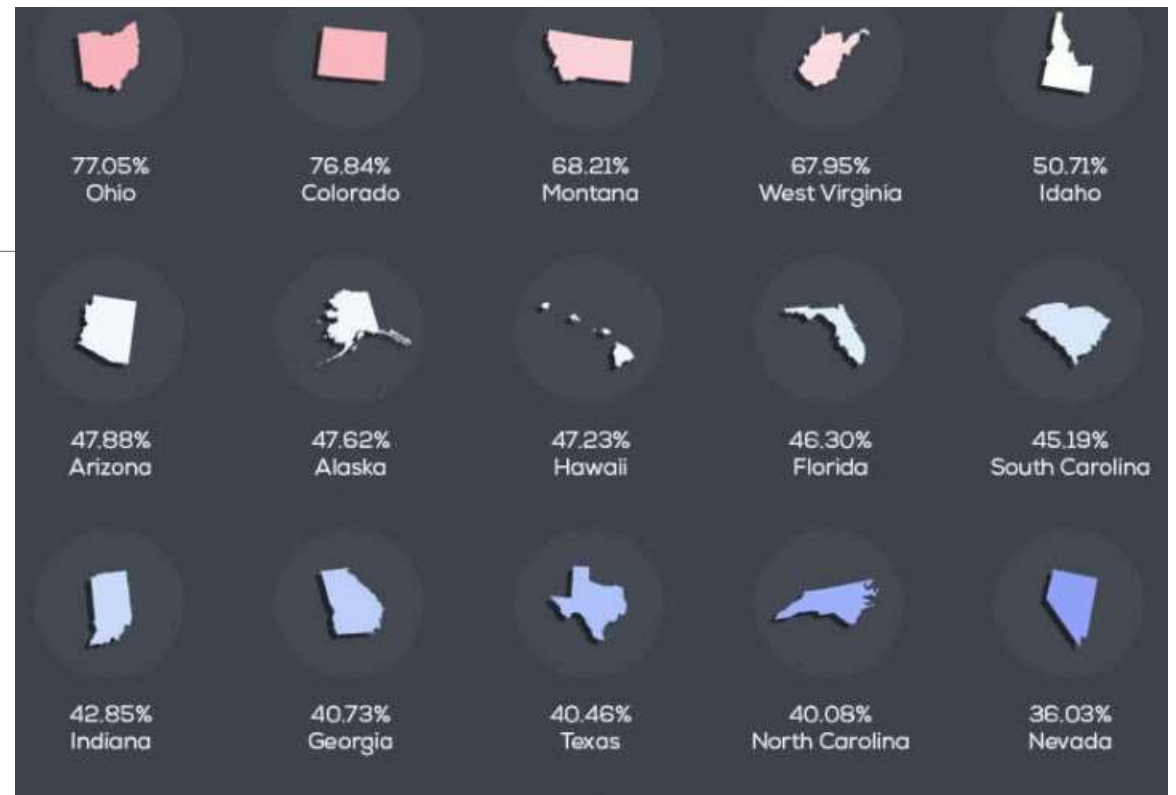
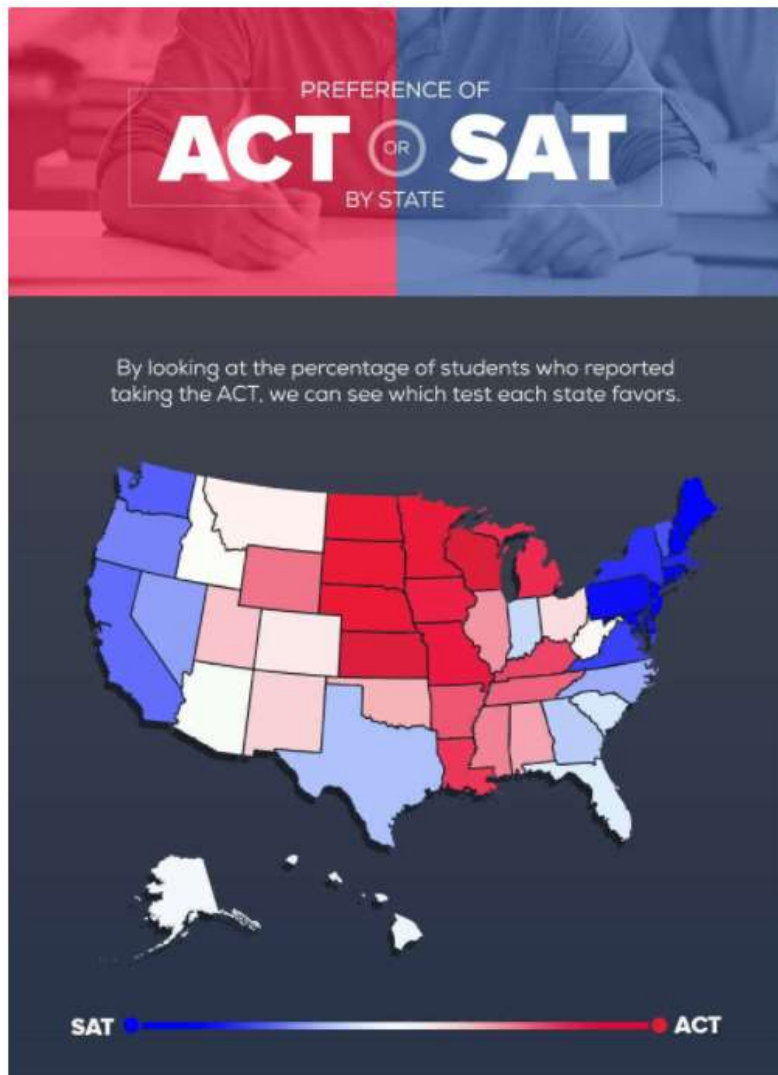




Should Hawaii state sign a statewide contract with either?  
Role: Consultant to the state actor of Hawaii.

CHEN TIANCHENG



Hawaii remains one of the remaining test neutral state



**SAT**

**HAWAII STATE**

**ACT**

# Data driven Methodology

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1. Identify the problem statement
2. Source for credible and useful data
3. Data cleaning and merging of dataframe
4. Exploratory data analysis
5. Findings and recommendations

# Data cleaning

Year	Type	State	Description	Error or issue	Fix
2017	SAT	Maryland	Abnormally low minimum Math score for Maryland at 52 when lowest score supposed to be 200.	52	524
2017	ACT	Maryland	Abnormally low minimum Science score for Maryland at 2.3.	2.3	23.8
2017	ACT	National	Extra meaningless row to be removed		
2017	ACT	Wyoming	Typo error in Wyoming 20.2x	20.2x	20.2
2018	ACT	Maine	Repeated row	Repeated row	Drop row
All	All	Participation column	String due to % at the end	String	To float
All	All	All column headers	Rename columns to consistent nomenclature and lower cases		
All	All	All	Merge into a single dataframe		

## Data cleaning (cont'd)

Year	Type	State	Description	Error or issue	Fix
2019	SAT	Puerto Rico	Contains letter " for its participation rate, also not part of 50 states of capital city of US.	"	Removed
2019	SAT	Virgin Islands	Contains letter " for its participation rate, also not part of 50 states of capital city of US.	"	Removed
2019	ACT	National	Extra meaningless row to be removed		
2019	All	Participation column	String due to % at the end	String	To float
2019	All	All column headers	Rename columns to consistent nomenclature and lower cases		

# Exploratory Data Analysis

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**From 2017 to 2019,**

**SAT participation rate up, but ACT participation rate down**

Mean SAT participation rate is at 39%, 45.7% and 49%.

Mean ACT participation is at 65.3%, 61.7%, 58.7%.

1) SAT gaining market share over the years and taking away ACT's dominant position. Number of 100% participation in SAT increasing as well, likely due to statewide contract and lobbying efforts working.

2) Both ACT and SAT was also losing participation due to colleges going test optional.

# Exploratory Data Analysis (cont'd)

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**From 2017 to 2019,**

**SAT and ACT total scores trending down**

Mean score of SAT total went from 1,126 to 1,120 and 1,113.

Mean score of ACT composite went from 21.51 to 21.50 to 21.46.

Both seem to suggest a drop in mean scores overall.



# Exploratory Data Analysis (cont'd)

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**From 2017 to 2019,**

**A few states have more than 50% participation for both SAT and ACT, and appears for a few years:**

**They are:**

- 1) Florida**
- 2) Hawaii**
- 3) North Carolina**
- 4) South Carolina**
- 5) Georgia**

**Key insight: Hawaii state is likely a highly contested state for ACT and SAT. As such, there is more bargaining power with both sides.**

# Data visualization – Heatmap findings

**1a) SAT participation has strong negative correlation with SAT sectional and total scores**

**1b) ACT participation has strong negative correlation with ACT sectional and composite scores**

- More people being forced to take exams when they don't want to.

**2a) Subject scores and total scores for 2017 SAT have a strong positive correlation with 2018 and 2019 SAT sectional and total scores.**

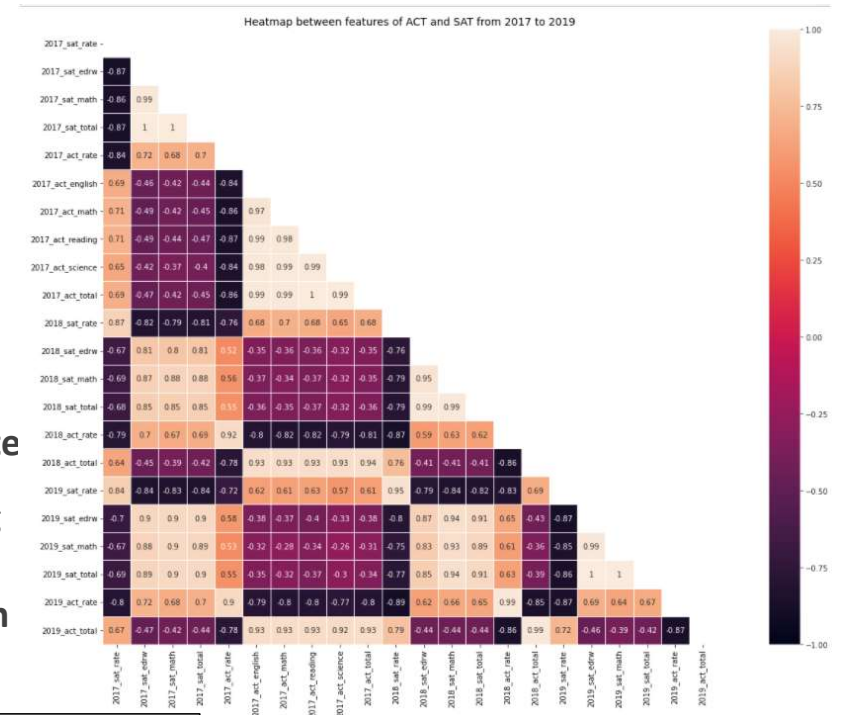
**2b) Subject scores and total scores for 2017 ACT have a strong positive correlation with 2018 and 2019 ACT sectional and composite scores.**

- States that do well in one exam in one year do well in other years, showing focus and consistency in results.

**3) Subject scores and total scores for SAT have a negative correlation with 2018 and 2019 ACT sectional and composite scores.**

- States tend to focus on one test and do better as a result.

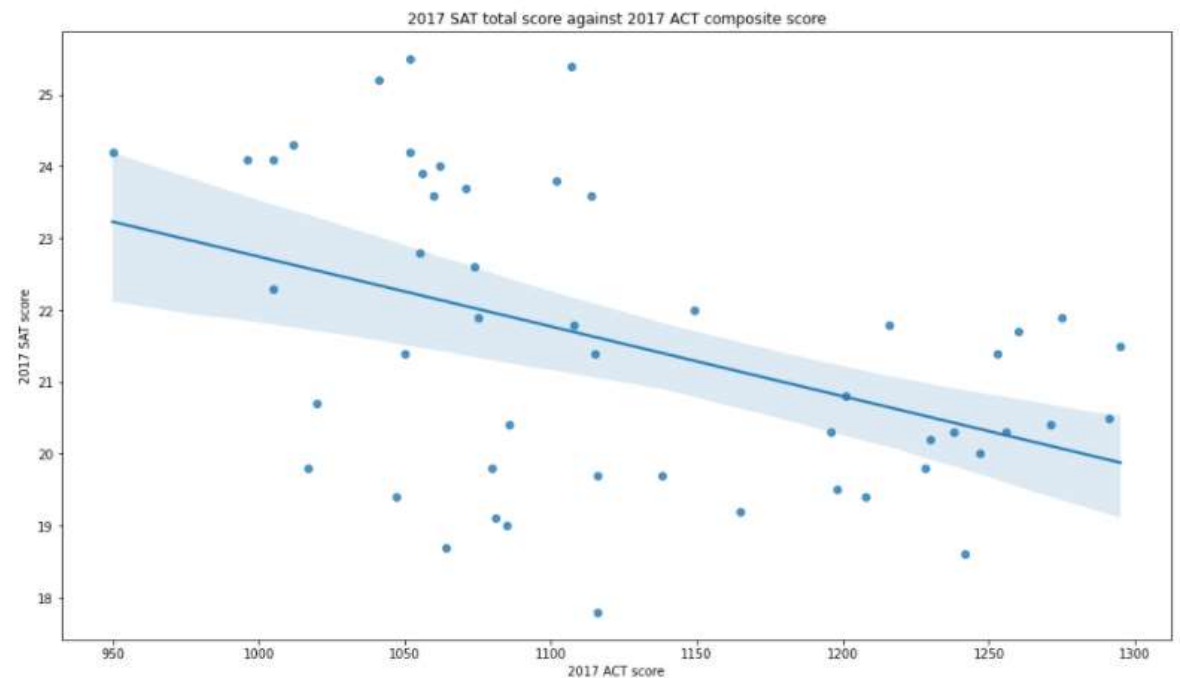
**Key insight: Creating high participation in one test can lead to side effect of lowered test score in Hawaii. To consider the tradeoff.**



# Data visualization – Scatterplot findings

## General negative correlation between SAT total score against ACT composite score

- Test takers and states favor one test and focuses on it.



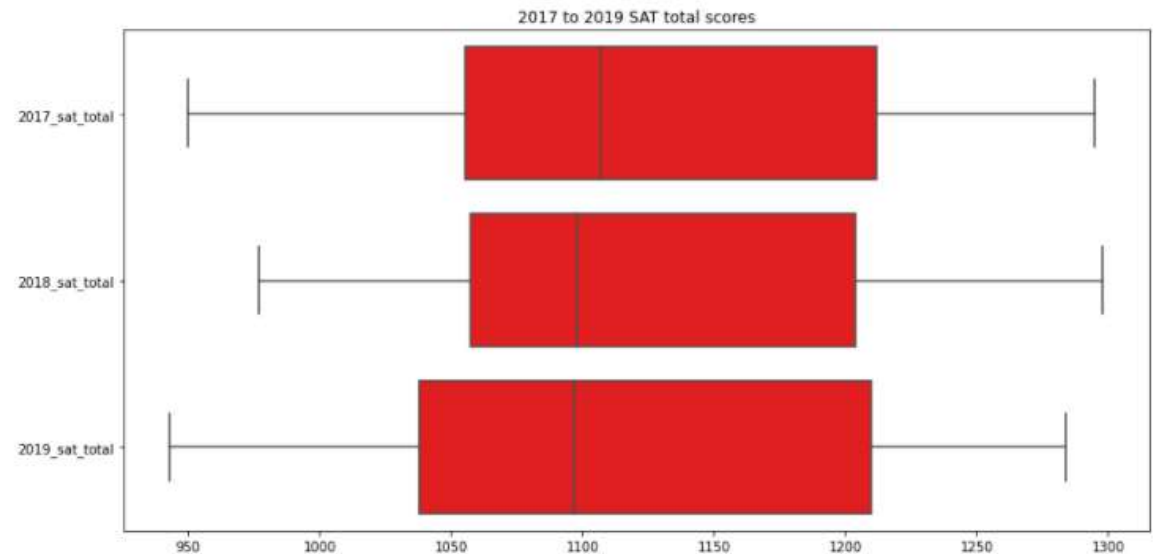
# Data visualization – Boxplot findings (specific finding SAT)

## 2018 left whisker shorter

- Seems to show its not that standardized
- Saga of leaked papers and overly easy difficulty in 2018

## Median score trending left and dropping

- SAT median total scores are falling (2017: 1107, 2018: 1098, 2019: 1097), a tradeoff of higher participation



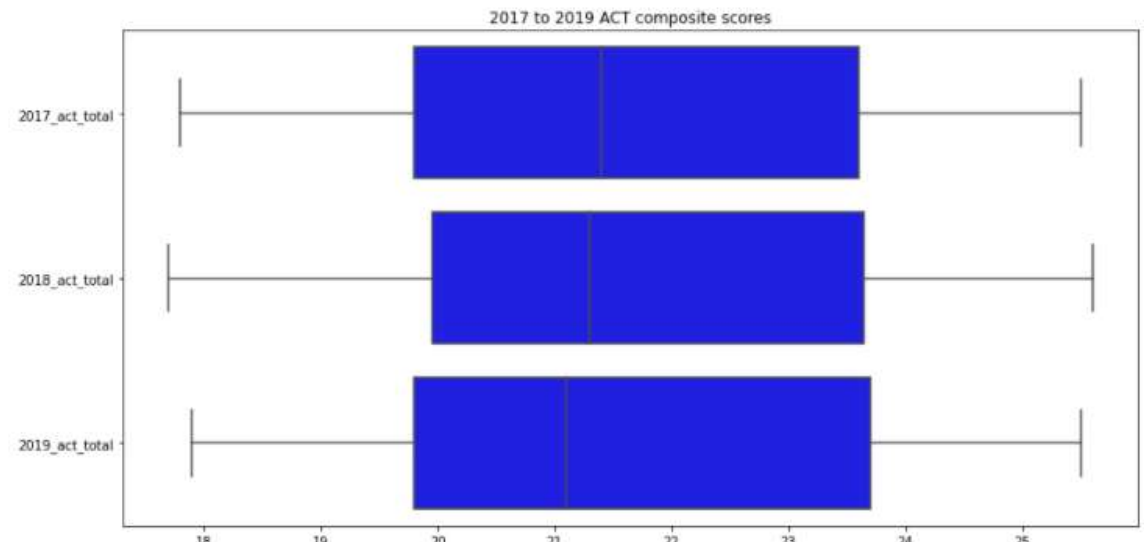
# Data visualization – Boxplot findings (specific finding ACT)

## Slight downtrend in medians

- ACT median total scores are falling (2017: 21.4, 2018: 21.3, 2019: 21.1).

## Similar sized whisker, IQR ranges

- From the similar sizes of wideness in both the Interquartile Range and whiskers, the composite scores is observed to be relatively stable.



**Key insight: ACT is the better standardized test for consistent measuring of performance.**

# Findings and conclusion

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**I recommend that Hawaii signed a statewide contract for ACT over SAT. ACT is the more consistent standardized testing.**

**Hawaii is in a special position for bargaining.**

- I would greatly recommend to the state actor that statewide contracts can give rise to economies of scale, allowing Hawaii to gain a bargain deals to be struck across a few years.
  - This may perhaps create or free up resources, where Hawaii can focus and channel into improving their test taker's preparedness.
  - I would also recommend for further tracking of scores and participation in the future, as SAT will revamp their test again in 2024.
  - There may be a tradeoff in overall scores that comes due to increased participation. State actor can funnel resources to address this tradeoff.
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