# Predicting High-School Graduation and Drop-out Rates

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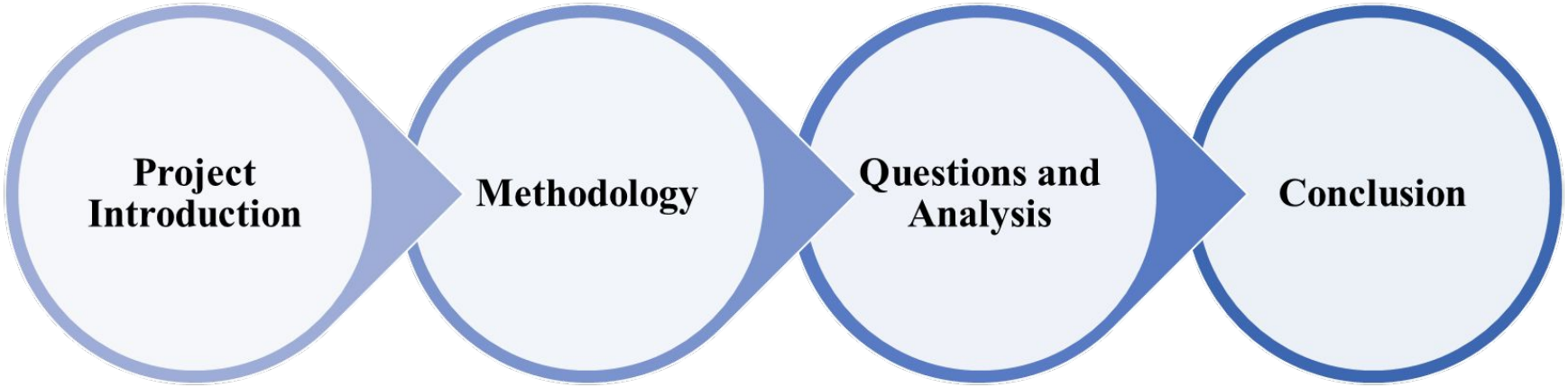
# AGENDA


Project Introduction
Methodology
Questions and Analysis
Conclusion

# INTRODUCTION

# THE IDEA

## National Centre for Education Statistics:

**Overall Dropout Rate**

5.3% in 2020

**Undergraduate Completion**

Rate: 63%

## Educational Equity & Attainment:

**Model**

School completion & Higher Education

**Factors**

Socio-Economic, Intelligence levels, Degree types

# THE PROJECT

**Who**

High School Students

**Where**

United States of America

**When**

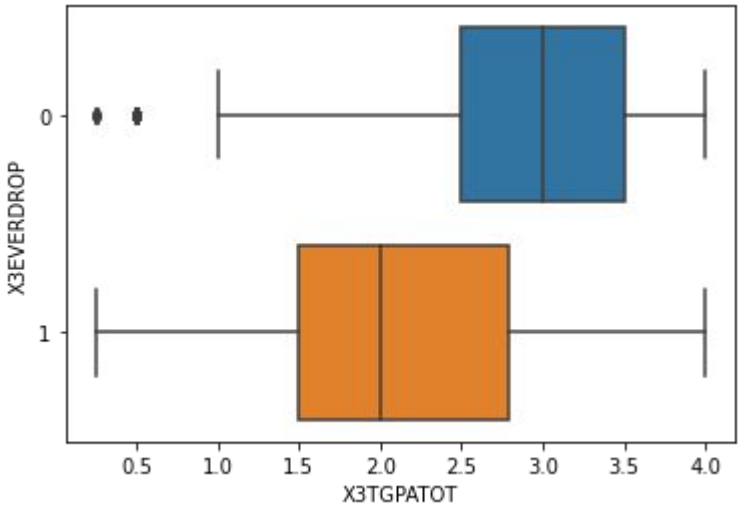
Panel Data Collected:

2009 to 2016

**Data Source**

National Center for Education Statistics

# EXPLORATORY DATA ANALYSIS

# METHODOLOGY

# MACHINE LEARNING MODELS

## PREDICTION

**Prediction model chosen because GPA and Math scores are continuous**

- Predicting Student GPA
- Predicting Student Math Scores
- Models
  - Linear
  - RidgeCV
  - LassoCV
  - Random Forest

## CLASSIFICATION

**We run Logistic Regression, Random Forest and Gradient Boost**

- Classifying Dropout Rates
- Classifying Higher Education and Employment

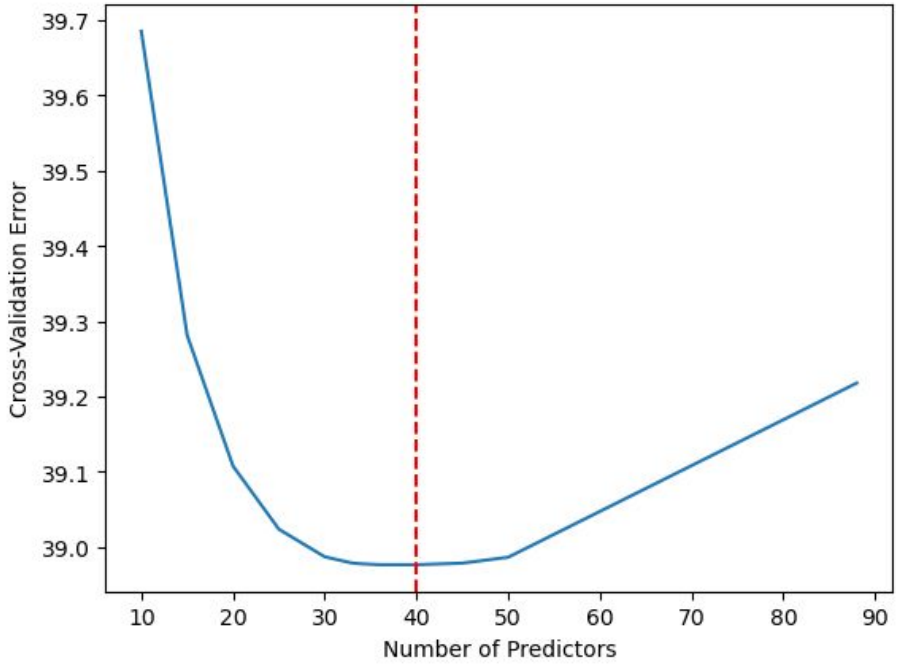
# Feature Selection

**Continuous Variables**

- ➔ Categorical Variables to Dummy Variables
- ➔ Ordinal Encoding
- ➔ SFS with ‘for loop’

**Categorical Variables**

- ➔ SelectFromModel



# KEY QUESTIONS

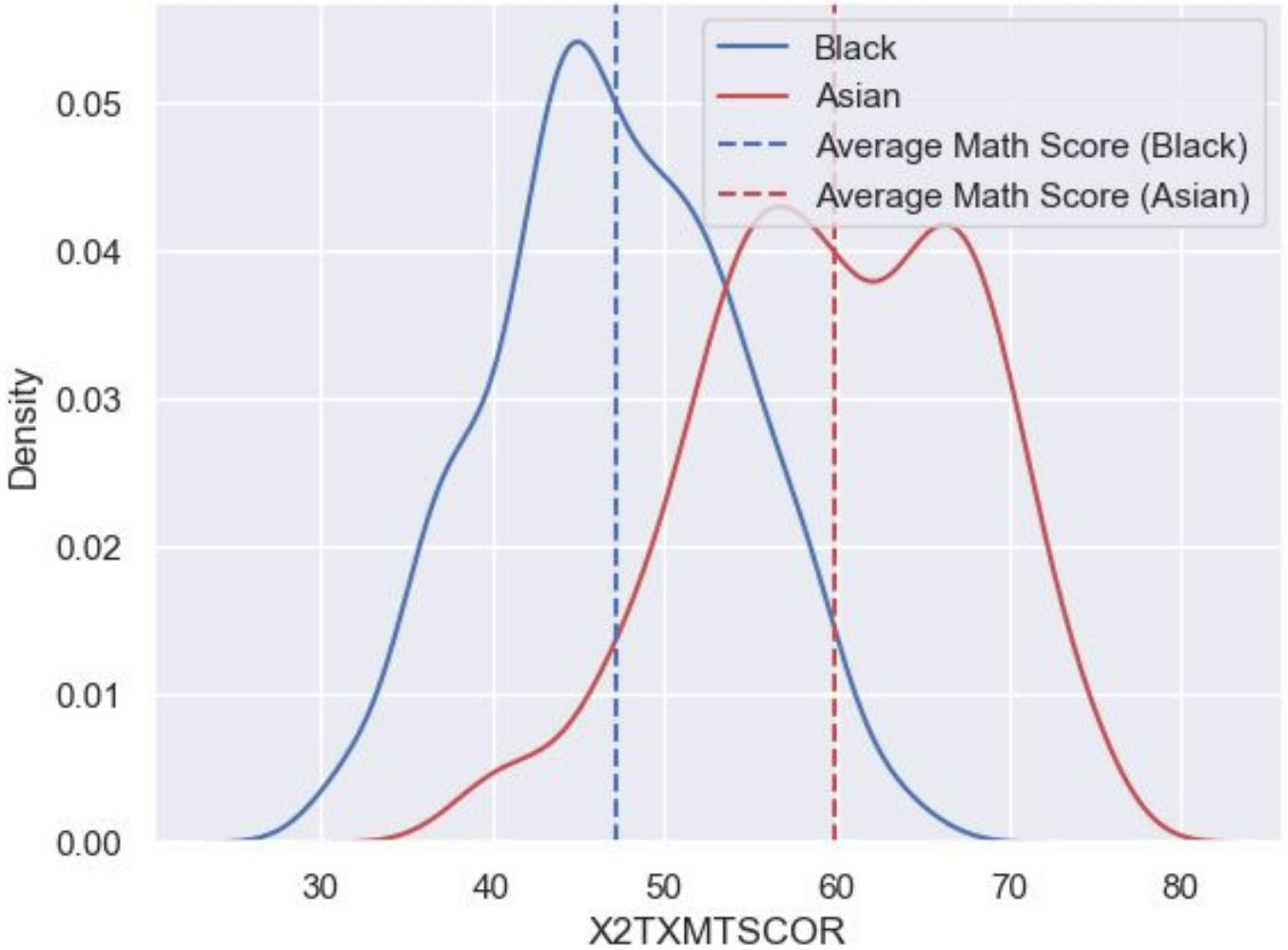
# PREDICTING THE MATH THETA SCORE

## KEY QUESTION

How significant are the disparities in math scores between black and non-black students?

## Findings & Conclusions

Black students tend to suffer institutional disadvantages that cause them to underperform in math, when compared to non-black students.


Black
Asian
Average Math Score (Black)
Average Math Score (Asian)
Density
0.05
0.04
0.03
0.02
0.01
0.00
30
40
50
60
70
80
X2TXMTSCOR

# PREDICTING GPA SCORES

## KEY QUESTION

How does a student's socioeconomic status as a 9th grader predict his or her educational success as in high school?

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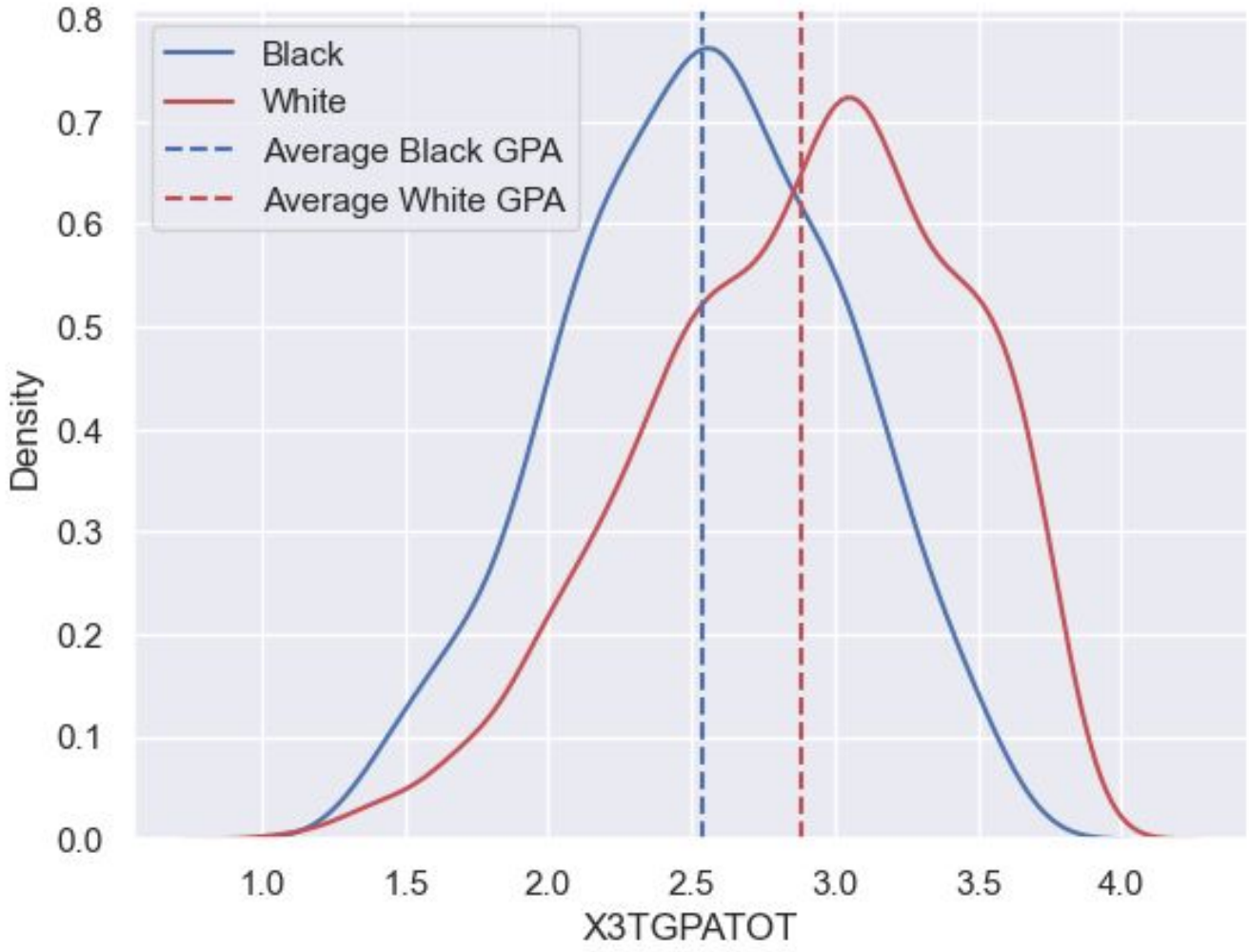
## Findings & Conclusions

With other factors held constant, on average, black students tend to have a lower GPA than white students. It is worth looking further into how institutional racism may factor into this.


Black
White
Average Black GPA
Average White GPA
Density
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
1.0
1.5
2.0
2.5
3.0
3.5
4.0
X3TGPATOT

# CLASSIFYING DROPOUT RATES

**KEY QUESTION**

How can we identify the key factors that influence drop out rates in a high school setting?

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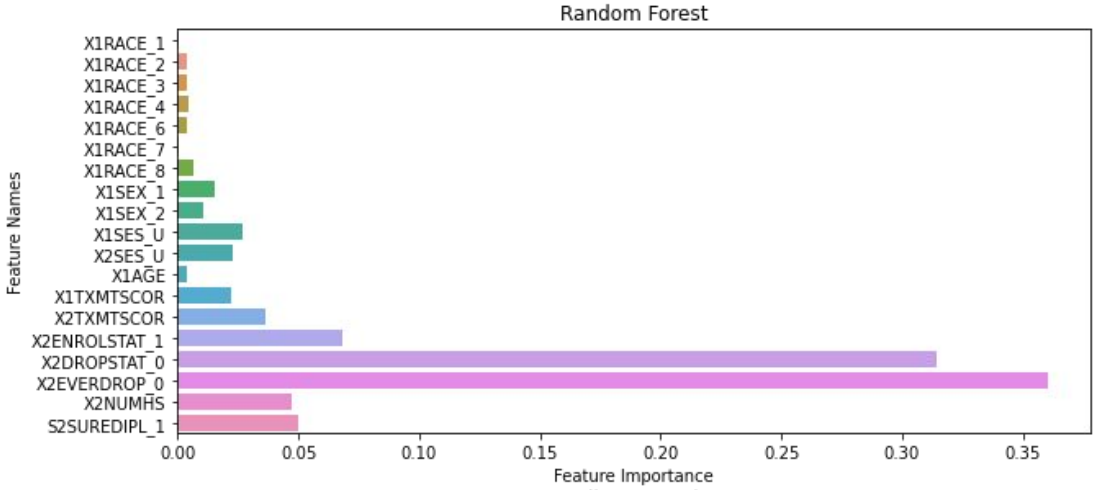
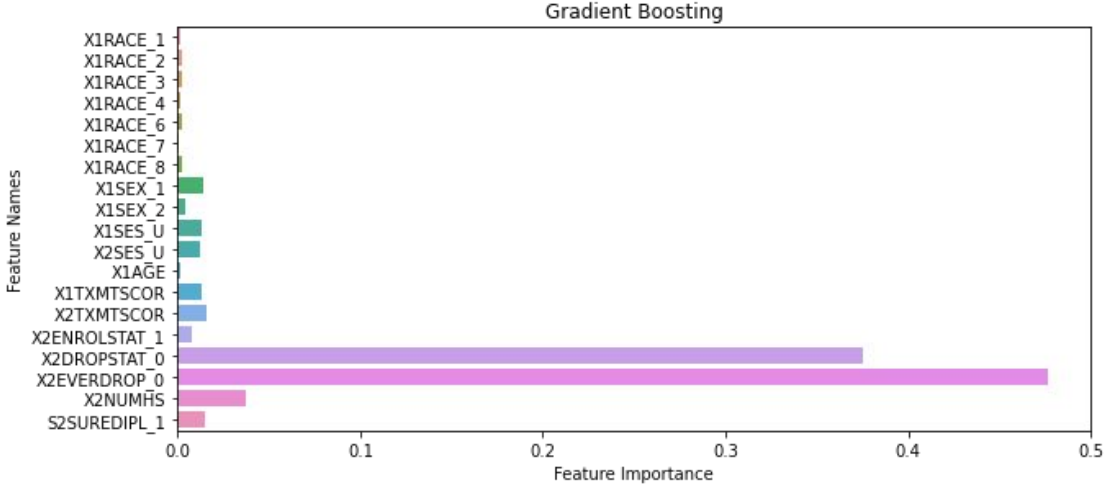
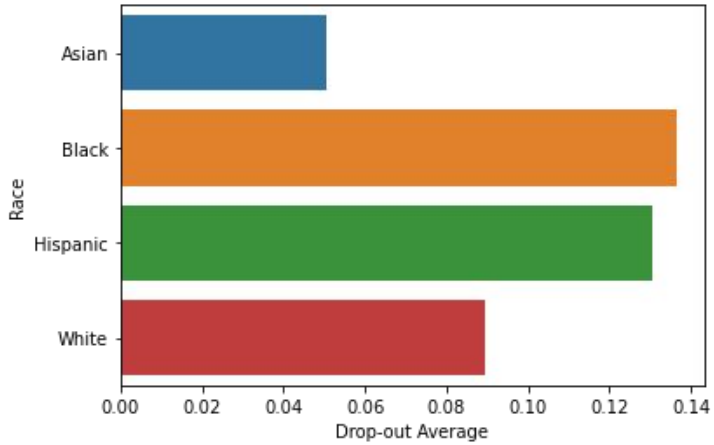
**Findings & Conclusions**

Black and Hispanic students are at a disadvantage and experience more drop out rates.

Feature Importance



# CLASSIFYING HIGHER EDUCATION & EMPLOYMENT

**KEY QUESTION**

How does basic education level influence Post Secondary Education and Employment Outcomes?

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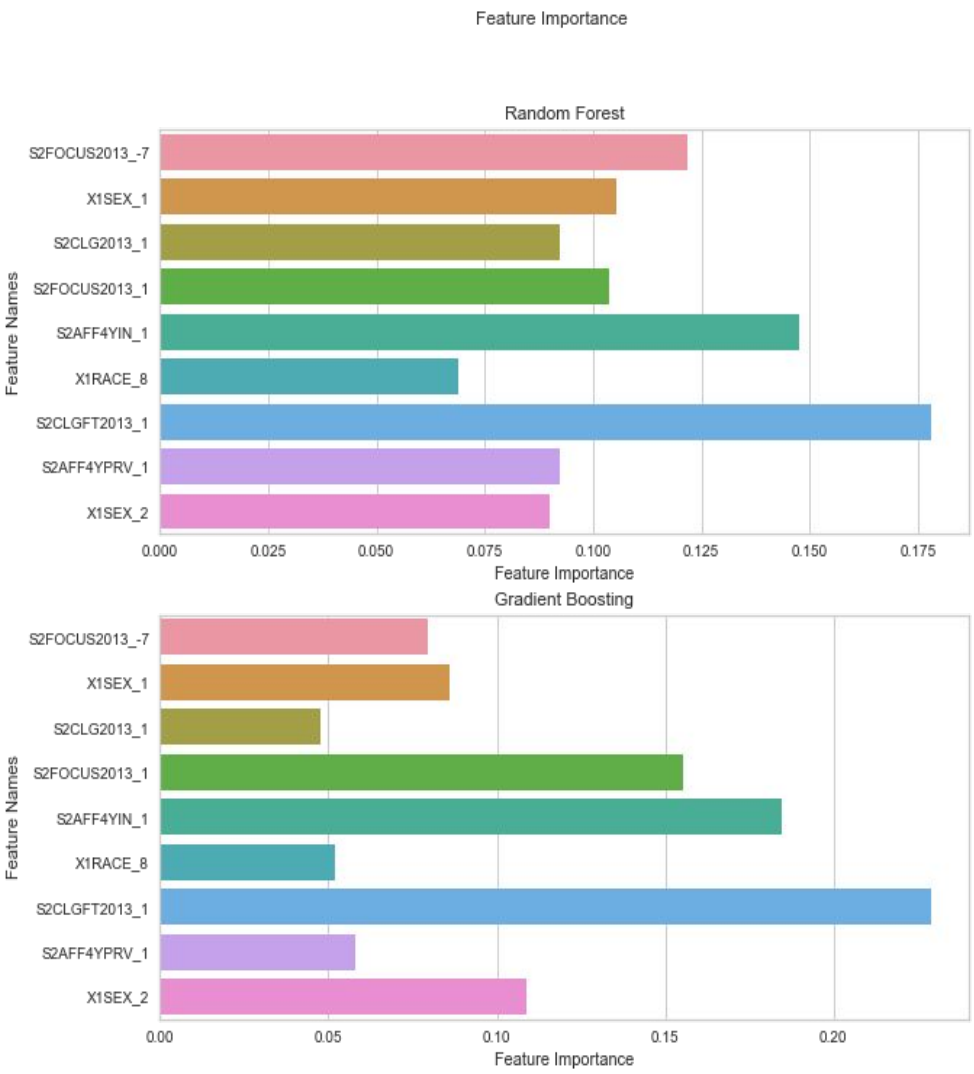
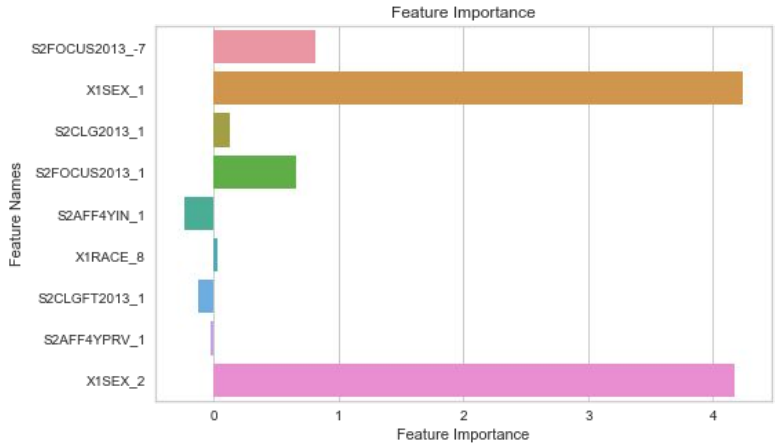
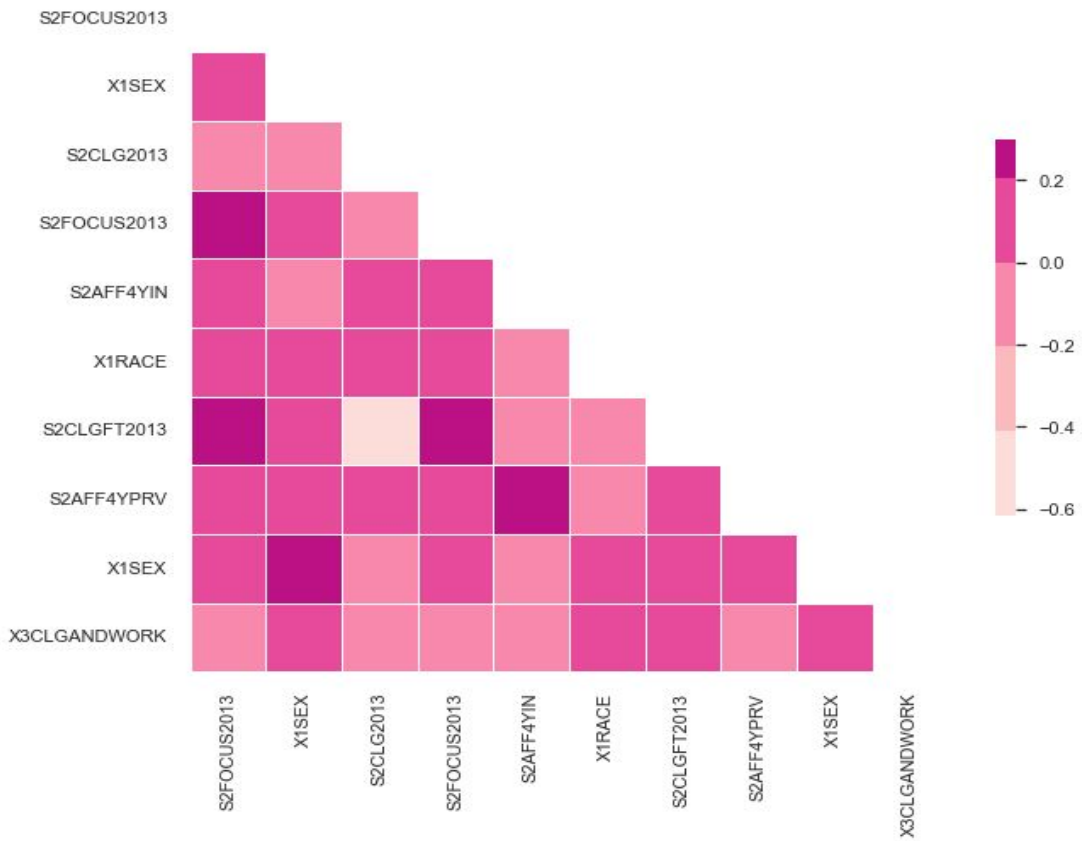
**Findings & Conclusions**

We observe that generally white, male students who intend to pursue higher education while they are in high school, are the ones who end up with education and employment opportunities.


Feature Importance
Random Forest
S2FOCUS2013_-7
X1SEX_1
S2CLG2013_1
S2FOCUS2013_1
S2AFF4YIN_1
X1RACE_8
S2CLGFT2013_1
S2AFF4YPRV_1
X1SEX_2
Feature Names
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
Feature Importance
Gradient Boosting
S2FOCUS2013_-7
X1SEX_1
S2CLG2013_1
S2FOCUS2013_1
S2AFF4YIN_1
X1RACE_8
S2CLGFT2013_1
S2AFF4YPRV_1
X1SEX_2
Feature Names
0.00
0.05
0.10
0.15
0.20
Feature Importance


Feature Importance
S2FOCUS2013_-7
X1SEX_1
S2CLG2013_1
S2FOCUS2013_1
S2AFF4YIN_1
X1RACE_8
S2CLGFT2013_1
S2AFF4YPRV_1
X1SEX_2
Feature Names
0
1
2
3
4
Feature Importance


S2FOCUS2013
X1SEX
S2CLG2013
S2FOCUS2013
S2AFF4YIN
X1RACE
S2CLGFT2013
S2AFF4YPRV
X1SEX
X3CLGANDWORK
S2FOCUS2013
X1SEX
S2CLG2013
S2FOCUS2013
S2AFF4YIN
X1RACE
S2CLGFT2013
S2AFF4YPRV
X1SEX
X3CLGANDWORK
0.2
0.0
−0.2
−0.4
−0.6

# CONCLUSION & WAY FORWARD

# KEY PROJECT TAKEAWAYS

- Race seems to be a significant predictor for GPA
- Race does seem to be a significant predictor in for Math Achievement
- Race seems to be a good predictor for dropping out of highschool.

Hence, race is an important predictor that not only determines attendance but also impacts educational outcomes

# WAY FORWARD

1. Targeted education policy to benefit minority communities
2. Establish training programs that's tailored to racial minorities who's socioeconomic status puts them at a disadvantage in the subject.
3. Leverage early high school data from 9th grade to make predictions about future outcomes to identify students that may lag behind.

# THANKYOU