Best Schools of NYC

May 25, 2018

0.0.1 Read in the data

```
In [1]: import pandas
        import numpy
        import re
        import random
        import matplotlib.pyplot as plt
        import matplotlib.colors as colors
        from mpl_toolkits.basemap import Basemap
        %matplotlib inline

        data_files = [
            "ap_2010.csv",
            "class_size.csv",
            "demographics.csv",
            "graduation.csv",
            "hs_directory.csv",
            "sat_results.csv"
        ]

        data = {}

        for f in data_files:
            d = pandas.read_csv("databank/{0}".format(f))
            data[f.replace(".csv", "")] = d
```

0.0.2 Read in the surveys

```
In [2]: all_survey = pandas.read_csv("databank/survey_all.txt", delimiter="\t", encoding='windo
        d75_survey = pandas.read_csv("databank/survey_d75.txt", delimiter="\t", encoding='windo

        # Combine two data frames by rows
        survey = pandas.concat([all_survey, d75_survey], axis=0)

        # Change the column head to align with other data frame
        survey["DBN"] = survey["dbn"]

        # Identify and make a feature list of our interest
```

```
survey_fields = [
    "DBN",
    "rr_s",
    "rr_t",
    "rr_p",
    "N_s",
    "N_t",
    "N_p",
    "saf_p_11",
    "com_p_11",
    "eng_p_11",
    "aca_p_11",
    "saf_t_11",
    "com_t_11",
    "eng_t_10",
    "aca_t_11",
    "saf_s_11",
    "com_s_11",
    "eng_s_11",
    "aca_s_11",
    "saf_tot_11",
    "com_tot_11",
    "eng_tot_11",
    "aca_tot_11",
]
survey = survey.reindex(survey_fields, axis=1)
data["survey"] = survey

# Print results for verification
print(data['survey'].head(5))
data['survey'].shape
```

```
      DBN  rr_s  rr_t  rr_p    N_s   N_t    N_p  saf_p_11  com_p_11  eng_p_11  \
0  01M015   NaN    88    60    NaN  22.0   90.0       8.5       7.6       7.5
1  01M019   NaN   100    60    NaN  34.0  161.0       8.4       7.6       7.6
2  01M020   NaN    88    73    NaN  42.0  367.0       8.9       8.3       8.3
3  01M034  89.0    73    50  145.0  29.0  151.0       8.8       8.2       8.0
4  01M063   NaN   100    60    NaN  23.0   90.0       8.7       7.9       8.1

      ...      eng_t_10  aca_t_11  saf_s_11  com_s_11  eng_s_11  aca_s_11  \
0     ...           NaN       7.9       NaN       NaN       NaN       NaN
1     ...           NaN       9.1       NaN       NaN       NaN       NaN
2     ...           NaN       7.5       NaN       NaN       NaN       NaN
3     ...           NaN       7.8       6.2       5.9       6.5       7.4
4     ...           NaN       8.1       NaN       NaN       NaN       NaN

   saf_tot_11  com_tot_11  eng_tot_11  aca_tot_11
0         8.0         7.7         7.5         7.9
```

```
1          8.5          8.1          8.2          8.4
2          8.2          7.3          7.5          8.0
3          7.3          6.7          7.1          7.9
4          8.5          7.6          7.9          8.0

[5 rows x 23 columns]
```

```
Out[2]: (1702, 23)
```

0.0.3 Add DBN columns

```
In [3]: # Change the column head to align with other data frame
        data["hs_directory"]["DBN"] = data["hs_directory"]["dbn"]

        # Set uniform field length to develop same size DBN value in the data frame
        def pad_csd(num):
            string_representation = str(num)
            if len(string_representation) > 1:
                return string_representation
            else:
                return "0" + string_representation

        # Call function to set same size of  DBN prefix
        data["class_size"]["padded_csd"] = data["class_size"]["CSD"].apply(pad_csd)

        # Generate DBN field by combining two columns
        data["class_size"]["DBN"] = data["class_size"]["padded_csd"] + data["class_size"]["SCH

        # Print results for verification
        data["class_size"]["DBN"].iloc[0:5]
```

```
Out[3]: 0    01M015
        1    01M015
        2    01M015
        3    01M015
        4    01M015
        Name: DBN, dtype: object
```

0.0.4 Convert columns to numeric

```
In [4]: # List of useful columns from the sat_result data frame
        cols = ['SAT Math Avg. Score', 'SAT Critical Reading Avg. Score', 'SAT Writing Avg. Sc

        # Convert the string data into numeric form, transfor errors into null
        for c in cols:
            data["sat_results"][c] = pandas.to_numeric(data["sat_results"][c], errors="coerce"

        # Combining three column valus into one and store it into a new column
        data['sat_results']['sat_score'] = data['sat_results'][cols[0]] + data['sat_results'][

        # Display results for verification
        data['sat_results']['sat_score'].iloc[0:5]

Out[4]: 0    1122.0
        1    1172.0
        2    1149.0
        3    1174.0
        4    1207.0
        Name: sat_score, dtype: float64
```

0.0.5 Extract Latitude and Longiude from the Data

```
In [5]: # Function to extract latitude from the given string
        def find_lat(loc):
            coords = re.findall("\(.+, .+\)", loc)
            lat = coords[0].split(",")[0].replace("(", "")
            return lat

        # Function to extract longitude from the given string
        def find_lon(loc):
            coords = re.findall("\(.+, .+\)", loc)
            lon = coords[0].split(",")[1].replace(")", "").strip()
            return lon

        # Extract latitude and longitude from the column at store them in new columns
        data["hs_directory"]["lat"] = data["hs_directory"]["Location 1"].apply(find_lat)
        data["hs_directory"]["lon"] = data["hs_directory"]["Location 1"].apply(find_lon)

        # Convert the extrated latitude and longitude into numeric form, transform errors into
        data["hs_directory"]["lat"] = pandas.to_numeric(data["hs_directory"]["lat"], errors="c
        data["hs_directory"]["lon"] = pandas.to_numeric(data["hs_directory"]["lon"], errors="c

        # Print results for verification
        data['hs_directory'].head(5)

Out[5]:       dbn                                        school_name       boro  \
        0  17K548                Brooklyn School for Music & Theatre   Brooklyn
        1  09X543                   High School for Violin and Dance      Bronx
        2  09X327        Comprehensive Model School Project M.S. 327      Bronx
        3  02M280     Manhattan Early College School for Advertising  Manhattan
        4  28Q680  Queens Gateway to Health Sciences Secondary Sc...     Queens

          building_code    phone_number    fax_number grade_span_min  grade_span_max  \
        0          K440    718-230-6250  718-230-6262              9              12
        1          X400    718-842-0687  718-589-9849              9              12
        2          X240    718-294-8111  718-294-8109              6              12
```

```
3          M520  718-935-3477             NaN              9              10
4          Q695    718-969-3155  718-969-3552              6              12

  expgrade_span_min  expgrade_span_max    ...      \
0               NaN                NaN    ...
1               NaN                NaN    ...
2               NaN                NaN    ...
3                 9               14.0    ...
4               NaN                NaN    ...

                        priority05 priority06 priority07 priority08  \
0                              NaN        NaN        NaN        NaN
1                              NaN        NaN        NaN        NaN
2  Then to New York City residents        NaN        NaN        NaN
3                              NaN        NaN        NaN        NaN
4                              NaN        NaN        NaN        NaN

  priority09  priority10                                         Location 1  \
0        NaN         NaN  883 Classon Avenue\nBrooklyn, NY 11225\n(40.67...
1        NaN         NaN  1110 Boston Road\nBronx, NY 10456\n(40.8276026...
2        NaN         NaN  1501 Jerome Avenue\nBronx, NY 10452\n(40.84241...
3        NaN         NaN  411 Pearl Street\nNew York, NY 10038\n(40.7106...
4        NaN         NaN  160-20 Goethals Avenue\nJamaica, NY 11432\n(40...

      DBN        lat        lon
0  17K548  40.670299 -73.961648
1  09X543  40.827603 -73.904475
2  09X327  40.842414 -73.916162
3  02M280  40.710679 -74.000807
4  28Q680  40.718810 -73.806500

[5 rows x 61 columns]
```

0.0.6 Condense Datasets

Data frame 'class_size'

```
In [6]: class_size = data["class_size"]

        # Segregate the data frame from high school students under general education category
        class_size = class_size[class_size["GRADE "] == "09-12"]
        class_size = class_size[class_size["PROGRAM TYPE"] == "GEN ED"]
        print(class_size[["GRADE ", "PROGRAM TYPE"]].head(5))

        # Consolidate the data frame for unique DBN field
        class_size = class_size.groupby("DBN").agg('mean')

        # Converting back DBN as index to column
        class_size.reset_index(inplace=True)
        data["class_size"] = class_size

        # Print data frame for verification
        data['class_size'].head(5)
```

```
    GRADE  PROGRAM TYPE
225  09-12        GEN ED
226  09-12        GEN ED
227  09-12        GEN ED
228  09-12        GEN ED
229  09-12        GEN ED
```

```
Out[6]:       DBN  CSD  NUMBER OF STUDENTS / SEATS FILLED  NUMBER OF SECTIONS  \
        0  01M292    1                            88.0000            4.000000
        1  01M332    1                            46.0000            2.000000
        2  01M378    1                            33.0000            1.000000
        3  01M448    1                           105.6875            4.750000
        4  01M450    1                            57.6000            2.733333

           AVERAGE CLASS SIZE  SIZE OF SMALLEST CLASS  SIZE OF LARGEST CLASS  \
        0           22.564286                   18.50              26.571429
        1           22.000000                   21.00              23.500000
        2           33.000000                   33.00              33.000000
        3           22.231250                   18.25              27.062500
        4           21.200000                   19.40              22.866667

           SCHOOLWIDE PUPIL-TEACHER RATIO
        0                             NaN
        1                             NaN
        2                             NaN
        3                             NaN
        4                             NaN
```

Data frame 'demographics'

```
In [7]: # Seggregating the dataframe 'demographics' based on the 'schoolyear' to extract uniqu
        data["demographics"] = data["demographics"][data["demographics"]["schoolyear"] == 2011

        # Print for verification
        data['demographics'].head(5)
```

```
Out[7]:        DBN                                                       Name  schoolyear  \
        6   01M015  P.S. 015 ROBERTO CLEMENTE                                    20112012
        13  01M019  P.S. 019 ASHER LEVY                                          20112012
        20  01M020  PS 020 ANNA SILVER                                           20112012
        27  01M034  PS 034 FRANKLIN D ROOSEVELT                                  20112012
```

```
35  01M063  PS 063 WILLIAM MCKINLEY                             20112012

   fl_percent  frl_percent  total_enrollment prek    k grade1 grade2  \
6          NaN         89.4               189   13   31     35     28
13         NaN         61.5               328   32   46     52     54
20         NaN         92.5               626   52  102    121     87
27         NaN         99.7               401   14   34     38     36
35         NaN         78.9               176   18   20     30     21

      ...     black_num black_per hispanic_num hispanic_per white_num  \
6     ...            63      33.3          109         57.7         4
13    ...            81      24.7          158         48.2        28
20    ...            55       8.8          357         57.0        16
27    ...            90      22.4          275         68.6         8
35    ...            41      23.3          110         62.5        15

   white_per male_num male_per female_num female_per
6        2.1     97.0     51.3       92.0       48.7
13       8.5    147.0     44.8      181.0       55.2
20       2.6    330.0     52.7      296.0       47.3
27       2.0    204.0     50.9      197.0       49.1
35       8.5     97.0     55.1       79.0       44.9

[5 rows x 38 columns]
```

Data frame 'graduation'

In [8]:

```
# Seggregating the dataframe 'graduation' for features useful to get unique DBN
data["graduation"] = data["graduation"][data["graduation"]["Cohort"] == "2006"]
data["graduation"] = data["graduation"][data["graduation"]["Demographic"] == "Total Co

# Print for verification
data["graduation"].head(5)
```

Out[8]:

```
     Demographic     DBN                            School Name Cohort  \
3   Total Cohort  01M292  HENRY STREET SCHOOL FOR INTERNATIONAL   2006
10  Total Cohort  01M448    UNIVERSITY NEIGHBORHOOD HIGH SCHOOL   2006
17  Total Cohort  01M450             EAST SIDE COMMUNITY SCHOOL   2006
24  Total Cohort  01M509                MARTA VALLE HIGH SCHOOL   2006
31  Total Cohort  01M515  LOWER EAST SIDE PREPARATORY HIGH SCHO   2006

    Total Cohort Total Grads - n Total Grads - % of cohort Total Regents - n  \
3             78              43                     55.1%                36
10           124              53                     42.7%                42
17            90              70                     77.8%                67
24            84              47                       56%                40
31           193             105                     54.4%                91
```

```
   Total Regents - % of cohort Total Regents - % of grads  \
3                        46.2%                      83.7%
10                       33.9%                      79.2%
17         74.400000000000006%                      95.7%
24                       47.6%                      85.1%
31                       47.2%                      86.7%

              ...            Regents w/o Advanced - n  \
3             ...                                  36
10            ...                                  34
17            ...                                  67
24            ...                                  23
31            ...                                  22

   Regents w/o Advanced - % of cohort Regents w/o Advanced - % of grads  \
3                               46.2%                             83.7%
10                              27.4%                             64.2%
17                74.400000000000006%                             95.7%
24                              27.4%                             48.9%
31                              11.4%                               21%

   Local - n Local - % of cohort Local - % of grads Still Enrolled - n  \
3          7                  9%              16.3%                 16
10        11                8.9%              20.8%                 46
17         3                3.3%               4.3%                 15
24         7  8.300000000000001%              14.9%                 25
31        14                7.3%              13.3%                 53

   Still Enrolled - % of cohort Dropped Out - n Dropped Out - % of cohort
3                         20.5%              11                     14.1%
10                        37.1%              20       16.100000000000001%
17                        16.7%               5                      5.6%
24                        29.8%               5                        6%
31                        27.5%              35       18.100000000000001%

[5 rows x 23 columns]
```

0.0.7 Convert AP scores to numeric

```
In [9]: # Convert 'ap_2010' data frame columns to numeric format, transform errors into null
        cols = ['AP Test Takers ', 'Total Exams Taken', 'Number of Exams with scores 3 4 or 5'

        for col in cols:
            data["ap_2010"][col] = pandas.to_numeric(data["ap_2010"][col], errors="coerce")

        # Print for verification
        print(data['ap_2010'].shape)
        data["ap_2010"].head(5)
```

```
(258, 5)
```

```
Out[9]:       DBN                                SchoolName  AP Test Takers   \
        0  01M448           UNIVERSITY NEIGHBORHOOD H.S.             39.0
        1  01M450                 EAST SIDE COMMUNITY HS             19.0
        2  01M515                    LOWER EASTSIDE PREP             24.0
        3  01M539         NEW EXPLORATIONS SCI,TECH,MATH            255.0
        4  02M296  High School of Hospitality Management              NaN

           Total Exams Taken  Number of Exams with scores 3 4 or 5
        0               49.0                                  10.0
        1               21.0                                   NaN
        2               26.0                                  24.0
        3              377.0                                 191.0
        4                NaN                                   NaN
```

0.0.8 Combine the Datasets

```
In [10]: combined = data["sat_results"]

         combined = combined.merge(data["ap_2010"], on="DBN", how="left")
         combined = combined.merge(data["graduation"], on="DBN", how="left")

         # Print for verification
         print(combined.shape)
         combined.head(5)
```

```
(479, 33)
```

```
Out[10]:       DBN                                    SCHOOL NAME  \
         0  01M292  HENRY STREET SCHOOL FOR INTERNATIONAL STUDIES
         1  01M448            UNIVERSITY NEIGHBORHOOD HIGH SCHOOL
         2  01M450                     EAST SIDE COMMUNITY SCHOOL
         3  01M458                      FORSYTH SATELLITE ACADEMY
         4  01M509                        MARTA VALLE HIGH SCHOOL

          Num of SAT Test Takers  SAT Critical Reading Avg. Score  \
         0                    29                            355.0
         1                    91                            383.0
         2                    70                            377.0
         3                     7                            414.0
         4                    44                            390.0

           SAT Math Avg. Score  SAT Writing Avg. Score  sat_score  \
         0               404.0                   363.0     1122.0
         1               423.0                   366.0     1172.0
         2               402.0                   370.0     1149.0
```

```
3                401.0                   359.0     1174.0
4                433.0                   384.0     1207.0

                     SchoolName  AP Test Takers    Total Exams Taken  \
0                           NaN              NaN                  NaN
1  UNIVERSITY NEIGHBORHOOD H.S.             39.0                 49.0
2        EAST SIDE COMMUNITY HS             19.0                 21.0
3                           NaN              NaN                  NaN
4                           NaN              NaN                  NaN

             ...             Regents w/o Advanced - n  \
0            ...                                   36
1            ...                                   34
2            ...                                   67
3            ...                                  NaN
4            ...                                   23

  Regents w/o Advanced - % of cohort Regents w/o Advanced - % of grads  \
0                              46.2%                             83.7%
1                              27.4%                             64.2%
2                74.400000000000006%                             95.7%
3                                NaN                               NaN
4                              27.4%                             48.9%

  Local - n  Local - % of cohort Local - % of grads Still Enrolled - n  \
0         7                   9%              16.3%                 16
1        11                 8.9%              20.8%                 46
2         3                 3.3%               4.3%                 15
3       NaN                  NaN                NaN                NaN
4         7   8.300000000000001%              14.9%                 25

  Still Enrolled - % of cohort Dropped Out - n Dropped Out - % of cohort
0                        20.5%              11                     14.1%
1                        37.1%              20       16.100000000000001%
2                        16.7%               5                      5.6%
3                          NaN             NaN                       NaN
4                        29.8%               5                        6%

[5 rows x 33 columns]
```

```
In [11]: to_merge = ["class_size", "demographics", "survey", "hs_directory"]

         for m in to_merge:
             combined = combined.merge(data[m], on="DBN", how="inner")

         # Print for verification
         print(combined.shape)
         combined.head(5)
```

```
(363, 159)
```

```
Out[11]:
      DBN                                        SCHOOL NAME  \
0  01M292      HENRY STREET SCHOOL FOR INTERNATIONAL STUDIES
1  01M448                UNIVERSITY NEIGHBORHOOD HIGH SCHOOL
2  01M450                         EAST SIDE COMMUNITY SCHOOL
3  01M509                            MARTA VALLE HIGH SCHOOL
4  01M539  NEW EXPLORATIONS INTO SCIENCE, TECHNOLOGY AND ...

  Num of SAT Test Takers  SAT Critical Reading Avg. Score  \
0                     29                            355.0
1                     91                            383.0
2                     70                            377.0
3                     44                            390.0
4                    159                            522.0

   SAT Math Avg. Score  SAT Writing Avg. Score  sat_score  \
0                404.0                   363.0     1122.0
1                423.0                   366.0     1172.0
2                402.0                   370.0     1149.0
3                433.0                   384.0     1207.0
4                574.0                   525.0     1621.0

                       SchoolName  AP Test Takers   Total Exams Taken  \
0                             NaN              NaN                NaN
1    UNIVERSITY NEIGHBORHOOD H.S.             39.0               49.0
2          EAST SIDE COMMUNITY HS             19.0               21.0
3                             NaN              NaN                NaN
4  NEW EXPLORATIONS SCI,TECH,MATH            255.0              377.0

     ...                                   priority04  \
0    ...      Then to Manhattan students or residents
1    ...                                          NaN
2    ...                                          NaN
3    ...                                          NaN
4    ...                                          NaN

                        priority05 priority06 priority07  priority08  \
0  Then to New York City residents        NaN        NaN         NaN
1                              NaN        NaN        NaN         NaN
2                              NaN        NaN        NaN         NaN
3                              NaN        NaN        NaN         NaN
4                              NaN        NaN        NaN         NaN

  priority09 priority10                                         Location 1  \
0        NaN        NaN  220 Henry Street\nNew York, NY 10002\n(40.7137...
1        NaN        NaN  200 Monroe Street\nNew York, NY 10002\n(40.712...
2        NaN        NaN  420 East 12 Street\nNew York, NY 10009\n(40.72...
3        NaN        NaN  145 Stanton Street\nNew York, NY 10002\n(40.72...
4        NaN        NaN  111 Columbia Street\nNew York, NY 10002\n(40.7...

         lat        lon
0  40.713764 -73.985260
1  40.712332 -73.984797
2  40.729783 -73.983041
3  40.720569 -73.985673
4  40.718725 -73.979426

[5 rows x 159 columns]
```

0.0.9 Fill Up Null Values

```
In [12]: # Fill up the null values with the column average value
         combined = combined.fillna(combined.mean())
         combined = combined.fillna(0)

         # Check for null values
         print("Null Values in Combined Data Frame =", combined.isnull().sum().sum())
```

```
Null Values in Combined Data Frame = 0
```

0.0.10 Add a School District Column for Mapping

```
In [13]: def get_first_two_chars(dbn):
             return dbn[0:2]

         combined["school_dist"] = combined["DBN"].apply(get_first_two_chars)

         # Print for verification
         combined["school_dist"].head(5)
```

```
Out[13]: 0    01
         1    01
         2    01
         3    01
         4    01
         Name: school_dist, dtype: object
```

0.0.11 Find correlations

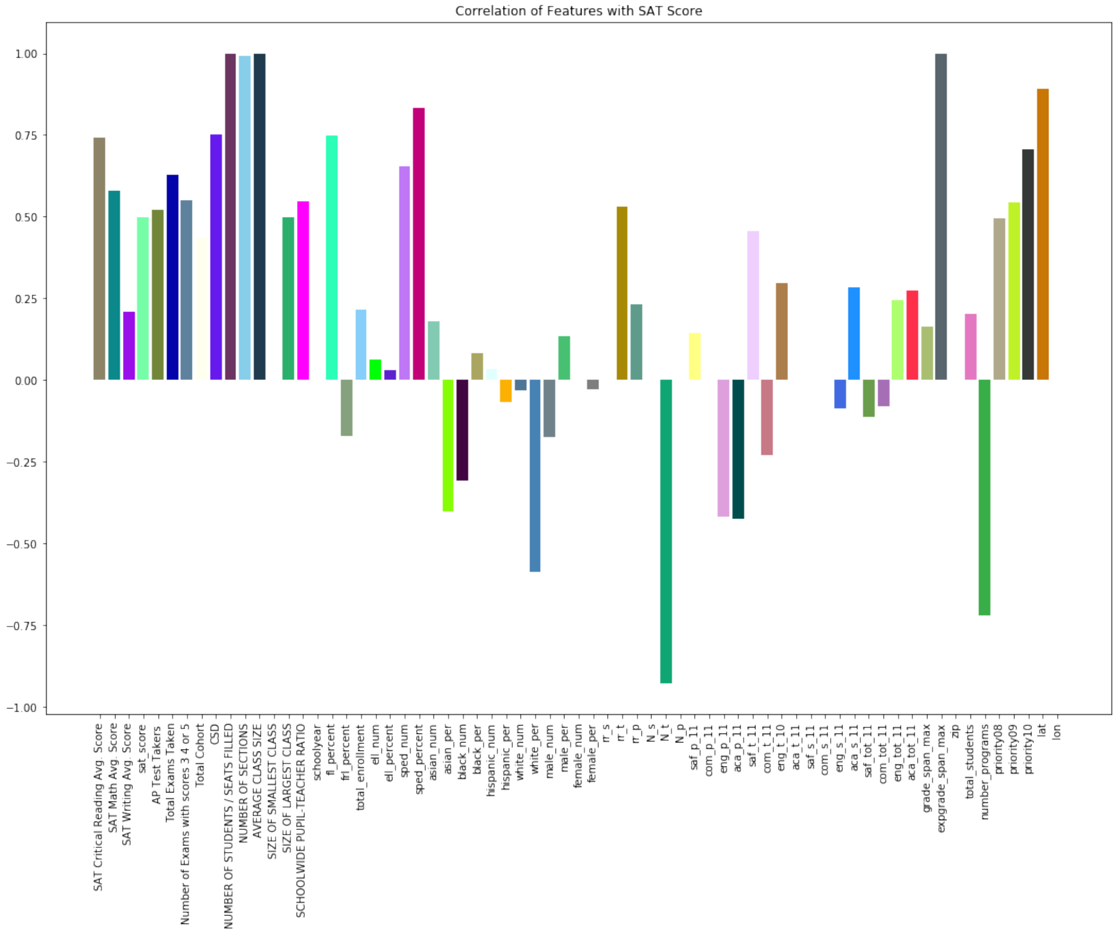
```
In [14]: correlations = combined.corr()
         corr_satscore = correlations.corr()["sat_score"]
         print(corr_satscore)
```

```
SAT Critical Reading Avg. Score         0.997433
SAT Math Avg. Score                     0.992862
SAT Writing Avg. Score                  0.997205
sat_score                               1.000000
AP Test Takers                          0.742299
Total Exams Taken                       0.747097
Number of Exams with scores 3 4 or 5    0.751203
Total Cohort                            0.469707
CSD                                     0.209195
NUMBER OF STUDENTS / SEATS FILLED       0.521990
NUMBER OF SECTIONS                      0.497414
AVERAGE CLASS SIZE                      0.580089
SIZE OF SMALLEST CLASS                  0.547800
SIZE OF LARGEST CLASS                   0.498482
SCHOOLWIDE PUPIL-TEACHER RATIO               NaN
schoolyear                                   NaN
fl_percent                                   NaN
frl_percent                            -0.926402
total_enrollment                        0.493900
ell_num                                -0.032734
ell_percent                            -0.588053
sped_num                                0.202543
sped_percent                           -0.719101
asian_num                               0.652992
asian_per                               0.831369
black_num                               0.178459
black_per                              -0.401030
hispanic_num                            0.143639
hispanic_per                           -0.639662
white_num                               0.706445
                                          ...
rr_p                                   -0.085942
N_s                                     0.551170
N_t                                     0.436806
N_p                                     0.628105
saf_p_11                               -0.078582
com_p_11                               -0.308995
eng_p_11                               -0.173111
aca_p_11                               -0.171177
saf_t_11                                0.275014
com_t_11                                0.034989
eng_t_10                                     NaN
aca_t_11                                0.063366
saf_s_11                                0.243283
com_s_11                                0.083379
eng_s_11                                0.134303
aca_s_11                                0.216600
saf_tot_11                              0.164197
```

```
com_tot_11                                  -0.068616
eng_tot_11                                  -0.026598
aca_tot_11                                   0.029286
grade_span_max                                    NaN
expgrade_span_max                                 NaN
zip                                          0.002559
total_students                               0.544247
number_programs                              0.296832
priority08                                        NaN
priority09                                        NaN
priority10                                        NaN
lat                                         -0.416402
lon                                         -0.424829
Name: sat_score, Length: 67, dtype: float64
```

0.0.12 Plot Correlations

```
In [15]: # Preparing a list of colors from matplotlib
         colors_list = list(colors._colors_full_map.values())
         random.shuffle(colors_list, random.random)

         fig, ax = plt.subplots(figsize=(18, 12))
         ax.bar(corr_satscore.index, corr_satscore, align='center', color=colors_list)
         ax.set_xticklabels(corr_satscore.index, rotation=90)
         ax.set_title("Correlation of Features with SAT Score")

         plt.show()
```



We observe high correlations between SAT score and following factors:

o Number of Students / Seats Filled o Average Class Size o The highest grade the school expects to serve eventually o Number of Teacher Respondents (-ve) o SAT Critical Reading Average Score o Free Lunch Percent o Number of distinct programs available at the school (-ve)

Its obvious to see how the class-size, number of students and the highest grade the school expects creates a competitive environment for the students to encourage them working hard to perform better in SAT.

The strong positive relationship of SAT Critical Reading Average Score with the SAT score shows the impact of effective reading skills on the overall SAT performance.

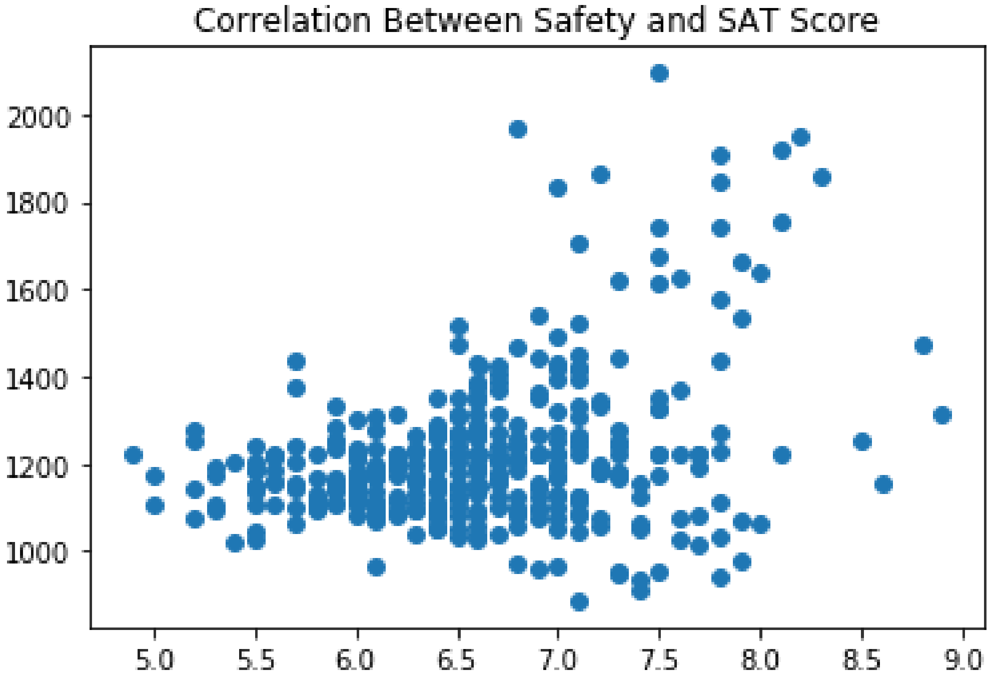
The positive correlation of Free Lunch with SAT score tells the success story of governments welfare program in the area of economically developing neighborhood and low-income immigrant regions.

It is interesting to note that higher the number of teachers participation in survey for expectation about students academia negatively influence the overall student performance in SAT.

The negative correlation of Number of distinct programs available at the school with SAT score goes in reverse parity with the positive correlation of class-size and number of students factors above as more program diversity tends to reduce the class-size an number of students per course. COMMENT ABOUT ABOVE SCATTER PLOT.

0.0.13 Analyze Effect of Safety on SAT Score

```
In [16]: plt.scatter(combined['saf_s_11'], combined['sat_score'])
         plt.title("Correlation Between Safety and SAT Score")
         plt.show()
```



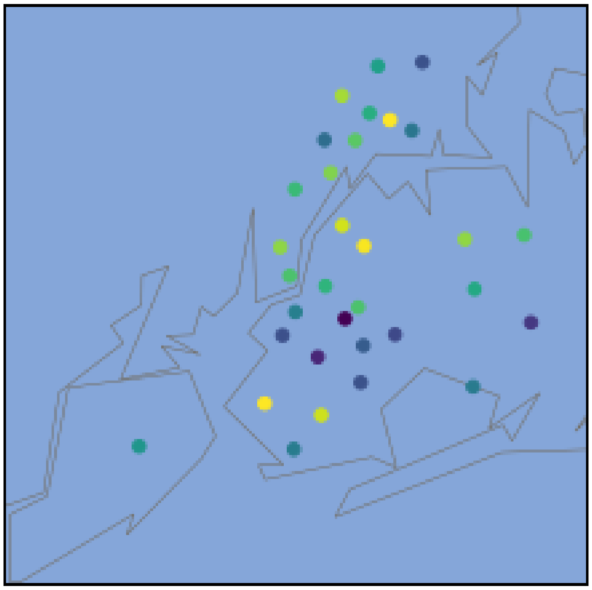
There appears to be a positive correlation between safety and SAT score though not so strong. There are some schools that have high safety standard and achieve high SAT score and some schools with low safety standard got low SAT score. Majority of the school from the sample falls between the safety score of 6.0 to 7.5 with an average SAT score below 1500.

0.0.14 Map Safety Score by Districts

```
In [17]: m = Basemap(
             projection='merc',
             llcrnrlat=40.496044,
             urcrnrlat=40.915256,
             llcrnrlon=-74.255735,
             urcrnrlon=-73.700272,
             resolution='i'
         )

         m.drawmapboundary(fill_color='#85A6D9')
         m.drawcoastlines(color='#6D5F47', linewidth=.4)
         m.drawrivers(color='#6D5F47', linewidth=.4)
```

```
        distr = combined.groupby("school_dist").mean()
        distr.reset_index(inplace=True)

        longitudes = (distr["lon"]).tolist()
        latitudes = (distr["lat"]).tolist()
        m.scatter(longitudes, latitudes, s=20, zorder=2, latlon=True, c=distr["saf_s_11"])
        plt.show()
```

```
C:\Users\Yogi_Ashwast\Anaconda3\lib\site-packages\mpl_toolkits\basemap\__init__.py:1708: Matplo
  limb = ax.axesPatch
C:\Users\Yogi_Ashwast\Anaconda3\lib\site-packages\mpl_toolkits\basemap\__init__.py:1711: Matplo
  if limb is not ax.axesPatch:
```

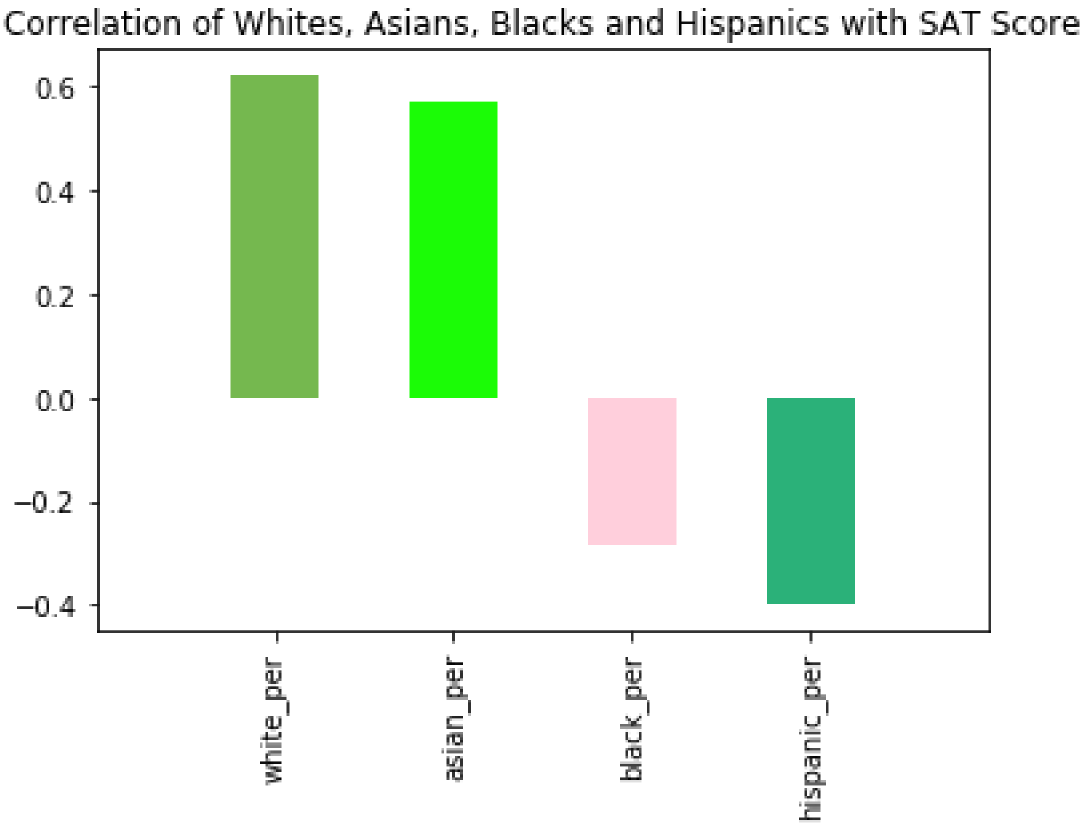


Brooklyn seems to have better safety score compared to the same for the parts of Manhattan, Queens and Bronx region.

0.0.15 Evaluate Racial Performance in SAT

```
In [18]: # Listing the races of interest
         races = ["white_per", "asian_per", "black_per", "hispanic_per"]
         racial_per = combined[races]

         # Extracting the coorelation value for the shortlisted races
         value_ht = combined.corr()["sat_score"][races]

         # Establish plot parameters
         x_cor = [1,2,3,4]
```

```
random.shuffle(colors_list, random.random)
plt.bar(x_cor, value_ht, width=0.5, align="center", tick_label=races, color=colors_lis
plt.xlim(0,5)
plt.xticks(rotation=90)
plt.title("Correlation of Whites, Asians, Blacks and Hispanics with SAT Score")

plt.show()
```

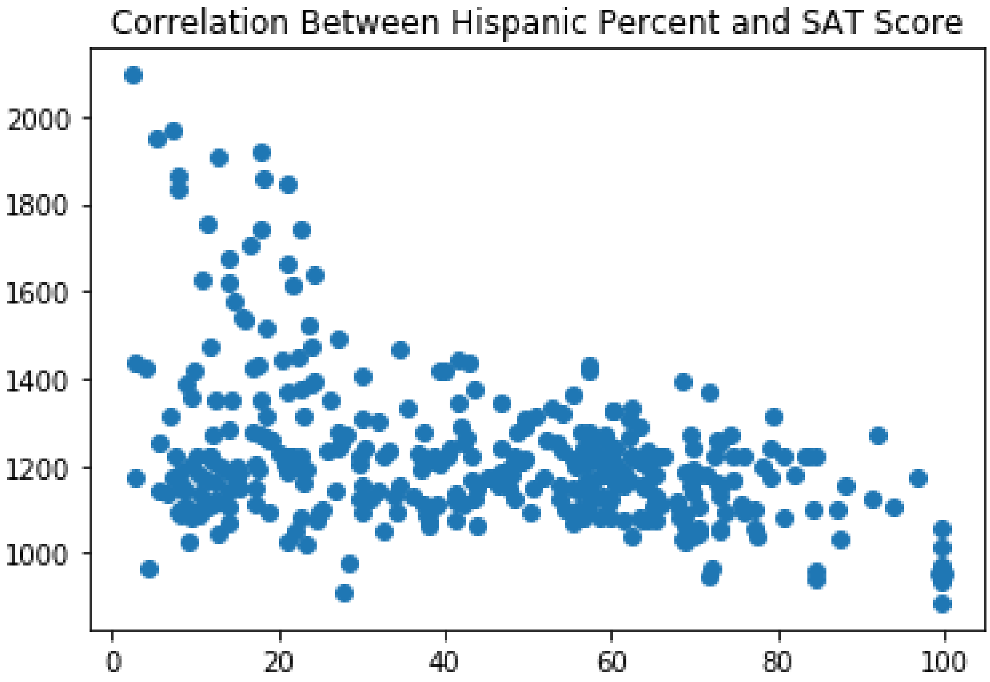


The whites and the Asians are found having strong positive correlation while the Blacks and the Hispanic are found having moderate negative correlation with the SAT score.

This is due to the fact that the Hispanic and the Blacks might be coming from the immigrant families. The socio-economic factors, family support and surrounding environment play significant role in overall performance of the students.

0.0.16 Plot Correlation Between Hispanic Proportion & SAT Score

```
In [19]: plt.scatter(combined['hispanic_per'], combined['sat_score'])
         plt.title("Correlation Between Hispanic Percent and SAT Score")

         plt.show()
```

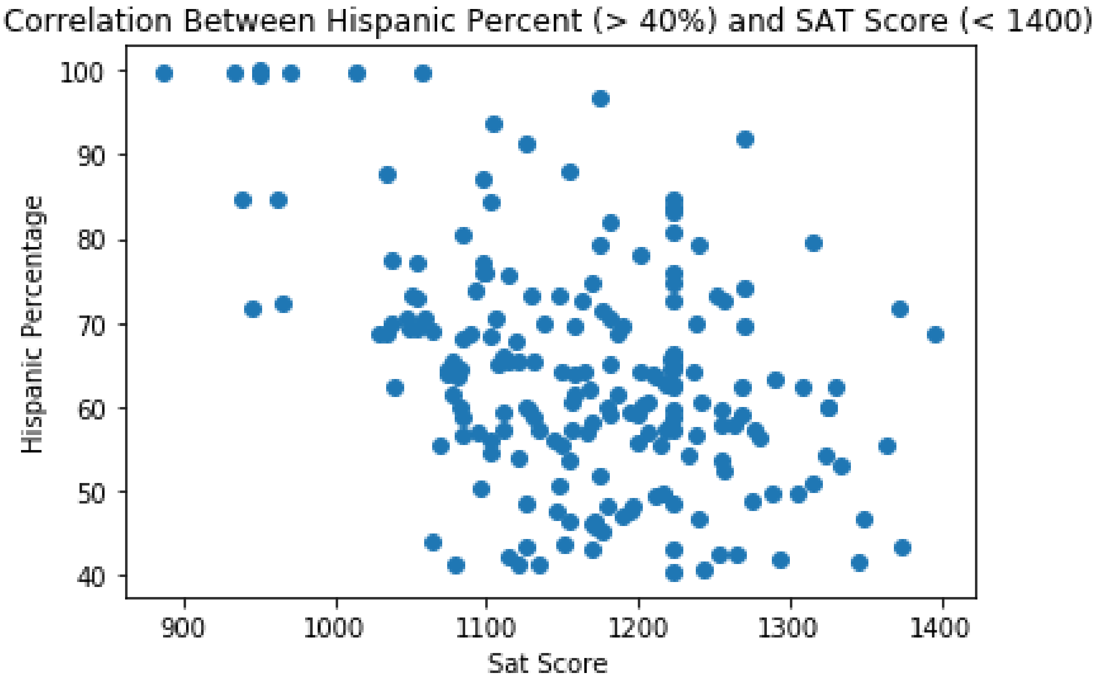


There seems to be a moderately strong downward trend with the increase of Hispanic Population. Very small portion of population attains a SAT score of 1800 or more while majority falls under the score of 1500.

0.0.17 Dependency: Low Sat Score & Hispanic Percent

```
In [20]: low_sat_high_hisp = combined[combined["sat_score"] < 1400]
         low_sat_high_hisp = low_sat_high_hisp[low_sat_high_hisp["hispanic_per"] > 40]
         sat_sc = low_sat_high_hisp["sat_score"].values
         hisp_per = low_sat_high_hisp["hispanic_per"].values

         plt.scatter(sat_sc, hisp_per)
         plt.xlabel("Sat Score")
         plt.ylabel("Hispanic Percentage")
         plt.title("Correlation Between Hispanic Percent (> 40%) and SAT Score (< 1400)")
         print("Correlation Value =", low_sat_high_hisp.corr()["sat_score"]["hispanic_per"])
```

```
Correlation Value = -0.41737620009586124
```



Majority of the schools with Hispanic population in the range of 40% - 80% get average SAT score of around 1150. The results become clearly evident when plotted with 40% or more Hispanic Proportion for SAT score of 1400 or less.

This is mainly due to the immigrant population along with the socio-economic and demographic factors.

0.0.18 List Schools with Hispanic More Than 95%

```
In [21]: hisp_per_95 = combined[combined["hispanic_per"] > 95]
         print(hisp_per_95["SCHOOL NAME"].unique())
```

```
['MANHATTAN BRIDGES HIGH SCHOOL'
 'WASHINGTON HEIGHTS EXPEDITIONARY LEARNING SCHOOL'
 'GREGORIO LUPERON HIGH SCHOOL FOR SCIENCE AND MATHEMATICS'
 'ACADEMY FOR LANGUAGE AND TECHNOLOGY'
 'INTERNATIONAL SCHOOL FOR LIBERAL ARTS'
 'PAN AMERICAN INTERNATIONAL HIGH SCHOOL AT MONROE'
 'MULTICULTURAL HIGH SCHOOL' 'PAN AMERICAN INTERNATIONAL HIGH SCHOOL']
```

0.0.19 List Schools with Hispanic Less Than 10%

```
In [22]: hisp_10_sat_1800 = combined[combined["hispanic_per"] < 10]
         hisp_10_sat_1800 = hisp_10_sat_1800[hisp_10_sat_1800["sat_score"] > 1800]
         print(hisp_10_sat_1800["SCHOOL NAME"].unique())
```

```
['STUYVESANT HIGH SCHOOL' 'BRONX HIGH SCHOOL OF SCIENCE'
 'BROOKLYN TECHNICAL HIGH SCHOOL'
 'QUEENS HIGH SCHOOL FOR THE SCIENCES AT YORK COLLEGE'
 'STATEN ISLAND TECHNICAL HIGH SCHOOL']
```

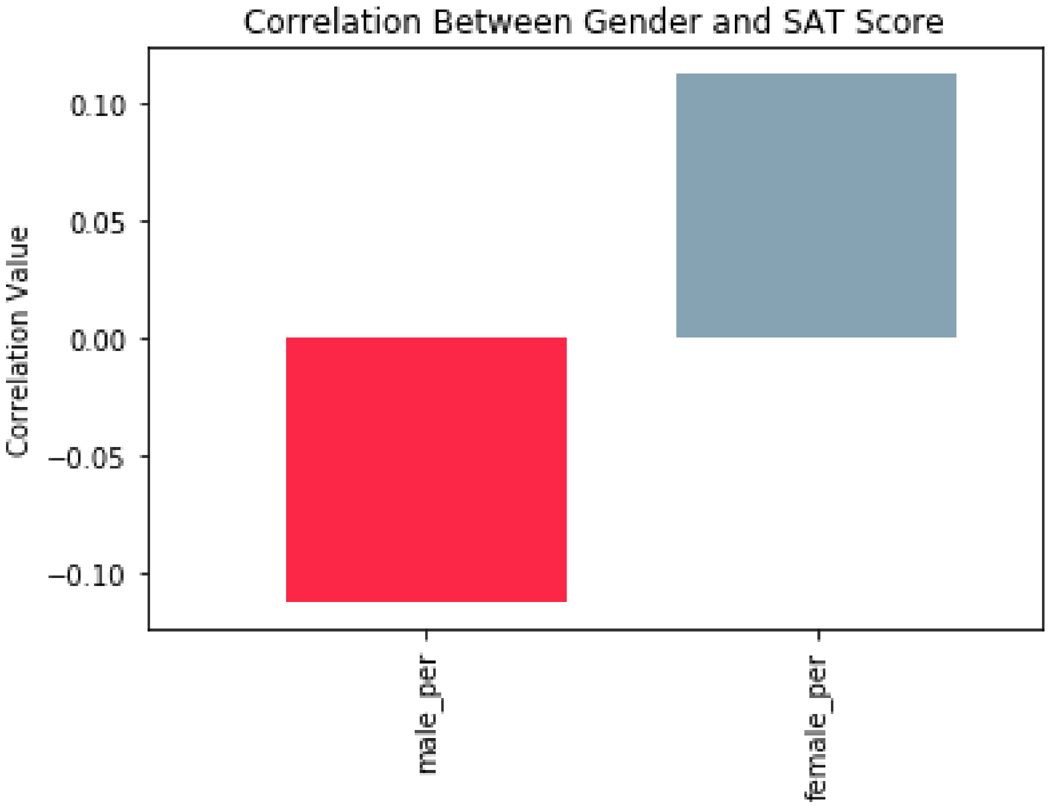
0.0.20 Enlist Schools in NYC with Low Total Enrollment and Low SAT Score

```
In [23]: # Find the school with low enrolllment that get low SAT score
         low_enrollment = combined[(combined['total_enrollment'] < 1000) & (combined['sat_score

         # Remove rows with invalid school name
         low_enrollment = low_enrollment[low_enrollment['School Name'] != 0]

         # Print for verification
         low_enrollment['School Name']
```

```
Out[23]: 91       INTERNATIONAL COMMUNITY HIGH SCHOOL
         126           BRONX INTERNATIONAL HIGH SCHOOL
         139    KINGSBRIDGE INTERNATIONAL HIGH SCHOOL
         141    INTERNATIONAL SCHOOL FOR LIBERAL ARTS
         179            HIGH SCHOOL OF WORLD CULTURES
         188        BROOKLYN INTERNATIONAL HIGH SCHOOL
         225    INTERNATIONAL HIGH SCHOOL AT PROSPECT
         237               IT TAKES A VILLAGE ACADEMY
         253                MULTICULTURAL HIGH SCHOOL
         286    PAN AMERICAN INTERNATIONAL HIGH SCHOO
         Name: School Name, dtype: object
```

0.0.21 Plot Correlation Between Sat Score & Gender

```
In [24]: gender = ["male_per", "female_per"]
         cor_val = combined.corr()["sat_score"][gender]
         x_val = [1, 1.0070]
         random.shuffle(colors_list, random.random)

         plt.bar(x_val, cor_val, 0.005, align='center', tick_label=gender, color=colors_list)
         plt.xlim(0.995,1.011)
         plt.ylabel("Correlation Value")
         plt.xticks(rotation=90)
         plt.title("Correlation Between Gender and SAT Score")
         plt.show()
```

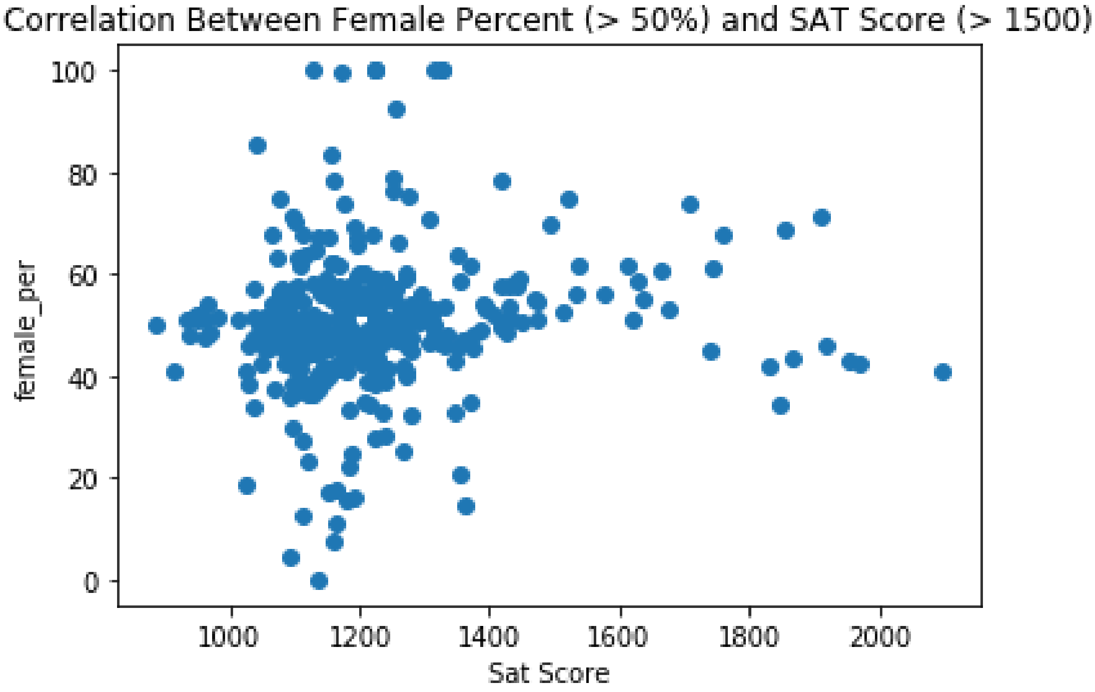


Female show very weak positive and male show very weak negative correlation for SAT score. This shows the relative performance of female and male students – which is more or less the same.

0.0.22 High SAT Score & High Female Percentage

```
In [25]: high_sat_n_fem = combined[combined["female_per"] > 50]
         high_sat_n_fem = high_sat_n_fem[high_sat_n_fem["sat_score"] > 1500]
         print("Schools with SAT > 1500 & Female > 50% =\n", high_sat_n_fem["SCHOOL NAME"].uni

         # Plot the scatter diagram
         plt.scatter(combined["sat_score"], combined["female_per"])
         plt.xlabel("Sat Score")
         plt.ylabel("female_per")
         plt.title("Correlation Between Female Percent (> 50%) and SAT Score (> 1500)")

         print("\nCorrelation Value between SAT Score and Female Percentage =", high_sat_n_fem
```

```
Schools with SAT > 1500 & Female > 50% =
 ['NEW EXPLORATIONS INTO SCIENCE, TECHNOLOGY AND MATH HIGH SCHOOL'
 'BARD HIGH SCHOOL EARLY COLLEGE'
 'PROFESSIONAL PERFORMING ARTS HIGH SCHOOL'
 'BARUCH COLLEGE CAMPUS HIGH SCHOOL'
 'N.Y.C. LAB SCHOOL FOR COLLABORATIVE STUDIES'
 'ELEANOR ROOSEVELT HIGH SCHOOL' 'MILLENNIUM HIGH SCHOOL'
 'BEACON HIGH SCHOOL'
 'FIORELLO H. LAGUARDIA HIGH SCHOOL OF MUSIC & ART AND PERFORMING ARTS'
 'LEON M. GOLDSTEIN HIGH SCHOOL FOR THE SCIENCES'
 'BARD HIGH SCHOOL EARLY COLLEGE II' 'TOWNSEND HARRIS HIGH SCHOOL'
 'BENJAMIN N. CARDOZO HIGH SCHOOL' "SCHOLARS' ACADEMY"
 'QUEENS GATEWAY TO HEALTH SCIENCES SECONDARY SCHOOL'
 'BACCALAUREATE SCHOOL FOR GLOBAL EDUCATION']

Correlation Value between SAT Score and Female Percentage = 0.44951913501293517
```



There exists moderately positive correlation between the female proportion and SAT score. While tested for pool of students having more than 50% female proportion and SAT score of greater than 1500, it is observed that around 40% - 65% of the total students attain SAT score in the range of 1000 – 1350.

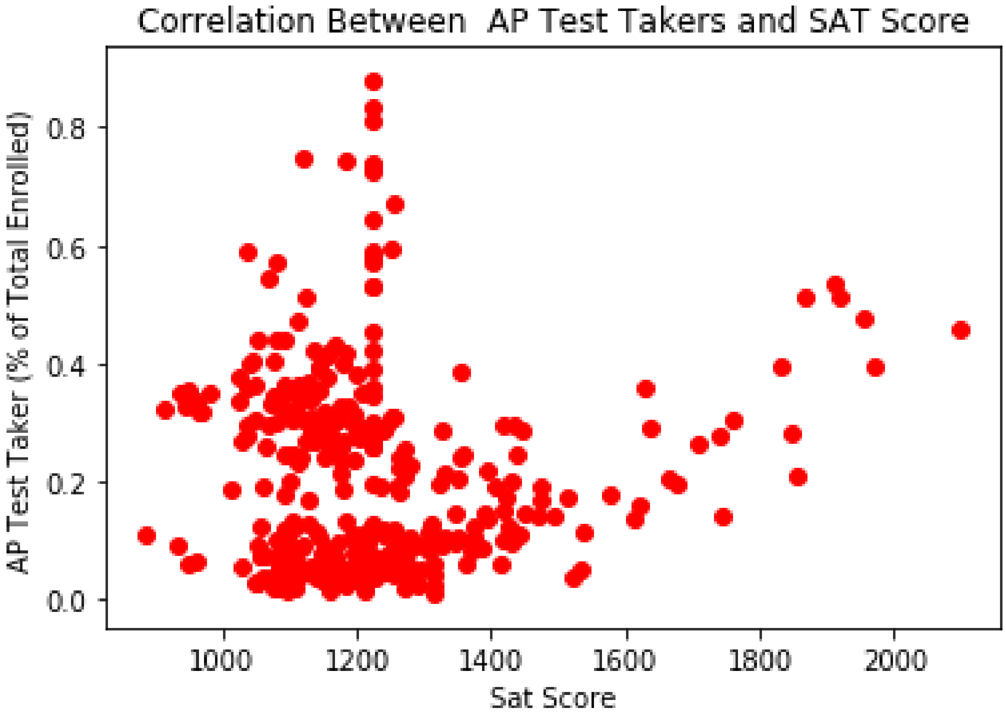
0.0.23 SAT Score > 1700 & Female Percentage > 60

```
In [26]: fem_60_sat_1700 = combined[(combined["sat_score"] > 1700) & (combined["female_per"] >
         print("Schools with SAT > 1700 & Female > 60% =\n", fem_60_sat_1700["SCHOOL NAME"].un
```

```
Schools with SAT > 1700 & Female > 60% =
 ['BARD HIGH SCHOOL EARLY COLLEGE' 'ELEANOR ROOSEVELT HIGH SCHOOL'
 'BEACON HIGH SCHOOL'
 'FIORELLO H. LAGUARDIA HIGH SCHOOL OF MUSIC & ART AND PERFORMING ARTS'
 'TOWNSEND HARRIS HIGH SCHOOL']
```

0.0.24 Relationship Between AP Test Takers & SAT Score

```
In [27]: combined["ap_per"] = combined["AP Test Takers "] / combined["total_enrollment"]
         plt.scatter(combined["sat_score"], combined["ap_per"], color='r')
         plt.xlabel("Sat Score")
         plt.ylabel("AP Test Taker (% of Total Enrolled)")
         plt.title("Correlation Between  AP Test Takers and SAT Score")
         plt.show()

         print("Corrleation value between SAT Score & Percent of AP Test Takers =", combined.c
```



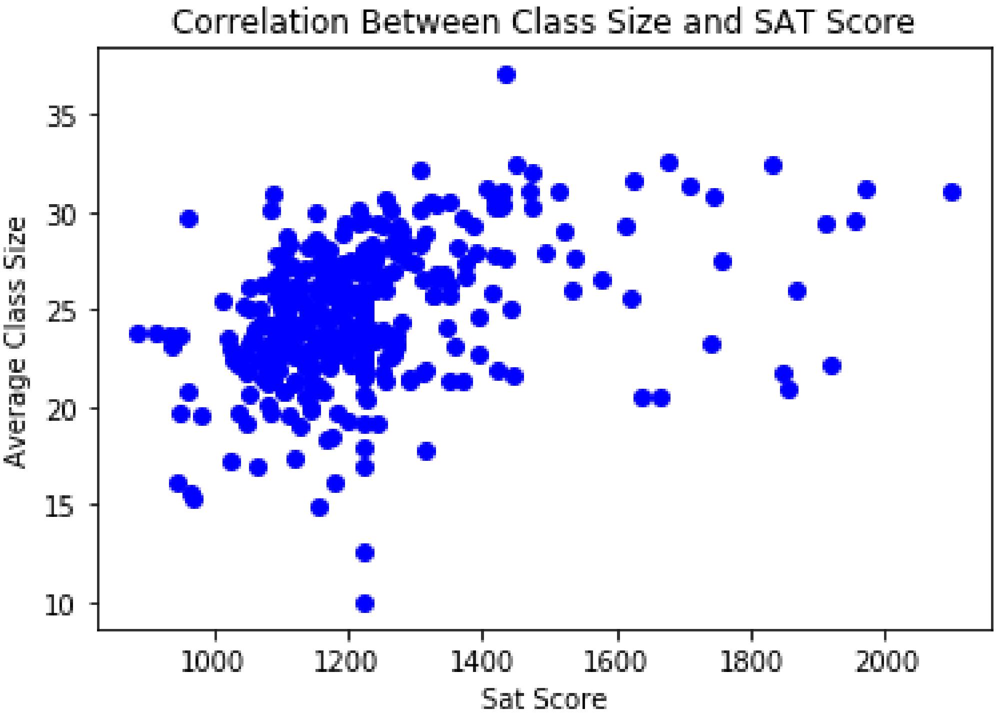
```
Corrleation value between SAT Score & Percent of AP Test Takers = 0.05717081390766967
```

No correlation is found between the AP Test Takers and the SAT score. In fact, up to 40% of the total enrollment who took AP Test scored less than 1400 in SAT. There are few percent of students who took AP Test and secured SAT score of 1800 – 2000.

The data about students' performance in AP Test Vs. SAT could give us more insight to further comment about the AP Test results predictive relevance for SAT score.

0.0.25 Relationship Between Class Size & SAT Score

```
In [28]: plt.scatter(combined["sat_score"], combined["AVERAGE CLASS SIZE"], color='b')
         plt.xlabel("Sat Score")
         plt.ylabel("Average Class Size")
         plt.title("Correlation Between Class Size and SAT Score")
         plt.show()

         print("Corrleation value between SAT Score & Average Class Size =", combined.corr()["
```



```
Corrleation value between SAT Score & Average Class Size = 0.3810143308095523
```

Moderately strong positive correlation has been observed between the class size and SAT score. Students' SAT score slowly improves as the class size increases from 20 to 30 students. Majority of the students score between 1000 – 1400 irrespective of class size. However, there are few exceptional cases where the students score beyond 1800.

This clearly shows that performance of students in SAT is strongly impacted by his/her class size, higher student-teacher ratio and consequently the dense social environment -which collectively proves to be encouraging for the students.

0.0.26 Correlation Between Different in Parent, Teacher and Student Responses to Surveys with SAT Score

Listing and Cleaning Data

```
In [29]: # short listing the relevant columns
         surv_col = ['aca_p_11', 'aca_t_11', 'aca_s_11', 'sat_score']
         response = combined[surv_col]

         # Cleaning the data with null values
         response = response.dropna(axis=0, how='any')

         # Making sure no null is left
         response.isnull().sum().sum()

Out[29]: 0
```

Develop Survey Response Differrence Data

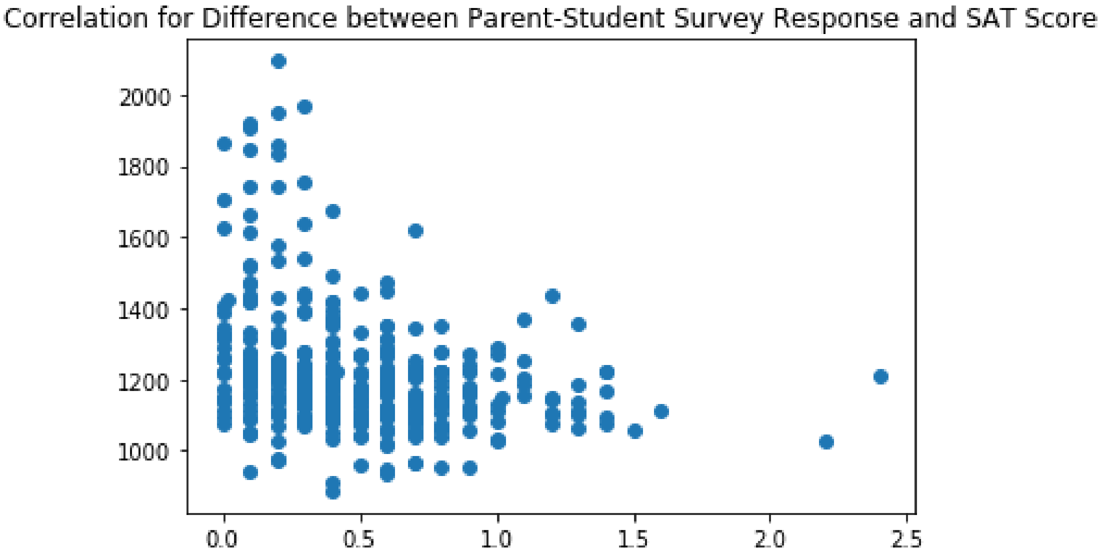
```
In [30]: # Developing the survey difference response data
         response['aca_p_s'] = (response['aca_p_11'] - response['aca_s_11']).abs()
         response['aca_p_t'] = (response['aca_p_11'] - response['aca_t_11']).abs()
         response['aca_t_s'] = (response['aca_t_11'] - response['aca_s_11']).abs()

         # Plot survey response difference
         resp_cols = ['aca_p_s', 'aca_p_t', 'aca_t_s']

         # Print for verfication
         print(response[resp_cols].head())
```

```
    aca_p_s  aca_p_t   aca_t_s
0  0.900000      1.1  0.200000
1  0.300000      0.0  0.300000
2  1.018611      0.4  1.418611
3  0.300000      0.5  0.200000
4  0.700000      1.1  0.400000
```

Correlation Between Parent-Student Survey Difference Response & SAT Score

```
In [31]: pss_cor0 = response.corr()[resp_cols[0]]["sat_score"]
         print("\nCorrelation between Parent-Student Survey Response & SAT Score =",
               pss_cor0)
         plt.scatter(response[resp_cols[0]], response["sat_score"])
         plt.title("Correlation for Difference between Parent-Student Survey \
         Response and SAT Score")
         plt.show()
```

```

Correlation between Parent-Student Survey Response & SAT Score = -0.2892526616448787
```



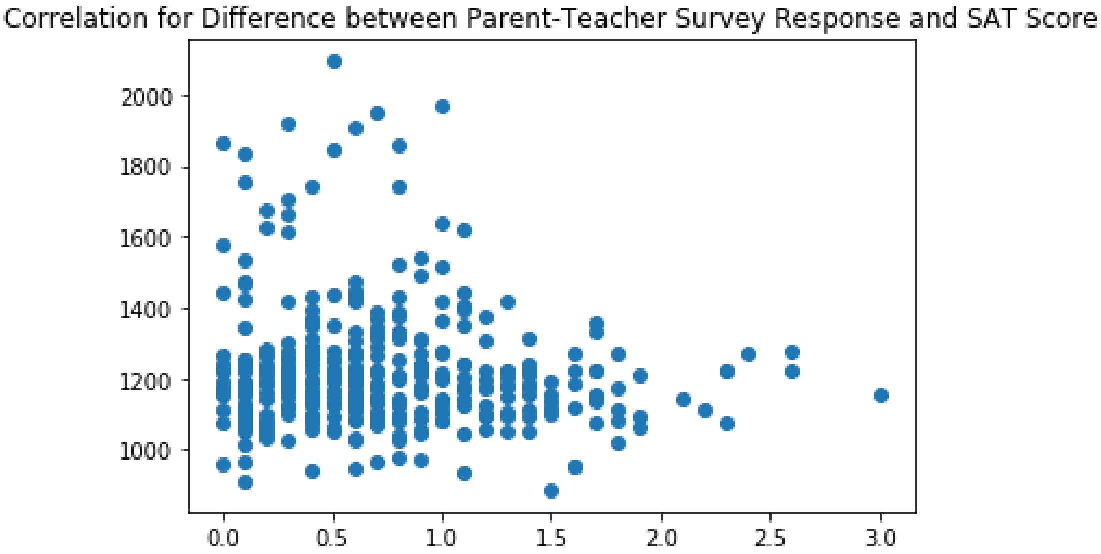
It appears that there is a moderately strong negative correlation between the difference in Parent-Student Survey Response and SAT Score. Hence, more similarity of parents and student's opinion about the latter's academic expectation, better would it be reflected in to the higher SAT score. In other words, more the disparity between parents and student's responses for students' academic expectation score, lower would be the SAT score.

This clearly indicates that parental involvement in student's education results into a better SAT performance and vice versa.

Correlation Between Parent-Teacher Survey Difference Response & SAT Score

```
In [32]: pss_cor1 = response.corr()[resp_cols[1]]["sat_score"]
         print("\nCorrelation between Parent-Teacher Survey Response & SAT Score =",
               pss_cor1)
         plt.scatter(response[resp_cols[1]], response["sat_score"])
         plt.title("Correlation for Difference between Parent-Teacher Survey \
         Response and SAT Score")
         plt.show()
```

```
Correlation between Parent-Teacher Survey Response & SAT Score = -0.11002982952218382
```

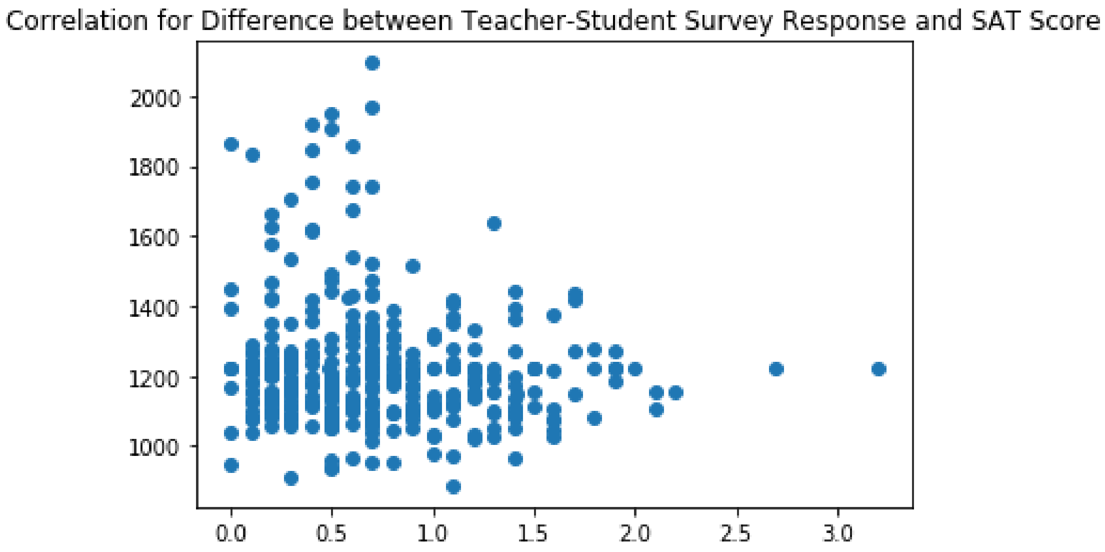


There exists weak negative relationship between the difference in parents and teachers' survey response and SAT score. This indicates that difference of opinion between the parents and the teachers over the expectation of student's academia has moderately reverse impact over student's performance in SAT. In other words, less the differences between the parental and teacher's opinion about student's academic expectation, moderately better would be student's performance in SAT.

Correlation Between Teacher-Student Survey Difference Response & SAT Score

```
In [33]: pss_cor2 = response.corr()[resp_cols[2]]["sat_score"]
         print("\nCorrelation between Teacher-Student Survey Response & SAT Score =",
               pss_cor2)
         plt.scatter(response[resp_cols[2]], response["sat_score"])
         plt.title("Correlation for Difference between Teacher-Student Survey \
         Response and SAT Score")
         plt.show()
```

```
Correlation between Teacher-Student Survey Response & SAT Score = -0.09657508196544748
```



No correlation is found between the difference in teachers' and students' survey response and SAT score. This indicates that difference of opinion between the teachers and students over the academic expectation for the students have no impact over student's performance in SAT.

0.0.27 Find out neighborhoods with Best Schools

Determine Top 10 Best School in NYC Based On SAT Score

```
In [34]: # Find the top 10 school based on the SAT score
         good_schools = combined[combined['sat_score'] > 1750]
         good_schools = good_schools.groupby('DBN').agg('max').sort_values(by='sat_score', asce
         good_schools[['boro', 'sat_score', 'SCHOOL NAME', 'CSD', 'zip']].head(10)
```

```
Out[34]:                  boro  sat_score  \
         DBN
         02M475      Manhattan     2096.0
         10X445          Bronx     1969.0
         31R605  Staten Island     1953.0
         10X696          Bronx     1920.0
         25Q525         Queens     1910.0
         28Q687         Queens     1868.0
         01M696      Manhattan     1856.0
         05M692      Manhattan     1847.0
         13K430       Brooklyn     1833.0
         02M416      Manhattan     1758.0

                                             SCHOOL NAME  CSD    zip
         DBN
         02M475                   STUYVESANT HIGH SCHOOL    2  10282
         10X445             BRONX HIGH SCHOOL OF SCIENCE   10  10468
```

```
31R605                STATEN ISLAND TECHNICAL HIGH SCHOOL   31  10306
10X696  HIGH SCHOOL OF AMERICAN STUDIES AT LEHMAN COLLEGE   10  10468
25Q525                        TOWNSEND HARRIS HIGH SCHOOL   25  11367
28Q687  QUEENS HIGH SCHOOL FOR THE SCIENCES AT YORK CO...   28  11433
01M696                     BARD HIGH SCHOOL EARLY COLLEGE    1  10002
05M692  HIGH SCHOOL FOR MATHEMATICS, SCIENCE AND ENGIN...    5  10031
13K430                     BROOKLYN TECHNICAL HIGH SCHOOL   13  11217
02M416                      ELEANOR ROOSEVELT HIGH SCHOOL    2  10021
```

Gathering NYC Property Value Information

```
In [35]: cols = ['Borough', 'CD', 'SchoolDist', 'ZipCode', 'BldgClass', 'price_sf', 'Address',
         brk_data = pandas.read_csv(r"databank/nyc_property/BK2017V11.csv", usecols = cols)
         brx_data = pandas.read_csv(r"databank/nyc_property/BX2017V11.csv", usecols = cols)
         mnh_data = pandas.read_csv(r"databank/nyc_property/MN2017V11.csv", usecols = cols)
         qns_data = pandas.read_csv(r"databank/nyc_property/QN2017V11.csv", usecols = cols)
         snr_data = pandas.read_csv(r"databank/nyc_property/SI2017V11.csv", usecols = cols)
         prop_val = pandas.concat([brk_data, brx_data, mnh_data, qns_data, snr_data], axis=0)

         # Print for verification
         print(prop_val.shape)
         prop_val.head(10)
```

```
(53340, 8)
```

```
Out[35]:   Borough   CD  SchoolDist  ZipCode              Address BldgClass  \
         0      BK  309        17.0  11213.0      400 UTICA AVENUE        O2
         1      BK  303        13.0  11205.0    117 SANDFORD STREET       G9
         2      BK  301        14.0  11222.0      239 INDIA STREET        O2
         3      BK  315        21.0  11229.0    1819 EAST 13 STREET       D7
         4      BK  313        21.0  11224.0    3740 OCEANIC AVENUE       M9
         5      BK  318        22.0  11210.0   1805 FLATBUSH AVENUE       K4
         6      BK  307        15.0  11215.0          511 7 AVENUE        W1
         7      BK  301        14.0  11249.0      58 NORTH 8 STREET       O5
         8      BK  303        14.0  11205.0     38 SKILLMAN STREET       R4
         9      BK  312        21.0  11230.0  1613 MC DONALD AVENUE       E1

                     OwnerName   price_sf
         0     VIS BAN REALTY CORP  50.000000
         1         117 SANFORD LLC  50.000000
         2      INDIA STREET CORP.  50.000000
         3        AMK II REALTY LLC  50.000000
         4    KOZNITZ CONGREGATION  50.000000
         5       MERVEILLE, GLADYS  50.000000
         6   DCAS/DEPARTMENT OF ED  50.003959
         7   101 KENT ASSOCIATES I  50.008548
         8                     NaN  50.015724
         9   CB REALTY COMPANY LLC  50.019231
```

0.0.28 Finding Top 10 Cost Effective Properties for NYC School Neighborhood (2 Deals/School)

Define functions to seggregate residential class

```
In [36]: # Filter data frame for select residential building class
         def usage(char):
             usg = ['A', 'B', 'C', 'D', 'R']
             if char in usg:
                 return 1
             else:
                 return 0
```

Define Function to Extract Neighborhood Details

```
In [37]: # Define function to extract the neighborhood details
         def find_property(data, df):
             sch_dst = data[0]
             zip_code = data[1]
             df = df[(df['ZipCode'] == zip_code) & (df['SchoolDist'] == sch_dst)]

             count = 0
             j = 0
             k = 0
             m = df.shape[0]
             inp_vals = [([0] * 5) for i in range(2)]

             if (m == 0):
                 inp_vals[j][k] = data[3]
                 inp_vals[j][k+1] = "No Resi. Property Found"
                 inp_vals[j][k+2] = "N/A"
                 inp_vals[j][k+3] = "N/A"
                 inp_vals[j][k+4] = data[2]
                 j += 1
                 k = 0

             elif (m == 1):
                 i = 0
                 inp_vals[j][k] = data[3]
                 inp_vals[j][k+1] = df['Address'].iloc[i]
                 inp_vals[j][k+2] = df['OwnerName'].iloc[i]
                 inp_vals[j][k+3] = df['price_sf'].iloc[i]
                 inp_vals[j][k+4] = data[2]
                 j += 1
                 k = 0

             else:
                 for i in range(m):
                     if (count < 2):
                         inp_vals[j][k] = data[3]
                         inp_vals[j][k+1] = df['Address'].iloc[i]
                         inp_vals[j][k+2] = df['OwnerName'].iloc[i]
                         inp_vals[j][k+3] = df['price_sf'].iloc[i]
                         inp_vals[j][k+4] = data[2]
                         j += 1
                         k = 0
                         count += 1
                     elif (count >= 2):
                         break
             return inp_vals
```

Top 10 Cost Effective Neighborhood Properties in NYC for Best Schools (2 choices / school)

```
In [38]: # Set up the data frame per ascending property prices, building class and location zi
         sorted_property = prop_val.sort_values(by=['price_sf', 'BldgClass', 'ZipCode'])
         sorted_property['ZipCode'] = pandas.to_numeric(sorted_property['ZipCode'], errors = '

         # Seggregate data based on the building class for residential properties
         sorted_property['Usage'] = sorted_property['BldgClass'].str[:1].apply(usage)
         sorted_property = sorted_property[sorted_property['Usage'] == 1]

         # Removing null values from the data frame
         sorted_property = sorted_property.dropna()

         # Extracting Top 10 Best Neighbordhood Data
         neighbor = [([0]*5) for i in range(20)]
         j = 0
         for i in range(10):
             first_row, second_row = find_property(good_schools[['CSD', 'zip', 'SCHOOL NAME',
             for k in range(5):
                 neighbor[j][k] = first_row[k]
                 neighbor[j+1][k] = second_row[k]
             j += 2

         # Set up neighbor data frame for output
         cols = ['Borough', 'Property Address', 'Owner', 'Price/Sq Ft', 'Neighborhood School']
         great_deal = pandas.DataFrame(columns=cols)

         # Feed the final output in the data frame
         for i in range(len(neighbor)):
                 great_deal[cols[0]] = ([x[0] for x in neighbor])
                 great_deal[cols[1]] = ([x[1] for x in neighbor])
                 great_deal[cols[2]] = ([x[2] for x in neighbor])
                 great_deal[cols[3]] = ([x[3] for x in neighbor])
                 great_deal[cols[4]] = ([x[4] for x in neighbor])

         # Removing data with missing values and resetting the index
```

```
great_deal = great_deal[great_deal['Borough'] != 0]
great_deal.reset_index(inplace=True, drop=True)

# Print the final results results
print("\nList of Least Expensive Neighborhood With Great Schools: \n")
great_deal
```

```
List of Least Expensive Neighborhood With Great Schools:
```

```
Out[38]:         Borough           Property Address                    Owner Price/Sq Ft  \
        0      Manhattan          201 WARREN STREET  TRIBECA NORTH END LLC     112.479
        1      Manhattan        399 CHAMBERS STREET     TRIBECA POINTE LLC     114.277
        2          Bronx       2450 DAVIDSON AVENUE   2460 DAVIDSON REALTY     51.4895
        3          Bronx       2776 SEDGWICK AVENUE     TINEO, JOSE RAMON     51.8865
        4  Staten Island              10 PEEL PLACE           ANN SOLAZZO      24.215
        5  Staten Island            41 PETER AVENUE        SCAROLA, GREGG M     24.2163
        6          Bronx       2450 DAVIDSON AVENUE   2460 DAVIDSON REALTY     51.4895
        7          Bronx       2776 SEDGWICK AVENUE     TINEO, JOSE RAMON     51.8865
        8         Queens     152-11 UNION TURNPIKE  ST. JOHN'S UNIVERSITY     50.8769
        9         Queens          154-27 64 AVENUE     WISCHHUSEN RICHARD     66.6693
        10        Queens           162-25 112 ROAD  CALVARY GRANDPARENT R     59.1462
        11     Manhattan          85 STANTON STREET         85 OWNERS CORP     97.2278
        12     Manhattan          138 LUDLOW STREET     TRIPUKA REALTY CORP      97.401
        13     Manhattan   No Resi. Property Found                    N/A         N/A
        14      Brooklyn          220 LINCOLN PLACE        220 LINCOLN LLC     50.0592
        15      Brooklyn         233 BERKELEY PLACE  233 BERKELEY PLACE LL     50.2336
        16     Manhattan         230 EAST 71 STREET        230 OWNERS CORP     97.0392
        17     Manhattan         305 EAST 75 STREET      GRUMA REALTY CORP     97.0882

                                 Neighborhood School
        0                     STUYVESANT HIGH SCHOOL
        1                     STUYVESANT HIGH SCHOOL
        2               BRONX HIGH SCHOOL OF SCIENCE
        3               BRONX HIGH SCHOOL OF SCIENCE
        4        STATEN ISLAND TECHNICAL HIGH SCHOOL
        5        STATEN ISLAND TECHNICAL HIGH SCHOOL
        6   HIGH SCHOOL OF AMERICAN STUDIES AT LEHMAN COLLEGE
        7   HIGH SCHOOL OF AMERICAN STUDIES AT LEHMAN COLLEGE
        8                  TOWNSEND HARRIS HIGH SCHOOL
        9                  TOWNSEND HARRIS HIGH SCHOOL
        10  QUEENS HIGH SCHOOL FOR THE SCIENCES AT YORK CO...
        11               BARD HIGH SCHOOL EARLY COLLEGE
        12               BARD HIGH SCHOOL EARLY COLLEGE
        13  HIGH SCHOOL FOR MATHEMATICS, SCIENCE AND ENGIN...
        14               BROOKLYN TECHNICAL HIGH SCHOOL
```

```
15                     BROOKLYN TECHNICAL HIGH SCHOOL
16                      ELEANOR ROOSEVELT HIGH SCHOOL
17                      ELEANOR ROOSEVELT HIGH SCHOOL
```

0.0.29 Conclusion

We are able to know various critical factors that do/do not affect students performance in SAT examination. Based on this info, we can verify and validate how fare the current SAT system is for the diverse demographics like NYC. In case we found any flaws in the SAT system for unfair testing performances, we can get better idea about the causes to focus on and fix the system.

We understand the impact of various demographic, socio-economic, and current credit and grading system related factors over the performance of students in SAT examination. This helps us to determine and verify how this test maintains balance amongst these factors for overall fairness of test within the widely diverse community.

We are able to determine top 10 best schools based on their average SAT score.

We shortlist the least expensive but situated with the top 10 best school neighborhood regions.

We could identify the regions of NYC neighborhood where schools do not perform well and understand whether or not there exists any ethnic diversity [to consider] for policy improvement.

We learn the impact of similarity and disparity of students/teachers/parents opinion towards students academia over the SAT performance. This highlights the roles and responsibilities of various players of the game and its relative significance for the final outcome.

Based on the correlations and its severity on students SAT score, we can mention that SAT is reasonably fair for the diverse NYC demographics.