Our visual explorations look at how New York City schools do in terms of college preparedness, and what kind of factors most influence school performance. Our recommendations take into consideration the balance between college readiness and student satisfaction, and which neighborhoods are best-suited for a middle-aged family looking to move into good-school neighborhoods.

Are New York City High Schools College-Ready?

Data Visualization (Spring 2015)

Yu Ang, Xiang Li, Sanjeevni Wanchoo

Table of Contents

Introduction

Many families with children entering teenage find themselves asking the same question: is it time to move to the suburbs yet? Parents inevitably find themselves looking for the most affordable “good school districts,” as good high school education for their children become paramount. New York City is a city of great opportunities, and many parents find themselves wanting to stay in the city rather than move to the suburbs. Living in the city opens doors to shorter work commute time for the parents, and a culturally rich environment for the kids. The question then becomes: are New York City High Schools preparing children well for college? Are there some good school neighborhoods where one can focus housing search on?

In order to answer this question, we turned to the publicly available New York City Department of Education (DOE) data on high schools for the year 2013-2014. Our analysis focuses on understand what makes a school college-ready. We use this analysis to narrow in on our schools and neighborhoods of choice. We look at several factors such as Advanced Placement (AP) course offerings, partnership with higher education institutions (colleges, universities, etc), program size, and sports offerings to see which schools had the strongest program in terms of college readiness.

Based on this, and a few other factors such as area demographics, we sought to recommend housing options to our clients, referred to as Steven and Alejandro during the course of this analysis, for their daughter, Luijandra. The housing options are important as, by default, New York City sends students to their ‘Zoned Schools’, which are usually the schools closest to the student. If a student wishes to enroll in another high school, he/she must submit additional application, which is often a time and effort investment.

Analysis

Introduction

In order to answer our question around college readiness, and help our client, we turned to the publicly available New York City Department of Education (DOE) data on high schools for the year 2013-2014. We first started out by defining what aspects of student education we needed to focus on. We decided to turn to ‘College Career Rate’ as one of the key indicators of college readiness. DOE defines College Career Rate as the percent of students who graduated from high school four years after they entered 9th grade and then enrolled in college, a vocational program, or a public service program within six months of graduation. We tried to balance this aspect with student satisfaction factor. The DOE data provided information on the student satisfaction rate, defined as a summary of student satisfaction (0-10) with the school based on results from the

annual School Survey. Survey questions focus on academic expectations, communication, engagement, safety, and respect.

Our analysis techniques and results are discussed in the sections that follow.

College Readiness

We broke College Career Rate down to brackets, and examine the distributions based on Quality Review Ratings. Surprisingly, we found that an average high school is not quite college-ready in New York City. With a relatively right skewed distribution, only 54.95% of students end up in college on average. Most high schools have a College Career Rate around 30%-50%, which probably includes half of the New York City high schools. Only a handful school with College Career Rate higher than 90%. We then looked deeper into those high schools in terms of Quality Review Ratings. The Ratings were divided into six categories: Underdeveloped, Underdeveloped with proficient features, Developing, Well Developed, Proficient and Outstanding. Not surprisingly, Well Developed and Proficient schools count for over 95% of high performing College Career Rate schools (90%+), while only one Underdeveloped school has a College Career Rate of over 90%.

Best Neighborhoods to Live In

Where are those high College Career Rate schools? We looked at the College Career Rate at the zip code level. By combining with the heat map in appendix, we are able to identify that good schools are spread across boroughs. Staten Island, and parts of Queens tend to do well. In contrast, some areas in northern part of Brooklyn and Bronx should be avoided.

A better environment is also another very important aspect when considering high schools. A family-friendly neighborhood is ideal for middle-aged parents. With so many young professionals living in the Big Apple, the demographic of neighborhoods, especially age, become important here. We are targeting neighborhoods with more middle-ages crowd. Midtown Manhattan, Queens and Staten Island popped up in our map.

Comparing both parameters, parts of Queen and Staten Island have both good schools and an appropriate neighborhood. We would, thus, recommend these to our clients as the best areas to live in.

College Career Rate versus Student Satisfaction

There are seven different types of New York City high schools. We try to see which type of high schools have comparably higher college career rate with a decent student satisfaction since our clients want their daughter go to a good college, but also enjoy a happy and healthy high school life.

The scatterplot in Figure 4 shows how different school types perform on average student satisfaction (y-dimension) and average college career (x-dimension). Average student satisfaction is measured on a 1 to 10 scale. Higher scores mean that the students are more satisfied with their school in terms of academic expectations, communication, engagement,

safety, and respect. The unit of average college career rate is percentage. Color represents different school types, while the size of circles is proportional to the school size, or the number of students enrolled in a school.

Based on the provide information, specialized schools and Consortium International schools perform the best. Specialized High Schools show the highest average college career rate though only above average student satisfaction rate. Consortium International schools are highest on the satisfaction rating, though they only manage to perform about average in terms of college readiness.

According to NYC Department of Education, there are nine specialized high schools serve the needs of academically and artistically gifted students. These specialized high schools have a very selective admission process based on entrance exams and high requirements of student performance, especially in academics or performing arts. This agrees with our results, as highly competitive students and very preparative environments probably lead to good college entrance results.

Advanced Placement Courses

Advanced Placement (AP) classes are advanced courses offered to students in preparation for college. Good score in these exams can often be used to waive out of first-year college courses. Thus, we hypothesize that a high school providing more AP classes is going to have a higher college career rate. We analyzed different type of schools by average college career rate and average number of AP classes. As the scatterplot in Figure 5 shows, there does, indeed, seem to be a roughly positive relationship between the number of AP courses offered, and college career rate.

Specialized Schools, once again, win the show here, ranking at the top in terms of both the most AP classes offered on average, and the highest average college rate. The results from the above graph confirms our hypothesis that the number of AP classes provided has a positive influence on the college rate of high schools.

Clustering Analysis

The earlier studies and visuals provided a good exploratory understanding of how various factors are related to college career rates, and types of schools. The next step of the analysis focused on using these variables to narrow in on the schools of interest. For this purpose, we used clustering analysis to guide our decisions.

We started out by looking at several different variables that our client would like to consider when choosing a school. From our initial analysis of variable correlations, we found that the number of sports offered to boys and girls were highly correlated. Hence, we chose to include only the total number of school sports variable, which takes the superset of the two. Furthermore, graduation rate and college career rate were also found highly correlated. This

makes sense, as graduation is a prerequisite for going to college. Hence, we did not include both for clustering. We decided that it was best to use it for profiling our clusters to gain more insight about each group of schools.

We used K-Means clustering technique to look at various school clusters. The following variables were clustered on: number of programs that the school offers, total number of students, total number of school sports offered, number of AP courses offered, and the number of higher education partners. The spider plot in Figure 7 of the appendix (reproduced below) shows various clusters, profiled on graduation rate, and satisfaction rate (shown in Table 1). Since the variables are scaled, level 0 on the plot for each variable indicates the average.

Cluster 1 ranks the lowest on all five variables, and seems to perform significantly worse as a group in terms of graduation rate. This is probably a cluster our client would like to avoid. Schools in cluster 4 seem to offer a lot of AP courses and are partnered with higher education institutions, yet have very few sports offerings. This may be part of the reason that they tend to do the worst on the student satisfaction scale. On the opposite side of these are the schools in cluster 5, which offer a lot of sports, but fewer than average AP courses, and have fewer than average higher education partners. They still manage to do average in terms of graduation rate, but rank highest on the satisfaction scale.
Perhaps of interest to our clients would be schools in clusters 2 and 3, which seem to do the best in terms of balancing college preparedness with satisfaction. In particular, schools in cluster three tend to do average or better in almost all variables, and offer the highest graduation rate, and the second highest satisfaction rating of the clusters.

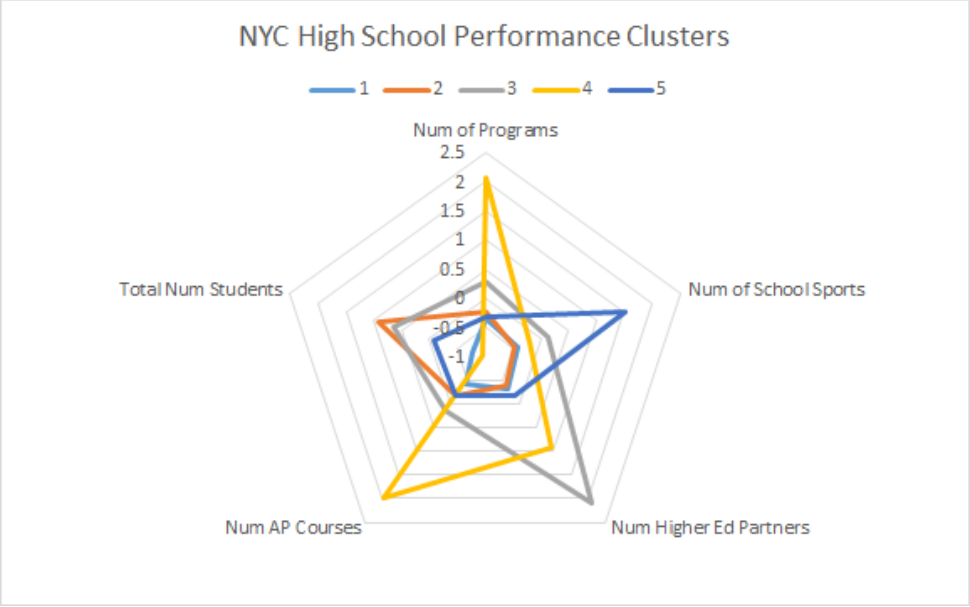

Table 1: Cluster Profiles

cluster	Avg Grad Rate (2013)	Student Satisfaction (2013)
1	65.16	7.37
2	76.70	7.41
3	77.65	7.38
4	74.50	7.17
5	72.00	7.45

Conclusion

Through our analysis, we have improved our understanding of what kind of factors most influence college preparedness in New York City High schools, and used this to guide our clients in deciding on neighborhoods of interest. In particular, we would encourage our clients to help their children prepare for specialized high schools, as these schools, by far, do the best job in college readiness. We would also encourage them to look at schools in the third cluster from our clustering analysis. In terms of neighborhoods, the areas mentioned earlier in Queens, parts of Midtown Manhattan, and parts of Staten Island are the best to consider. The intersection of the schools and neighborhoods would probably be the guiding principle. However, these are just some suggestions, as the ultimate decision may also come down to proximity to their work, and affordability, among other things.

Appendix I : Visualisations

Figure 1: Frequency Distribution of College Career Rates

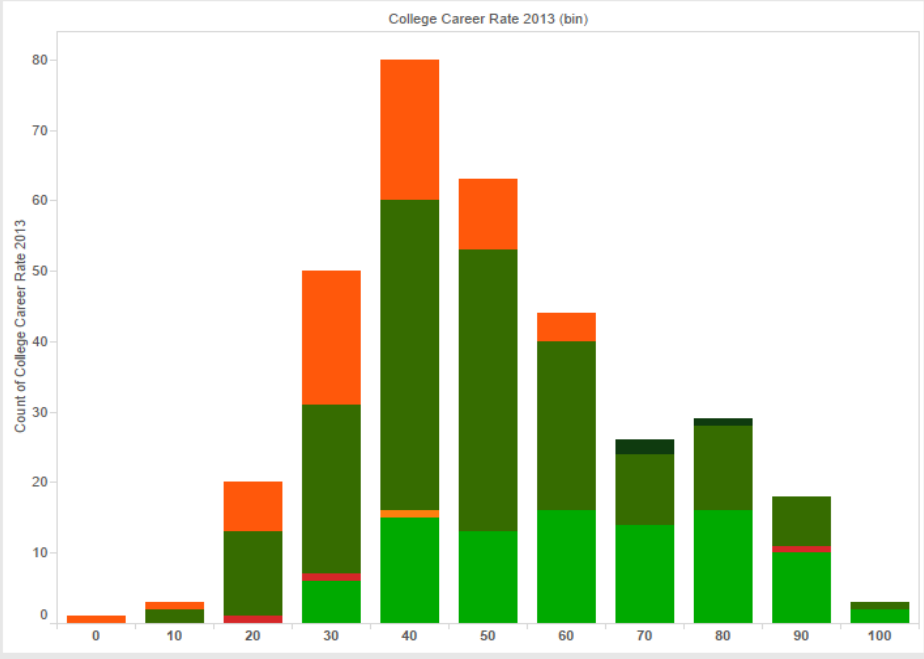

Figure 2: Average College Career Rate Across Different Zip Codes

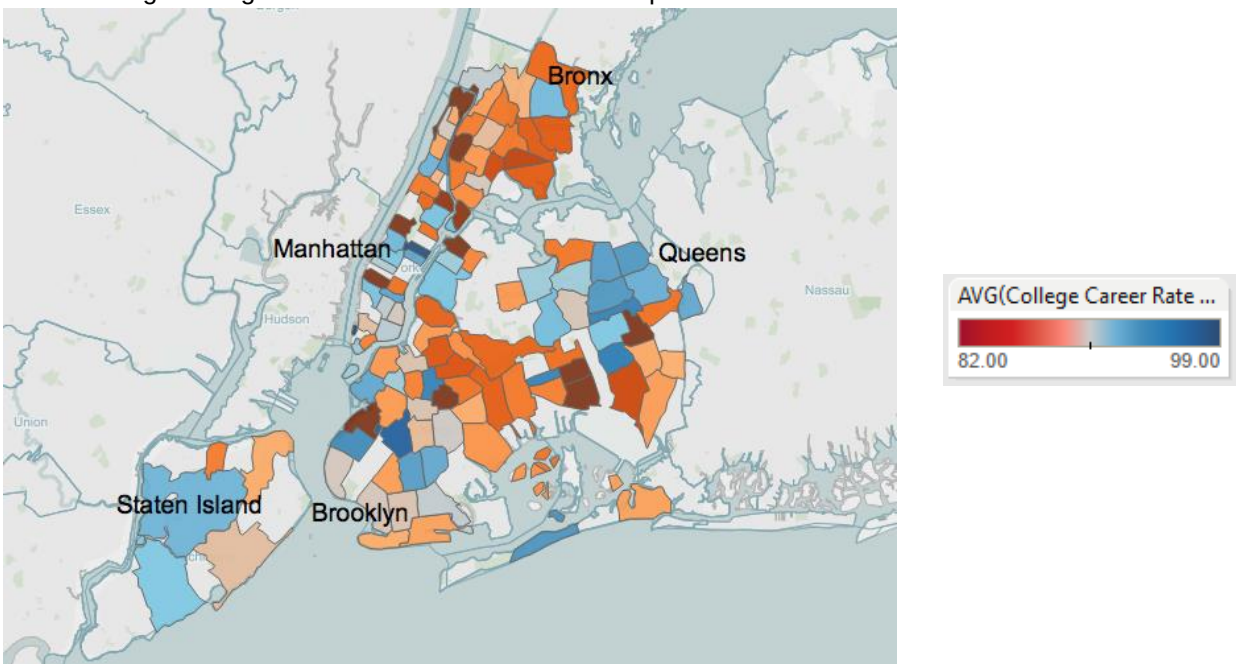

Figure 3: Average Household Age Distribution Across Various Zip Codes in NYC

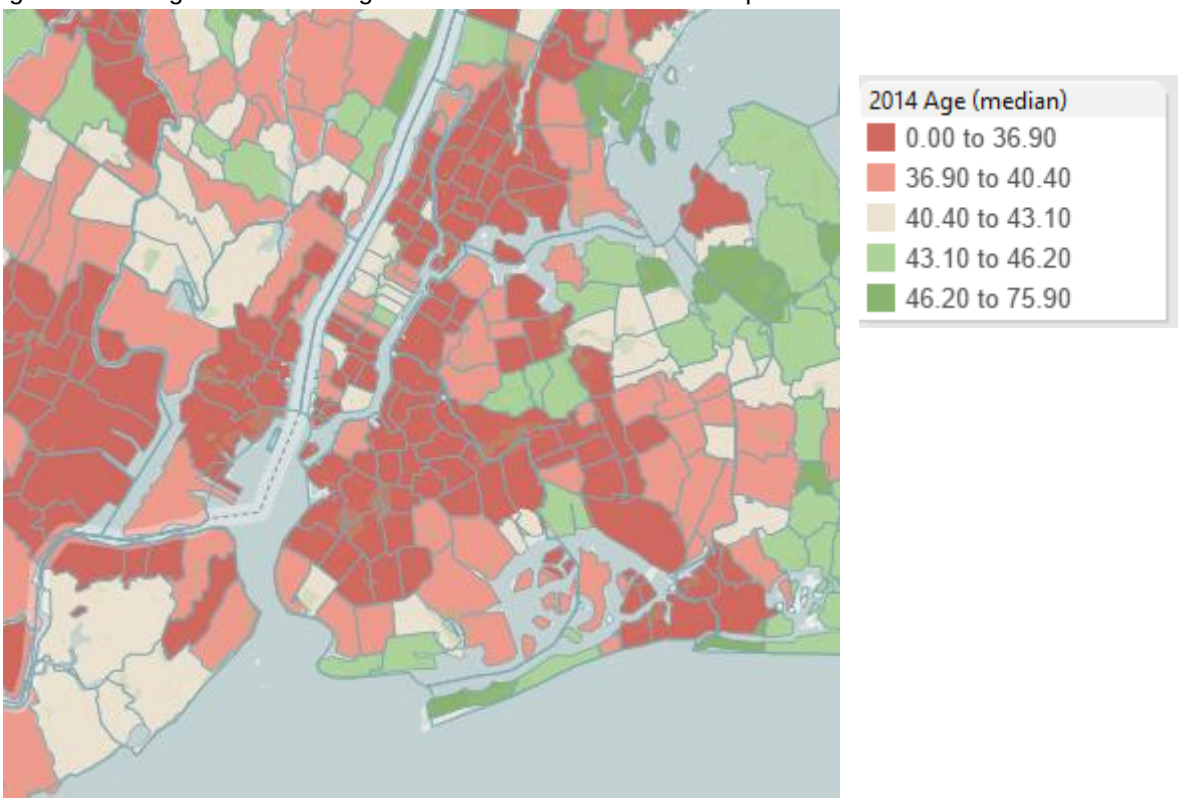

Figure 4: Average Student Satisfaction Rate vs. Average College Career Rate for various School Types

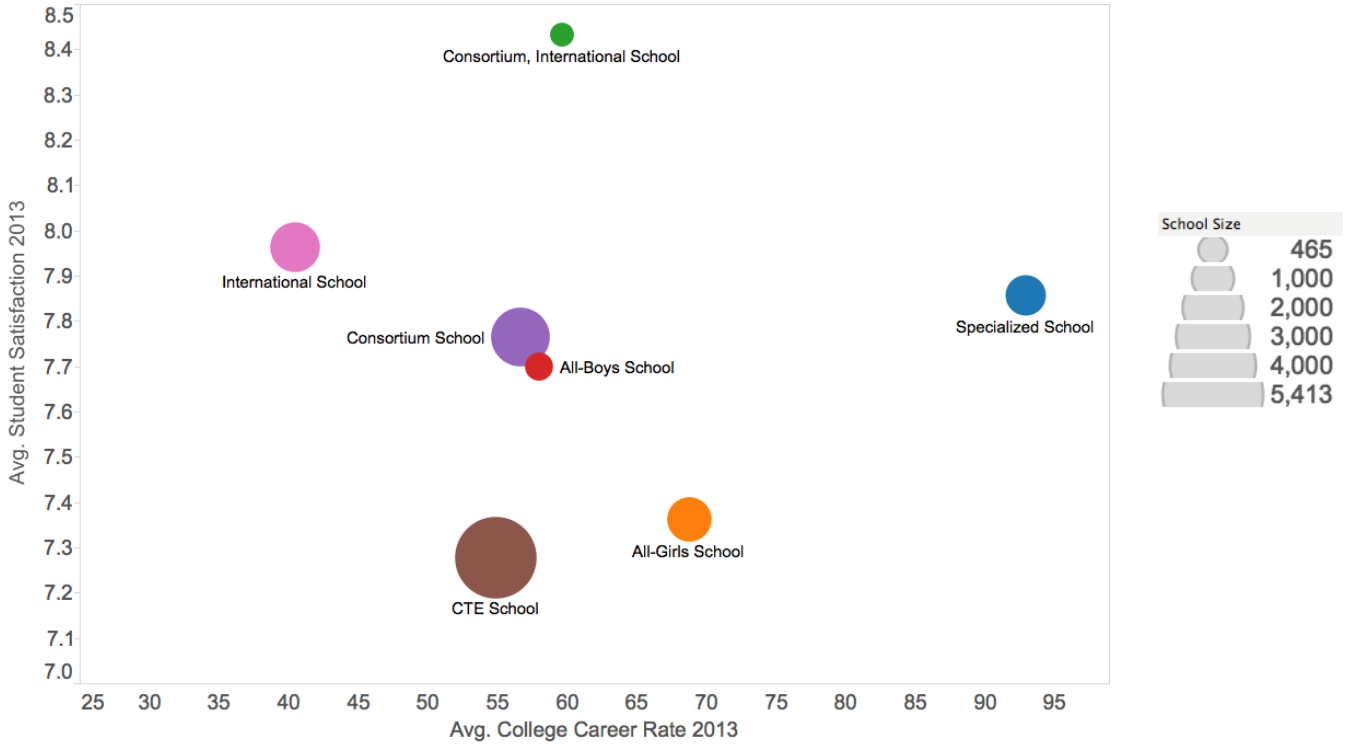

Figure 5: Average College Career Rate versus Average Number of AP Courses offered across different schools.

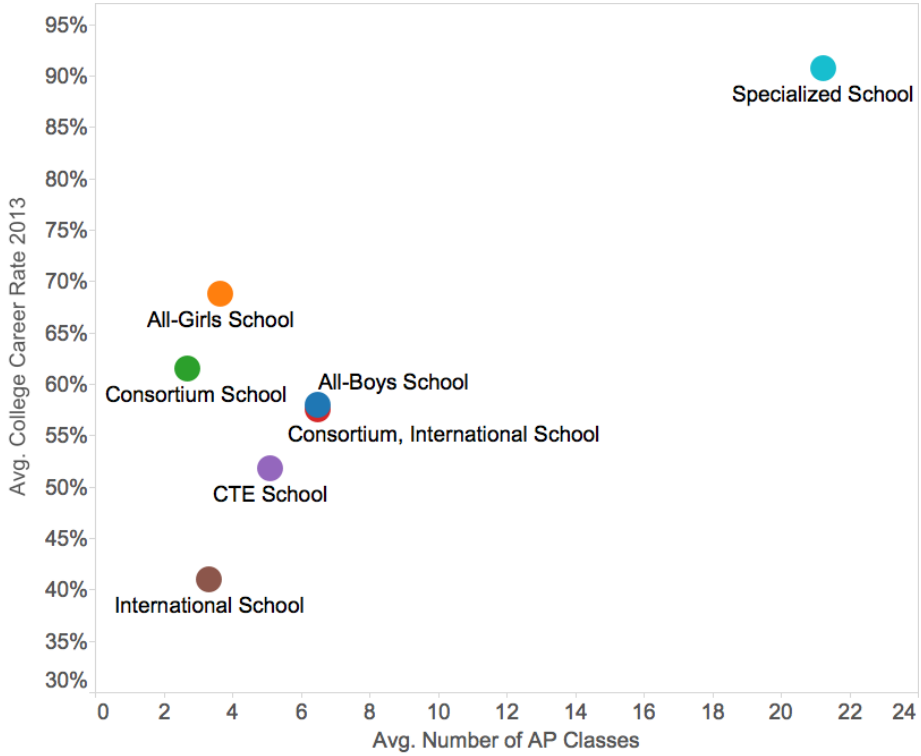

Figure 6: Correlation Matrix

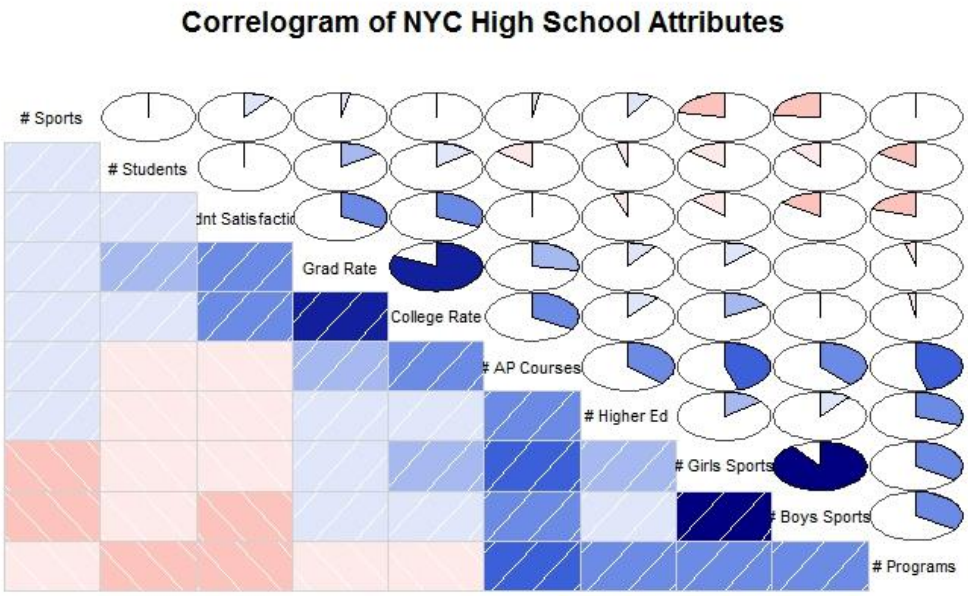

Figure 7: NYC High School Performance-Based Clusters