



NYC HS Admissions Matching Algorithm

-Davide Moste &
Joel Bianchi



Agenda

- Introduction
- Matching in NYC Schools
- Coding Simulation
- Ethical Concerns

MATCHING PROCESS IN NYC DOE

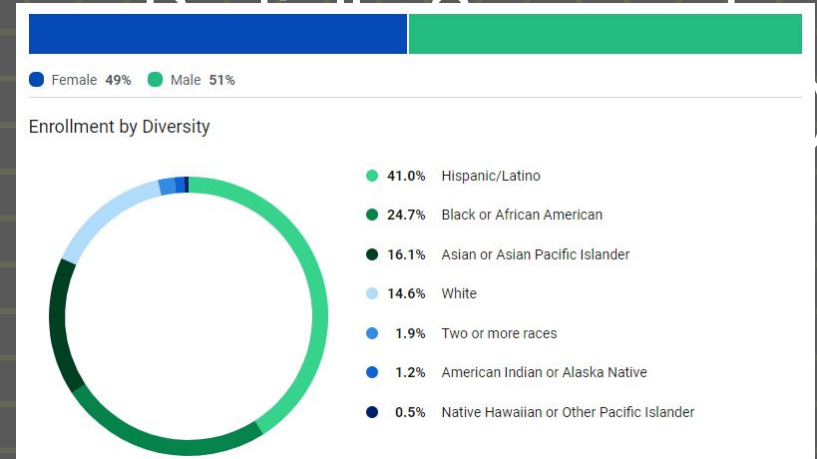


LEARNING THROUGH THE NYC PUBLIC SCHOOL SYSTEM

- 1.03 million students
 -
- 1851 public schools
 - 542 HS

Types of High Schools

- Specialized
- Screened

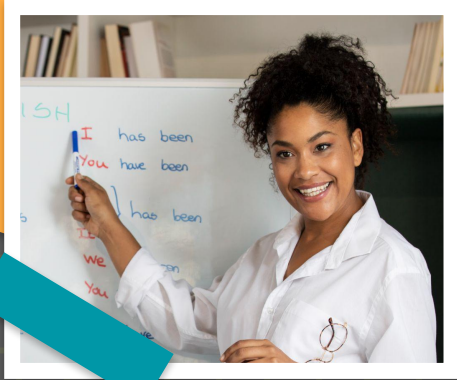


(1) STUDENTS RANK 12 HIGH SCHOOLS



- How do students know what schools to rank?
- Guidance counselors play an outsized role in advising students & parents.

(2) SCHOOLS RANK ALL THE STUDENTS INTERESTED IN THEIR SCHOOL



- Schools receive a list of ALL students who ranked them
- Common data used to sort:
 - Attendance
 - MS Math Scores
 - MS ELA Scores
- Schools use personal preferences:
 - Coming to Open House

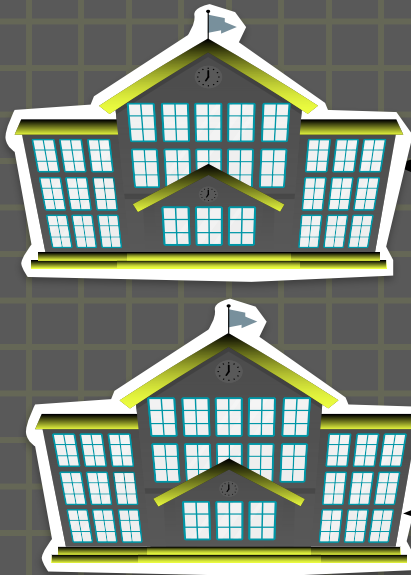
(3) NYC DOE FORCES SCHOOLS TO REVISE LIST FOR ACADEMIC BALANCE

- Partial-screened schools cannot just take the “top” students:
 - ie. Top 20% of rankings must include at least 30% students from Bottom Quartile ELA scores
- NYC DOE can check the school’s list for their required criteria



(4) DOE MATCHES STUDENTS TO SCREENED SCHOOLS BASED ON LISTS

- Some published criteria
- Generally opaque!



New
for
2023!

Group	Rank & Grade
1	↑15%, $\geq 90\%$
2	↑30%, $\geq 80\%$
3	↑50%, $\geq 70\%$
4	↑70%, $\geq 65\%$
5	Everyone else

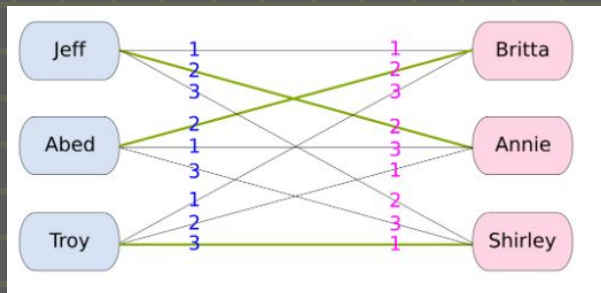
HS MATCHING CODE SIMULATION



“STABLE MARRIAGE” PROBLEM (Gale-Shapley Algorithm, 1962)



- Original algorithm for college admissions, [Harvard 1962](#)
- Won [Nobel](#) in economics, 2012
- Used by many [dating apps!](#)



- 2 Variations:
 - Prioritize “Men” or “Women”

HS MATCHING CODE SIMULATION DESIGN

- **Generate Lists from Students**
 - Universally agreed / Randomly generated
- **Generate SortedLists from each School**
 - Import real / random student data from .csv file
 - Each school assigns weights to each criteria
- **Match Students to Schools**
 - Use variation of “Stable Marriage” algorithm
 - If student’s first choice is full, check if they are “more deserving”
- **Analyze School Demographics**
 - Adjust data to see outcomes

HS MATCHING CODE SIMULATION DESIGN

- **Java vs Python**
 - Object-oriented for Student & School
- **Replit**
 - Collaboration
- **ArrayList<Student> & ArrayList<School> as primary data structures**

```
1 //Uses Random data generator from
2 // https://docs.google.com/spreadsheets/d/1NvYGaDli1jGMunw78f2cYzZ_LKD5hntwyL6CRI4JgI0/edit?usp=sharing
3
4 import java.io.*;
5 import java.util.Scanner;
6 import java.util.ArrayList;
7
8 class Main {
9
10 // Create an ArrayList to store all of the Student objects
   you will later create
11 public static ArrayList<Student> students = new
   ArrayList<Student>();
12 public static ArrayList<School> schools = new
   ArrayList<School>();
13 public static StableMarriage sm;
14
15 public static void main(String[] args) {
16
17 // PULL IN SCHOOL & STUDENT DATA
18 System.out.println("Parsing Student database!");
19 pullStudentData("studentData(real).csv");
20
21 System.out.println("Parsing School database!");
22 pullSchoolData("schoolData.csv");
```

[HS Match Simulation](#)

ETHICAL CONCERNS



FOCUS CONCERN: Emphasis on Test Scores Results in Segregation

- New York - “most segregated schools”, ([Civil Rights Project, 2018](#))
- “NYC uses selective admissions more than any other school district in the country” -[NYT, 9/29/2022](#)
- NYC Specialized HS - use single test score to offer admissions

Demographics of Specialized High School Applicants

	Asian	Black	Latinx	Multi-Racial	Native American	White	Missing Data
Distribution of Testers by Ethnicity	31%	20.7%	25.8%	1.8%	.9%	17.1%	2.8%
Total Distribution of SHSAT Offers by Ethnicity	52.5%	3.2%	5.7%	3.9%	.6%	27.8%	6.3%

Challenges with Reducing Segregation in Matching

- Many parents want an **objective test score** to determine acceptance
 - Is the SHSAT score or State Exams truly “objective” about a child’s **academic potential**?
- University of Texas started using **class rank** to diversify, after disallowed from using race to boost admissions for black and latinx students
 - What if minority students are given an opportunity that they are not **prepared** for?
 - How can schools accommodate these students to help them **catch up**?
 - If school provides additional supports, how to not **stigmatize** them?

“The Adams Administration”: NYC Matching in 2023

- **MS Admissions:**

- From Pure Lottery →
- Top Tier Student lottery for HS spots:
 - Top 15% in citywide grades
 - Over 90% grades

- **HS Admissions:**

- SHSAT for Specialized HS
- Class Rank in Top 15% prioritized for Screened HS

