NYC HS Admissions Matching Algorithm

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Agenda

- Introduction
- Stages of Algorithm
- Ethical Concerns
- Code Demo
- Conclusion

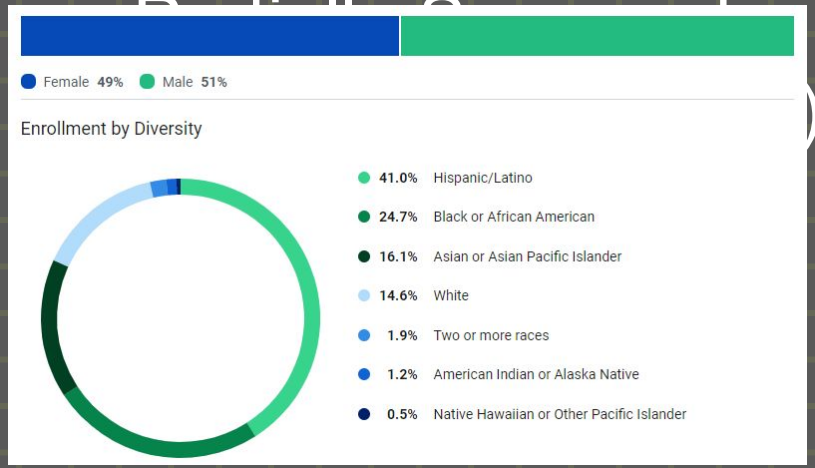
MATCHING PROCESS IN NYC DOE

LEARNING THROUGH THE NYC PUBLIC SCHOOL SYSTEM

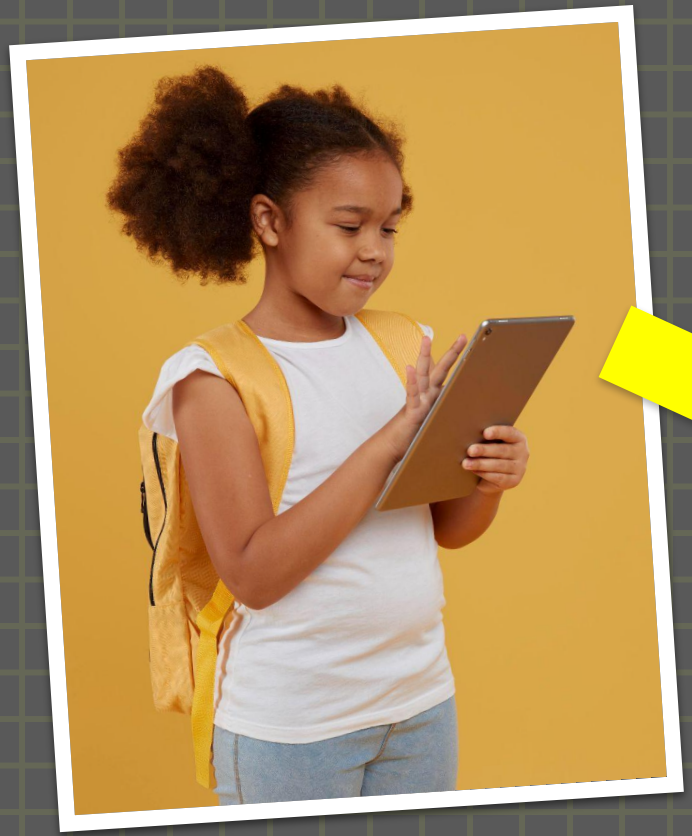
- 1.03 million students
  -
- 1851 public schools
  - 542 HS

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

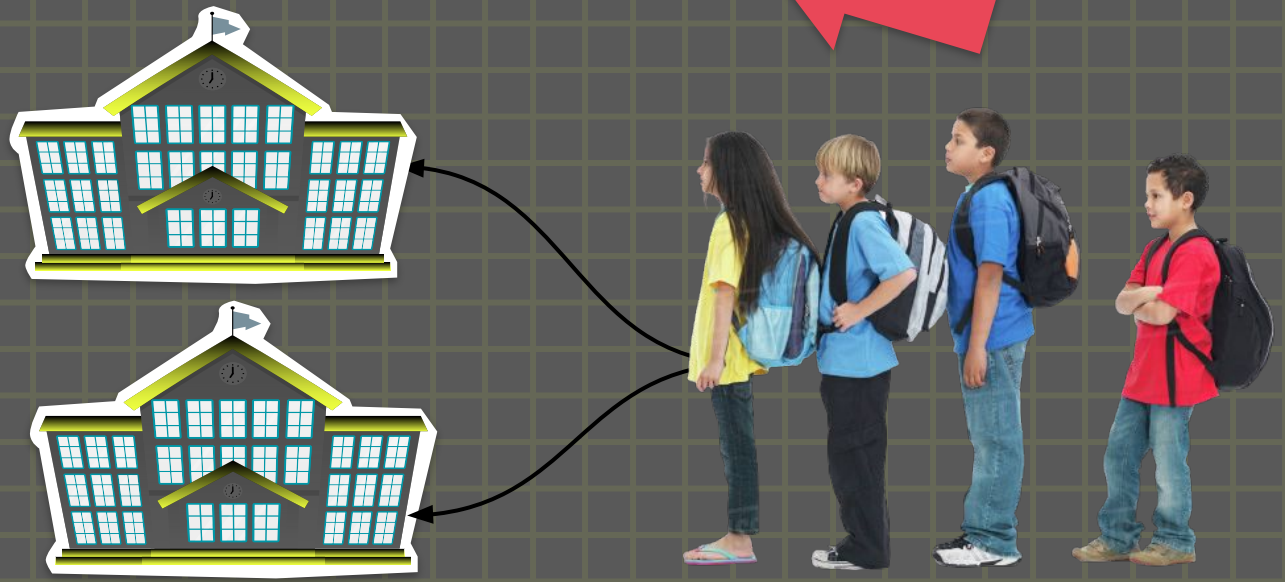
(3) NYC DOE FORCES SCHOOLS TO REVISE LIST FOR ACADEMIC BALANCE

- 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!

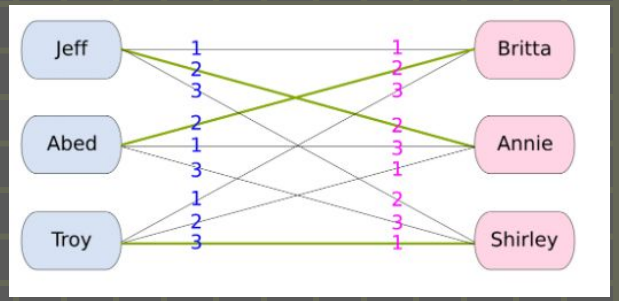


New for 2023!

Group	Rank & Grade
1	↑15%, >=90%
2	↑30%, >=80%
3	↑50%, >=70%
4	↑70%, >=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”

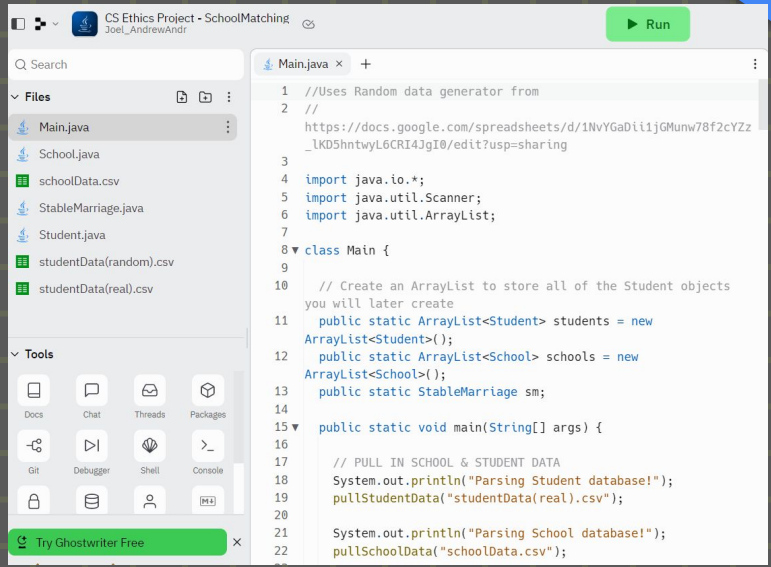
HS MATCHING CODE SIMULATION DESIGN

- **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 Match Simulation

HS MATCHING CODE SIMULATION DESIGN

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



[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