Rochester Police Department Recruitment Process
Data Analysis Report

Ankit Ranjan
With: Isabelle Schmit and Jiang Shang
University of Rochester

1 INTRODUCTION

Rochester Police Department's(RPD) recruitment is a multi-stage process that spans over a time of, close to, one and half year. This process consists of a number of stages which can be condensed into 5, namely - Application, Written Exam, Agility Test, Background Check and Interview. Anyone who passes all the five stages is selected for the police academy. The procedure will be talked about in detail in the next section. However, one thing worth mentioning is the fact that the hiring procedure is a long procedure. With multiple stages that can have gaps spanning months between them, some people tend to just drop out of the procedure. This is one of the motivation behind the project. Now, the data we have is of the candidates who have applied to police department in the last 10 years and was provided to us by the department. The aim of the project being:

- To identify the demographics of the people who drop at various stages of the hiring process.
- To verify whether the recruitment maintained racial diversity. More specifically a 26% minority diversity as mandated by a court order.
- To determine if RPD can have city residency as a criterion for application screening and keep the minority representation as well as number of hires intact.
- To establish if the change in order of hiring stages can reduce the wait time between the stages.

The results of the above questions could be used by RPD for their benefits like minimizing the dropouts, maintaining hiring diversity and maybe add new initiatives to increase pass rates. Exploratory analysis helped us arrive at most of the results. Association rules mining was done on the dataset to find out complex patterns that could have been missed in the exploratory analysis. There were biases identified in some of the stages, which could be either because of the design of the stage (like higher success among males than the females in Agility Stage) or just plain chance. We were able to achieve our objectives, the methods used and results achieved are discussed in the later sections.

2 HIRING PROCESS

As discussed before the procedure can be divided into 5 stages - Application, Written Exam, Agility Test, Background Check and Interview. The first stage is application stage and it begins once a person has applied for the written exam. This stage involves collection of exam fees, screening a candidate's interest and checking whether they meet the age and education requirement. If not they are automatically disqualified. The next stage is Written Exam where candidates have to take a civil

service exam, held yearly by New York state. Since, the state corrects the paper and sends the scores back to RPD, the department has to wait for the results before resuming the procedure for the current lot of applicants. Once the scores arrive RPD's Human Resources department determines the candidates who pass or fail and then schedules a physical test, which makes up the next stage – Agility Test. This stage subjects the candidates to physical examination and is the fastest stage as it is graded on completion. The candidates who pass the Agility test have to undergo a stringent Background check, which is umbrella term for a number of tests that a candidate is subjected to. This stage includes a medical exam, psychiatric exam, personality evaluations, fingerprinting, lie detector test and a background investigation into criminal history and references of the candidate. With all the sub-stages, this stage takes the longest to complete, but upon passing through it the candidate is sent for the Interview stage. At this stage, the applicant has a one-on-one interview with the police chief. The interview stage is more of a formality than a real screening as is evident from the fact that no one has been failed at this stage in past 10 years. So, all in all if someone makes it to the Interview stage they are guaranteed to be hired, unless they drop out of the process.

3 DATA PREPARATION

Two different excel files were provided to us, one with data of all the applicants (ApplciantData.xls) and one with data of every applicant who passed the written exam(PoliceRecruits.xls). Both files followed a similar schema, however there were features present in ApplicantData.xls that weren't in PoliceRecruits.xls, and they are discussed in detail in Appendix A.

First, the attributes with a large number of missing values or the attributes that were not present for both datasets were removed from the spreadsheets. The attributes like Master #, Submitted Application Date and similar attributes that only had clerical significance were removed too. Ultimately we were left with the following attributes - Date Applied for Exam, Written Test Appearance, Final Score, Race, Gender, DOB, Resident, Vet Status, and Disposition Codes. We then used the DOB field to add another column to the data namely Age which was further transformed into a column Age Range, which was a condensed form of the age column. All the age values were divided into six categories (range of ages) and the Age value was replaced by the range they belonged to, e.g. 20 was transformed to '19-22'.
Another set of attributes was extracted from the column Disposition Codes. These codes let us know the status of a candidate in the system and are assigned to every candidate. Now some of the codes were very clear like – PW, which meant "Passed Written" and we could infer that the candidate has passed the written exam and is awaiting scheduling of his physical agility exam date. Then there were codes like DB, which meant "Dropped Medical" and needed knowledge of hiring procedure to infer that it belongs to Background stage of the procedure. But there were codes like WC, "Withdrew from Consideration", which were not clear at all and were marked unknown, the candidates with these codes were ignored in our analysis. Now, with the help of the disposition codes the status of candidates could be inferred for every stage. Thus, it was decided to represent every candidate's status more accurately by breaking down the code for every stage of the hiring process with statuses being – "pass", "fail", "drop", "in progress". So, something like PA or "Passed Agility" meant the candidate has passed every stage till the Agility Stage and would be represented as pass for Application, Written Exam and Agility Stage "In Progress" for the nest stage i.e. Background Check and be marked N/A for Interview and Hiring stage. There were 60 odd disposition codes in the data and we hand-assigned statuses to each code. The data files were parsed and for

every code we added the status of all the stages to that data point. The disposition codes, their descriptions, and their related status codes for each stage of the process can be found in Appendix B.

One issue that we faced with our dataset but were unable to resolve was duplicate values. Since, there is no restriction in number of times a candidate can apply we could have had repeating data points with no unique parameter for us to be able to identify these duplicate rows. The Department's HR system has SSN of the candidate which assists them in identifying candidates that have applied multiple times but the data for us was anonymized and we were unable to identify any candidate who would have applied twice. As a solution, our sponsor instructed us to consider each data point as a separate candidate.

4 ANALYSIS METHODS

One of the things to be done was to find patterns based on demographics among the candidates that drop/fail at any of the recruitment stage which we achieved by doing association rules mining. Association Rule Mining[1] is a rule-based learning method for discovering strong rules/relations between values of different variables. For us the variables considered were - Race, Gender, Residency Status, Age and the result for the current stage. There are two parameters which help in determining whether a rule is important to us or not - Support and Confidence. Support is how frequently some rule A occurs in a dataset and confidence is how often the occurrence of rule A results in B. Both support and confidence are values between 0 and 1. We used a value of 0.1 for support, i.e. any rule A that occurs more than 10% of times will be considered for rule mining. We set our confidence level at 0.8 i.e. a rule A should result in B at least 80% of the times for the rule A => B to be considered as important.

We used Apriori[2] for our association rule mining. This algorithm uses a bottom up approach where the association rules are extended one size at a time. It starts with discovering all the rules with only one variable then expands the discovered rules by a size of one at every iteration, keeping only the ones that satisfy the values of support and confidence set by us. We used a machine learning tool called WEKA[3] for implementing Apriori. The dataset used for this part was a little different than the ones used originally. We partitioned data into various parts according to the stages of recruitment. Only the people who passed the previous stage were considered for mining for current stage. This helped us in finding rules that were applicable to each stage separately. Also, as no one is failed at the interview stage we didn't do any mining for the Interview stage or for the candidates that were hired.

Not all the rules discovered by association mining were useful. Most of them were removed because they were redundant and had been considered in the previous stage itself. Like a candidate who is White and Male is also a Non-Resident, was a rule that was thrown up at every stage. Some were also removed because they didn't give any information regarding the stage that a candidate failed or dropped at. Another thing to be noted was that none of the rules showed us that the age had any influence on a candidate's results.

5 ANALYSIS AND RESULTS

To begin the analysis, we started with some basic visualisations. First thing we looked at were the passing rates for the hiring process. This was done taking two different approaches with one involving the passing rate across stages and second one involved looking at passing rates of various demographics across stages. Pass rate for all the candidates can be seen in Figure 1.

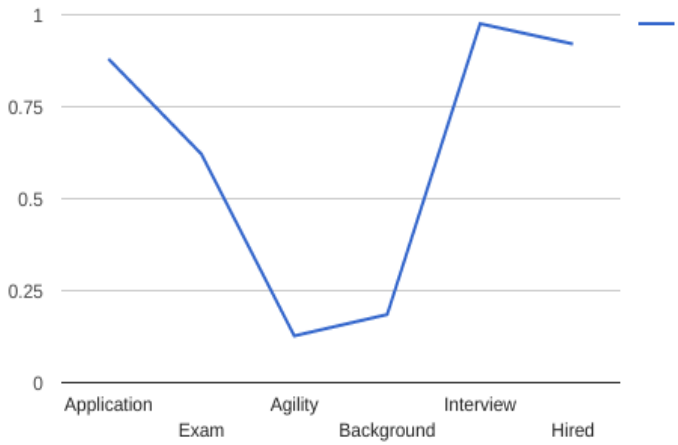

Figure 1- Pass Rate of Each Stage

We can see that Agility and Background stages have lowest passing rates. These rates are calculated against the number of people that passed the previous stage or made it to this stage. Next up we looked at the demographics of the applicants who pass every stage. For this we had two different metrics, one within-stage passing rate and second within-demographic passing rate. Within-stage passing rate was calculated by dividing the number of applicants of a demographic that pass the stage against the total number of people of that pass the stage. It shows the distribution of demographics throughout the stages and the plot of this metric would be a straight line if there was no bias, meaning that the proportion share of different demographics will not change across stages. This "no-bias" line is the light coloured line in the plots to follow. Although this an effective way to check any glaring biases, the comparison of demographics against each other could not be figured out using this. And so, within-demographics comes into picture, it is calculated by dividing number of people of a demographic that pass a stage by the number of people of the said demographic that make it to this stage. It allows us to see which demographics fare the best/worst across all the stages and compare them against each other. Ideally, they should follow the trend in Figure 1.

5.1 EXPLORATORY ANALYSIS

5.1.1 RACE

While looking at within-stage pass rates (Figure 2) for races we see that White applicants make up a large share of applicants and their passing rate have more variation than other races across the stages. Upon looking at other races we can see that none of them stray too far from the expected outcome line, the thin coloured lines.

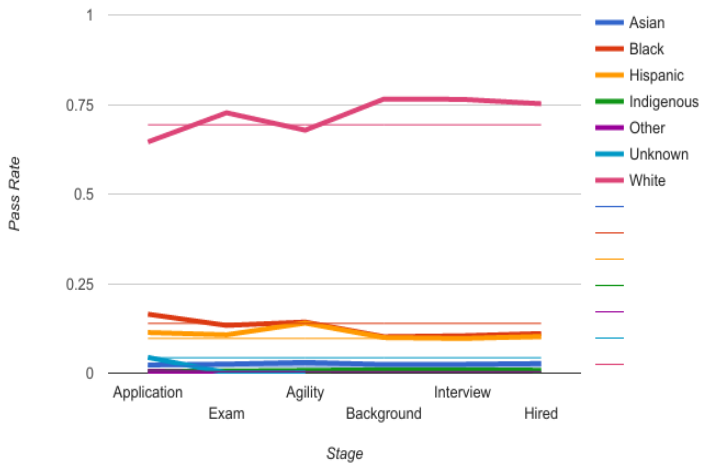

Figure 2- Within-Stage Pass rate for Race

Looking at within-race pass (Figure 3) rates the descrepancies are far more visible. We can see how White applicants have least passing rate during Application stage but fare better at the Background stage. African-Americans and Hispanics perform worse than every other race at Written Exam but are more likely to accept the position offered to them. Indigenous people make up fare better than most races thorughout the process but are least likely to accept a position once offered, also they are very low in number. The biggest dicrepancies comes from the applicants who belong to "Other" race or whose race is "Unknown". The applicants from "Unknown" fail to show up for the Written Exam and have very low passing rate, close to 1% and do not make it past the agility stage. None of the applicants that are from "Other" race make it past the agility test either, anyway they make up a very small share of the applicant pool(0.4%) to begin with.

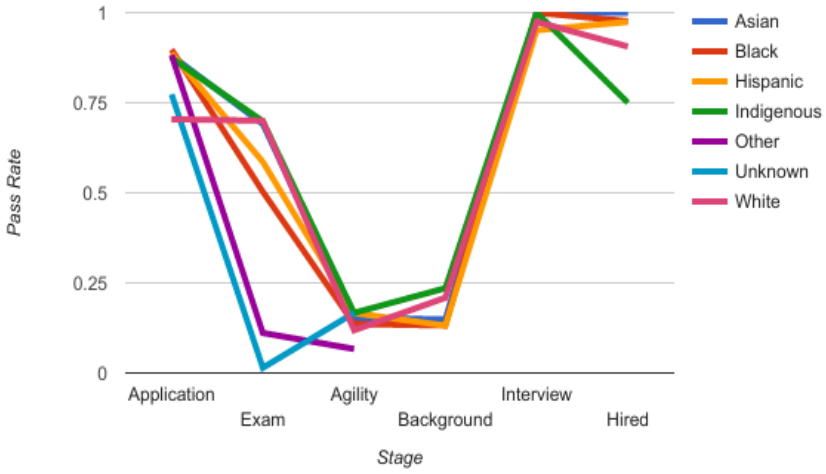

Figure 3 Within-Race Pass Rate at various stages

5.1.2 GENDER

The within-stage and within-demographic (Figure 4 and Figure 5) plots for gender shows little bias between the genders, the thin coloured line showing the expected proportion. Although applicant pool has male applicants in clear majority, the hiring rates seems to follow similar pattern.

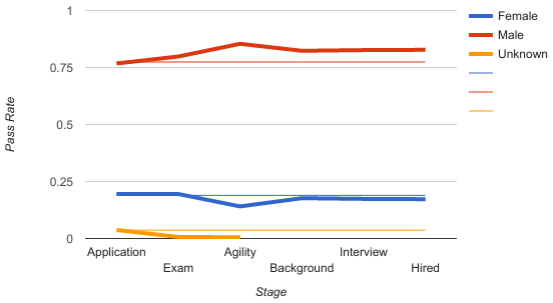

Figure 4 Within-Gender pass rate at various stages

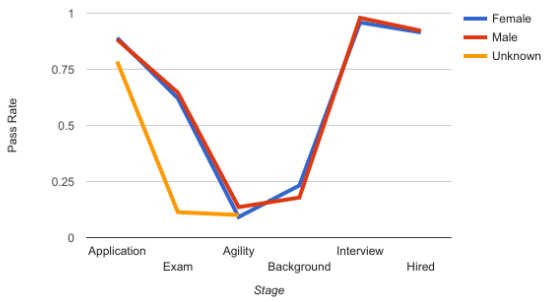

Figure 5 Within-Stage Pass rate for Gender

From both the plots we can conclude that male applicants fare better than their female counterparts in agility stage. But female applicants perform better at Background stage. These two differences combine to make the gender of hired applicants in a ratio similar to that of the applicant pool. Just as in race comparison, the people of gender "Unknown" do not make it past the agility stage.

5.1.3 AGE

Looking at within-stage pass rates (Figure 6, with thin coloured lines for expected pass rates) we can see that the age distribution is less skewed than other demographics. The proportion for each age-range is almost consistent throughout the process with the 19-22 y/o category having the highest deviation, with higher hiring percentage than application percentage. The rest of the categories are consistent except for boundary ranges, which consists of people who do not qualify as applicants. Individuals "must be at least nineteen (19) years of age, and have not reached thirty-fifth (35th) birthday on or before date of written test"[4]**.** From the within-age rates (Figure 7), we can see that the <19 and >35 ranges are the only ranges that do not follow the overall pass rate trend from Figure 1.

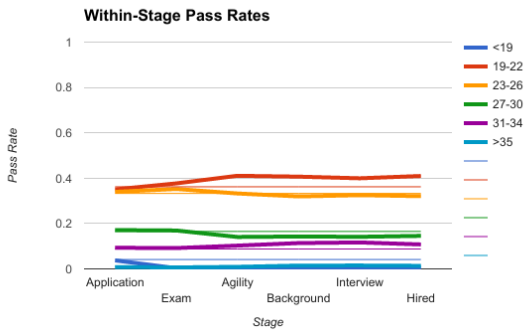

Figure 6 Within Stage pass rate for different age-groups

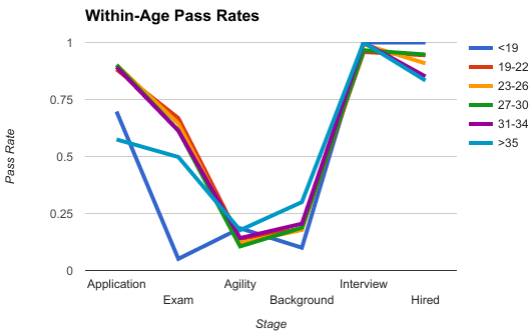

Figure 7 Within Age Group pass rates at various stages

For both the groups the pass rate in application stage is very low, which must come from the fact that they do not satisfy the age requirements. But the age in our calculation was the age at the time of application and the age bar that the department poses is at the time of the test, this could explain why not all the people in the younger age group is failed at the application stage itself. The group of <19 y/o have very low written exam pass rate and that reduces their share in the applicant pool down to 0.1%. Out of which only one person makes it past the background stage, and in due course

is hired too. The >35 age group should not have made it past the application stage, but they do and this could either be because of an HR oversight or maybe the rules have been changed sometime in last 10 years >35 y/o applicants are from before the change. This group performs worse than other age groups (except <19 y/o group) in the written exam stage, but outperforms them all in the remaining stages except the Hiring stage. In all other qualifying age range, there are little to no difference between their passing rate, showing lack of age wise bias.

5.2 IN-PROGRESS ANALYSIS

As mentioned in the "Data Preparation" section for each stage we have 4 different statuses for a candidate in every stage – "pass", "fail", "drop" and "in progress". In our analysis, we found a fair number of applicants whose disposition code didn't point to either pass or fail or drop condition and thus were labelled as "in progress" or the stage. Like PW (Passed Written Exam) tells us they passed the written exam but nothing regarding the stages after that, thus these candidates were labelled "pass" for Written Exam stage and "in progress" for the next stage – "Agility" and N/A for stages after. So, we looked into the "in progress" statuses and compiled the disposition codes and numbers for all the stages, the complete table is in Appendix C. A threshold of 85% of the total "in progress" candidates and a minimum absolute count of 200 was used for it. The codes which passed the threshold are in Table 1

Table 1 Codes which crossed the threshold

Stage	Code	Description	Percentage	Count
Application	AS	Application Screen	92.11	3025
Exam	NF	Exam Fee Not Paid	94.87	3586
Agility	PW	Passed Written Examination	99.64	10225

5.3 RESULTS

All the percentages and ratios that are discussed are against the total number of people that passed the previous stage and made it to the stage being discussed. Only the relevant tables and figures have been mentioned. Tables for every Race and Gender and their performance in every stage is in Appendix D.

5.3.1 APPLICATION STAGE

At this stage, the rejections occur only on the basis of what a person has filled in his/her form. It is only an application screening procedure. In this section, we will be talking about the composition of applicants at this stage. Of all African-American and Hispanic applicants 43.8% and 31% of them are city residents, respectively. On the other hand of all the White applicants only 9% of them are Residents of the city. Due to high share of White individuals being non-residents and the fact that White people are more in number we see that among non-residents 75% are White whereas among residents only 38% are White. The pass rate for this stage among all other races except white is very high, with the minimum being 88%. At first look we see that White applicants have comparatively

low pass rate at 70%, but this is because most of their disposition codes point to their application status being “Unknown”. If we remove the unknowns their unknown candidates the pass percentage shoots up to 87%, which is similar to that of other races. Now due to the sheer huge number of White applicants, and their low pass rate (including unknown candidates) the overall pass rate for this comes up to about 75%. Table 2 is a comparison between the racial composition of the applicants that are resident of the city of Rochester and the actual racial composition of the city.

Table 2 Racial Distribution

Race	Resident Applicants	City of Rochester
White	38.50	37.6
African American	36.54	41.7
Hispanic	18.31	16.4
Asian	2.07	3.1
Indigenous	0.56	0.5
Others	0.70	0.7
Unknown	3.30	---

* All values are percentage total of the candidates that made it to this stage.

5.3.2 WRITTEN EXAM STAGE

From the exploratory analysis, we did see that not all races fair equally well in this stage. A boxplot of the scores for every race (Figure 8) shows that African Americans and Hispanics don’t do well compared to other races. Only the applicants with “Other” or “Unknown” as their races are close to their scores. These scores are backed by the fact that the pass percentage of African Americans is just about 50%, another 33% are either drop or fail at this stage and the rest are in “In Progress” category. Hispanics too have a low passing percentage with only 58% of them making it past this stage. White, Asian and Indigenous applicants enjoy a fairly high success rate of around 70%. Figure 9 shows that there is no bias among the genders at this stage.

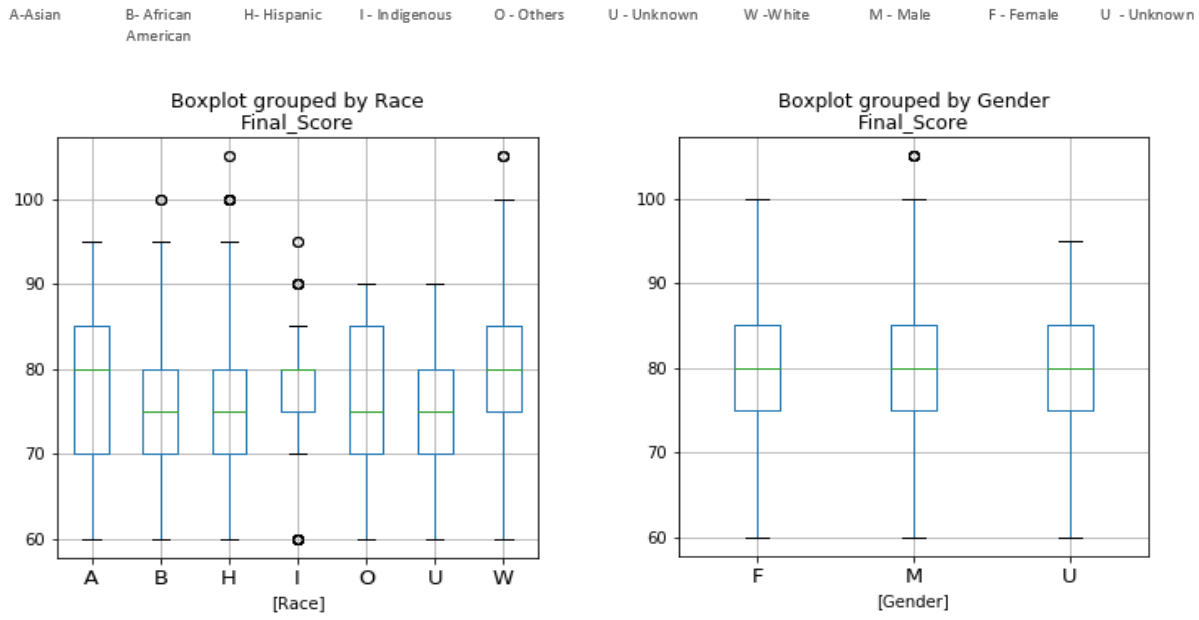

Figure 8 Boxplot of Scores for every Race

Figure 9 Boxplot of Score with respect to Genders

Combining both Gender and Race however gives us even better insights. From Figure 10 we can see that the females who identify themselves in the “Other” race category fare the worst.

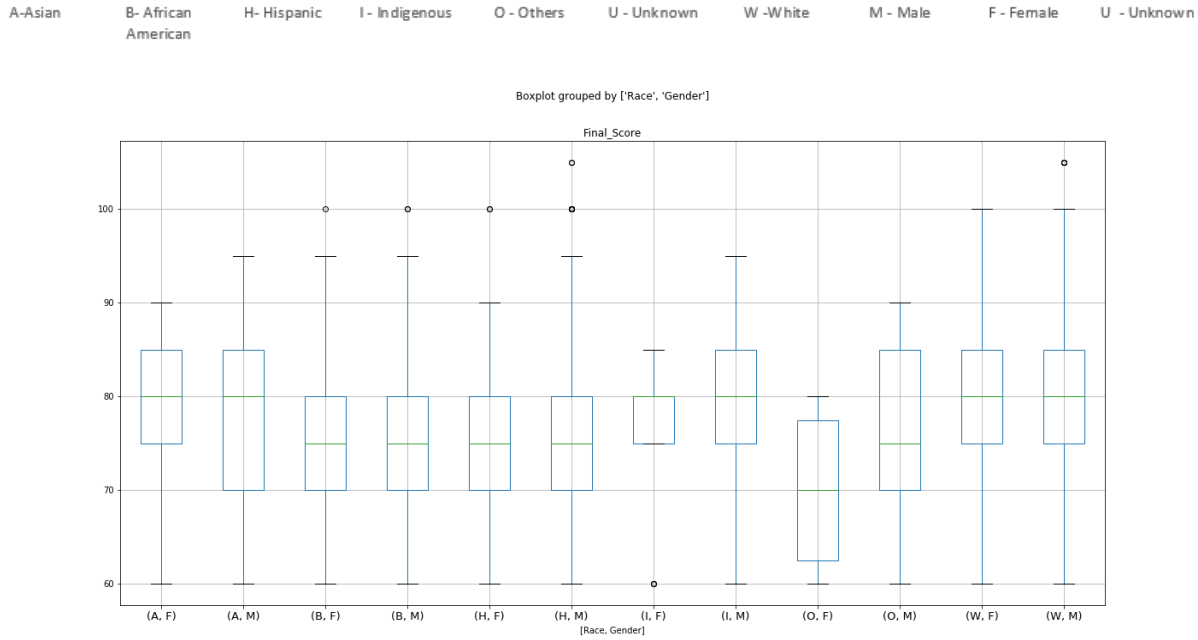

Figure 10 Boxplot for every Race and Gender combination

Apart from that what we see is that the only 57% of the Indigenous Females make it past this stage. The males of Indigenous race have a passing rate of 73% making up for their female counterparts. Also, the residents have nearly double the rate of failure compared to the applicants that are not a resident of the city, 11.1% v/s 5.9%. A race wise comparison of how they fare in this stage can be seen in Table 3.

Table 3 Race-wise Results for Written Exam

Race	**Pass**	**Fail**	**Drop**	**In Progress**
White	69.99	5.17	15.44	9.40
African American	50.31	12.41	20.26	17.02
Asian	69.05	7.93	14.31	8.71
Hispanic	58.60	10.86	18.86	11.68
Indigenous	69.86	7.54	10.96	11.64

*All values are percentage total of the candidates that made it to this stage.

5.3.3 AGILITY STAGE

This stage is where physical fitness of a candidate is ascertained. Surprisingly this stage has the least passing rate among all the stages, it was unexpected as we thought the background check to be the stage to have least passing percentage. This low passing rate, however, was not because of very strict procedure or high failure rate of candidates in agility test, but because most of the candidates (~59%) are stuck in the "in progress" stage. This means that the candidates have passed the written exam but for some reason haven't either taken their agility test or it hasn't been scheduled yet. The disposition code of more than 99% who are "in progress" at this stage is "PW", which stands for "passed written exam" and no other information is available. We also observed that men are more successful at this stage with a passing percentage of 13.59% as against 9.17% for women, as can be seen in Table 4. Women are also more likely to drop at this stage. White applicants have the lowest dropping/failure rate but also the lowest passing rate, this is due to the fact that almost two-thirds of the white applicants are in "in progress" category. African-American Females and White Males have the least passing rate in their respective gender categories. Another interesting thing to note was the fact that Residents are 9% more likely to drop at this stage compared to the non-resident applicants.

Table 4 Gender-wise Result for Agility Stage

Gender	Pass	Fail	Drop	In Progress
Male	13.6	9.63	18.47	58.30
Female	9.17	8.68	23.02	59.13

*All values are percentage total of the candidates that made it to this stage.

5.3.4 BACKGROUND STAGE

This stage is a combination of Psych Evaluation, Polygraph test, and Background check making it one of the toughest stages to pass. Although this stage doesn't have least passing rate it is the recruitment step with highest failure rate. 4 in 5 people who make it past agility fail at background check stage. White people have highest passing percentage at this stage, almost 6% more than the next highest race. Women enjoy far more success at this stage than their male counterparts, 23% success rate versus 18% for men, the gender comparison can be seen in Table 5. White women having a pass percentage close to 29%, which is more than the average passing rate and very high compared to women of other races (only considering the races for which the candidates at this stage are large in number). To put this in perspective the next highest success rate is for African-American females and it less than half of White female's share at 13.58%. Taking after their female counterparts White males too have the highest passing rate among the males of every race. Another point to notice is the fact that more non-residents tend to go ahead of this stage compared to the residents, 19.7% versus 12.6%. Table 6 shows a more comprehensive result for every race. Though Indigenous have a higher success rate than the White applicants we haven't talked about them because of their share of applicant pool at this stage is very low, only 0.7% (or 17) of the candidates are of Indigenous race.

Table 5 Race-wise Result for Background Check

Race	Pass	Fail	Drop	In Progress
White	20.89	76.40	1.59	1.12
African American	13.21	83.96	----	2.83
Asian	14.93	83.58	----	1.49
Hispanic	13.14	83.98	1.60	1.28
Indigenous	23.53	76.47	----	----

Table 6 Gender-wise result for Background Stage

Gender	Pass	Fail	Drop	In Progress
Female	23.25	74.84	0.32	1.59
Male	17.85	79.32	1.94	0.89

*All values are percentage total of the candidates that made it to this stage.

5.3.5 INTERVIEW STAGE/HIRED

After making it to interview stage it is guaranteed that the person would be admitted to the police academy. In fact, no one has been failed at Interview stage in the last 10 years. So, instead of going through the data of people making it to Interview we can directly go to the pool of candidates that are hired. Looking at the demographics of the hired candidates one can clearly see that the RPD is fairly male dominated. Of all the candidates selected 82.75% of them are men. Overall Whites make up 75% of the population which brings minority representation at 25% which is just a point shy of the court mandated 26% share of the total. So, we can say that the department is not necessarily biased in terms of race. Race distribution among the hires can be seen in Table 7. Residents make up about only 12.4% of the total hires. This brings us to the question whether the minority representation be maintained if the eligibility criteria also included a mandatory residentship of the city of Rochester. As far as the representation is considered, among the resident hires the minorities are the majority of the crowd. But then under that condition RPD won't be able to recruit enough number of people for the force. In fact, they would need 8 times the current number of resident applicants to be able to keep hiring adequate number of people for RPD.

Table 7 Racial Distribution of Final Hires

Race	% of Total
Asian	2.70
African American	11.05
Hispanic	10.24
Indigenous	0.81
White	75.20

*All values are percentage total of the candidates that made it to this stage.

6 CONCLUSION

In conclusion, the project has achieved the goals satisfactorily. The analysis shows the demographics of the people that tend to fail/drop more than the general population. Specifically, in Written Exam stage African-American, Hispanic and Indigenous Female applicants tend to be least successful. In Agility, female candidates fare worse than male candidates, also African-American Female and White Male candidates are least likely to pass among their respective genders. Background check seems to be biased towards Female candidates compare to their male counterparts. Also, the White candidates tend to do better than candidates of other races. In fact, White Female applicants have double the success rate compared to the next best race, among the female candidates. Interview

and subsequent Hiring come off as more of a formality than an actual screening process, as no one has been rejected after making it past background stage in past 10 years. Also, there are candidates that do not satisfy the age requirements (>35 y/o) that are hired by the department. The court mandated 26% is just about satisfied, with 25% minority representation among the hires. Addition of residency as a criterion for applicants is not feasible for the department. Only resident hires would satisfy the minority representation condition but the number of hires would be too low. The Rochester Police Department would need 8 times the current resident applicants for it to be able to hire enough people for the police force. The question of changing the order of stage can be answered with a No. We see that the percentage of people that drop/fail at every stage increases as we go further ahead in the hiring procedure. Thus, it makes sense to keep the stages that are expensive later than the stages that cost state less amount of money. The current order of stages follows that order and shouldn't be disturbed.

REFERENCES

1. Association Rule Mining, https://en.wikipedia.org/wiki/Association_rule_learning
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3. WEKA, http://www.cs.waikato.ac.nz/ml/weka/Witten_et_al_2016_appendix.pdf
4. Does the Rochester Police Department have age requirements ?, http://www.cityofrochester.gov/article.aspx?id=8589936729

APPENDIX A

Attribute	Description	Present in ApplicantData.xls	Present in PoliceRecruits.xls
Master #	String, identifier for test batch	yes	No
Date Applied for Exam	Date, day application was submitted	yes	Yes
Application Close Date	Date, last day for individual to submit application for batch, linked with master #	yes	No
Exam Date	Date, day exam for master # was held	yes	No
Date of List Establishment	Date, day individual was entered into HR system, not necessarily same as date applied	yes	No
Expire off List Date	Date, ~3 years after application close date when applicant is removed from consideration for that batch	yes	Yes
Exam Fee	String, duplicate of Disposition or PD (paid)	yes	No
Written Test Appearance	String, AP (appeared), DN (did not appear), IS (import score from NYS), FW (failed written)	yes	No
Final Score	Integer, score on written exam	yes	Yes
Race	String, A (Asian or Pacific Islander), B (African American), H (Hispanic), I (American Indian or Alaskan Native), O (Other), W (White)	yes	Yes
Gender	String, M (male), F (female)	yes	Yes
DOB	Date	yes	Yes
Resident	String, C (city resident), O (non-city resident)	yes	Yes
Vet Status	String, VQ (Qualified Veteran -submitted proof), VC (Conditionally approved Vet), VCD (Conditionally approved Disabled Vet), VN (Veteran, not qualified), N (Not a Veteran), DQ (Disabled Veteran approved)	yes	Yes
Disposition	String, codes explained in Appendix B	yes	yes
Status	String, AC (active), IN (inactive)	yes	Yes
Submitted Application Online	Boolean	yes	Yes
Zip Code	String	yes	No

APPENDIX B

Code	Description	Stage	Status	Application	Exam	Agility	Background	Interview	Hired
AD	Alternate test date denied	application	In progress	pass	N/A	N/A	N/A	N/A	N/A
EA	Eligible for Exam Participation	application	pass	pass	in progress	N/A	N/A	N/A	N/A
NA	No Answer to Canvass Letter	application	drop	drop	N/A	N/A	N/A	N/A	N/A
AI	Application incomplete	application	drop	drop	N/A	N/A	N/A	N/A	N/A
NQ	Not Qualified	application	fail	fail	N/A	N/A	N/A	N/A	N/A
AV	Age verification - conditional approval	application	In progress	in progress	N/A	N/A	N/A	N/A	N/A
AN	Application not received	application	drop	drop	N/A	N/A	N/A	N/A	N/A
AT	Alternate test date request	application	In progress	pass	in progress	N/A	N/A	N/A	N/A
BC	Check bounced - Exam Fee	application	In progress	pass	in progress	N/A	N/A	N/A	N/A
UA	Underage	application	fail	fail	N/A	N/A	N/A	N/A	N/A
OA	Over age requirement	application	fail	fail	N/A	N/A	N/A	N/A	N/A
NH	No High School/GED	application	fail	fail	N/A	N/A	N/A	N/A	N/A
AH	Age Hold	application	In progress	in progress	N/A	N/A	N/A	N/A	N/A
AS	Application Screen	application	In progress	in progress	N/A	N/A	N/A	N/A	N/A
NF	Exam Fee Not Paid	application	fail	pass	in progress	N/A	N/A	N/A	N/A
WW	Withdrew from written examination	exam	drop	pass	drop	N/A	N/A	N/A	N/A
DX	Disqualified from Exam	exam	fail	pass	fail	N/A	N/A	N/A	N/A
FW	Failed Written exam	exam	fail	pass	fail	N/A	N/A	N/A	N/A
DN	Did Not Appear for examination	exam	drop	pass	drop	N/A	N/A	N/A	N/A
PW	Passed Written Examination	exam	pass	pass	pass	in progress	N/A	N/A	N/A
PA	Passed Agility	agility	pass	pass	pass	pass	in progress	N/A	N/A
WA	Withdrew from agility test	agility	drop	pass	pass	drop	N/A	N/A	N/A
AA	Alternate agility date request	agility	in progress	pass	pass	in progress	N/A	N/A	N/A
FA	Failed Agility Test	agility	fail	pass	pass	fail	N/A	N/A	N/A
DA	Did Not Appear for Agility	agility	drop	pass	pass	drop	N/A	N/A	N/A
QC	Questionnaire Completed	background	pass	pass	pass	pass	in progress	N/A	N/A
WM	Withdrew from medical	background	drop	pass	pass	pass	drop	N/A	N/A

DQ	Did not appear for questionnaire	background	drop	pass	pass	pass	drop	N/A	N/A
WB	Withdrew from background investigation	background	drop	pass	pass	pass	drop	N/A	N/A
PB	Passed Background Investigation	background	pass	pass	pass	pass	pass	in progress	N/A
DP	Did Not Appear for Psychiatric Exam	background	drop	pass	pass	pass	drop	N/A	N/A
MP	Medical Passed	background	pass	pass	pass	pass	in progress	N/A	N/A
DB	Did not appear for medical	background	drop	pass	pass	pass	drop	N/A	N/A
FM	Failed Medical Exam	background	fail	pass	pass	pass	fail	N/A	N/A
FB	Failed Background Investigation	background	fail	pass	pass	pass	fail	N/A	N/A
DL	Did not appear for oral exam	interview	drop	pass	pass	pass	pass	drop	Dp
NX	Consider for Next Class	interview	pass	pass	pass	pass	pass	in progress	N/A
TI	Temporary inability to accept appointment	hiring	in progress	pass	pass	pass	pass	pass	in progress
DO	Declined Offer	hiring	drop	pass	pass	pass	pass	pass	Drop
AL	Appointed to title from prior list	hiring	pass	pass	pass	pass	pass	pass	Pass
HR	Hired	hiring	pass	pass	pass	pass	pass	pass	Pass
VO	VOID this Applicant Record	overall	fail	unknown	unknown	unknown	unknown	unknown	unknown
WC	Withdrew from Consideration	overall	drop	unknown	unknown	unknown	unknown	unknown	unknown
WD	Withdrew from Selection Process	overall	drop	unknown	unknown	unknown	unknown	unknown	unknown
TE	Time expired	overall	drop	unknown	unknown	unknown	unknown	unknown	unknown
NM	No response to telephone messages	overall	drop	drop	N/A	N/A	N/A	N/A	N/A
MD	Military Deferment - Active Duty	overall	drop	unknown	unknown	unknown	unknown	unknown	unknown
MR	Mail Returned	overall	drop	drop	N/A	N/A	N/A	N/A	N/A
OE	Accepted Other Employment	overall	drop	unknown	unknown	unknown	unknown	unknown	unknown
RG	Resignation	overall	drop	unknown	unknown	unknown	unknown	unknown	unknown
DNS	Did not say yes for Electronic Signature	unknown	drop	unknown	unknown	unknown	unknown	unknown	unknown
SF	Same Final Score as new holding	unknown		unknown	unknown	unknown	unknown	unknown	unknown
DNP	Didn't submit paperwork	unknown	drop	pass	pass	pass	drop	N/A	N/A
AE	Appointed to an Equal or Higher Position	unknown	drop	pass	pass	pass	pass	pass	drop

IS	Imported Score (from other jurisdiction)	unknown	in progress	pass	in progress	N/A	N/A	N/A	N/A
ER	Eligible for Referral	unknown	in progress	unknown	unknown	unknown	unknown	unknown	unknown
RF	Recommended Failure	unknown	fail	unknown	unknown	unknown	unknown	unknown	unknown
TD	TIAB Denied - Not Available	unknown		unknown	unknown	unknown	unknown	unknown	unknown
RT	Removal due to CRT retake - new record add	unknown		unknown	unknown	unknown	unknown	unknown	unknown

APPENDIX C

The highlighted parts are the ones that has already been mentioned in Section 5.2

Stage	Code	Description	Percentage	Count
Application	AS	Application Screen	92.11	3025
Application	AH	Age Hold	7.76	255
Application	AV	Age Verification-conditional approval	0.12	4
Exam	NF	Exam Fee Not Paid	94.87	3586
Exam	IS	Imported Score (from other jurisdiction)	4.47	169
Exam	BC	Check bounced - Exam Fee	0.32	12
Exam	AT	Alternate test date request	0.29	11
Exam	EA	Eligible for Exam Participation	0.05	2
Agility	PW	Passed Written Examination	99.64	10225
Agility	AA	Alternate agility date request	0.36	37
Background	MP	Medical Passed	72.73	16
Background	PA	Passed Agility	22.73	5
Background	QC	Questionnaire Completed	4.55	1
Interview	NX	Consider for Next Class	55.56	5
Interview	PB	Passed Background Investigation	44.44	4
Hired	TI	43	100.00	1

APPENDIX D

All the percentages and ratios that are discussed are against the total number of people that passed the previous stage and made it to the stage being discussed. Only pass, fail and drop percentages has been displayed and not the ones “in progress”.

Application

Race	Gender	Pass	Fail	Drop
Asian	Female	88.79%	2.59%	0.86%
	Male	91.19%	1.53%	0.17%
African American	Female	91.60%	1.36%	0.19%
	Male	90.52%	1.64%	0.32%
Hispanic	Female	90.60%	1.39%	0.46%
	Male	90.21%	1.12%	0.22%
Indigenous	Female	86.84%	0%	0%
	Male	90.40%	0.80%	0.80%
White	Female	87.43%	1.07%	0.06%
	Male	87.45%	0.92%	0.09%

Exam

Race	Gender	Pass	Fail	Drop
Asian	Female	80.58%	6.80%	7.77%
	Male	66.73%	8.18%	15.61%
African American	Female	47.04%	11.52%	22.44%
	Male	51.94%	12.72%	19.23%
Hispanic	Female	59.41%	9.22%	18.57%
	Male	58.26%	11.43%	18.96%
Indigenous	Female	57.58%	9.09%	15.15%
	Male	73.45%	7.08%	9.73%
White	Female	71.31%	5.12%	14.12%
	Male	69.65%	5.15%	15.78%

Agility

Race	Gender	Pass	Fail	Drop
Asian	Female	9.64%	16.87%	26.51%
	Male	16.43%	15.60%	23.40%
African American	Female	7.59%	13.90%	35.10%
	Male	16.19%	17.04%	24.37%
Hispanic	Female	13.79%	14.22%	27.16%
	Male	17.56%	15.42%	22.60%
Indigenous	Female	10.53%	10.53%	31.58%
	Male	18.07%	16.87%	21.69%
White	Female	8.67%	5.42%	18.03%
	Male	12.53%	7.41%	16.80%

Background

Race	Gender	Pass	Fail	Drop
Asian	Female	50.00%	37.50%	0%
	Male	10.17%	89.83%	0%
African American	Female	11.32%	88.68%	0%
	Male	13.58%	83.02%	3.40%
Hispanic	Female	14.06%	84.38%	2.02%
	Male	12.96%	83.81%	0%
Indigenous	Female		100.00%	0%
	Male	26.67%	73.33%	0%
White	Female	28.88%	68.98%	0.53%
	Male	19.92%	77.26%	1.75%

Interview

Race	Gender	Pass	Fail	Drop
Asian	Female	100.00%	0%	0%
	Male	100.00%	0%	0%
African American	Female	100.00%	0%	0%
	Male	100.00%	0%	0%
Hispanic	Female	88.89%	0%	0%
	Male	96.88%	0%	0%
Indigenous	Female	0%	0%	0%
	Male	100.00%	0%	0%
White	Female	96.30%	0%	0%
	Male	97.71%	0%	0.38%

Hired

Race	Gender	Pass	Fail	Drop
Asian	Female	100.00%	0%	0%
	Male	100.00%	0%	0%
African American	Female	100.00%	0%	0%
	Male	97.22%	0%	2.78%
Hispanic	Female	100.00%	0%	0%
	Male	96.77%	0%	3.23%
Indigenous	Female	0%	0%	0%
	Male	75.00%	0%	25.00%
White	Female	88.46%	0%	11.54%
	Male	91.02%	0%	8.59%