Stats and the Future of the Department

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What is R

R is a popular, functional programming language that is used for data analysis and data science. It allows for fast, reliable, and repeatable calculations.

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com.

Including CFO DATA

For this demonstration, June CFO data was included.The first ten young people referred this month are as follows:

Table 1: Raw June CFO Referrals

FNAME	LNAME	STRTNO	STRTDC	STRTNM	APRTNO	CITY	STATE	ZIP	SEX	UPDATE_IDENT	JEMSID	POFNAME	POLNAME
DEMARCUS	ABRAM	13240	S	CORLISS	NA	CHICAGO	IL	60827	M	1	10326791	JOSEPH	NAEGELE
LATRELL	ALLEN	5616	S	ABERDEEN ST	NA	CHICAGO	IL	60621	M	1	10335541	HANNAH	SIEGEL
XAVIER	ALLEN	10727	S	CALUMET AVE	UNIT 1	CHICAGO	IL	60628	M	1	10342391	VICTOR	JUNIOUS
CAPRIA	ALLEN	5622	S	HONORE ST	HOUSE	CHICAGO	IL	60636	F	1	10316032	DARRYL	DAWKINS
JULIAN	ALMANZA	2511	N	LAWNDALE AVE	NA	CHICAGO	IL	60647	M	1	10341183	ANTWAN	JONES
JOSE	ALVAREZ	3567	W	PALMER STREET	D	CHICAGO	IL	60647	M	1	10347745	YVONNE	PULIDO
JAYLEN	ANDERSON	103	E	58TH ST	3W	CHICAGO	IL	60637	M	1	10350803	MICHAEL	MUHAMMAD
TIYANA	ASH	4348	W	WILCOX STREET	1ST FLOOR	CHICAGO	IL	60624	F	1	10348582	KENNETH	OLLINS
JESUS	AYALA	2653	S	CHRISTIANA AVE	NA	CHICAGO	IL	60623	M	1	10327168	HECTOR	ESCALERA
DALVIN	BALDWIN	6409	S	CARPENTER	2ND FLOOR	CHICAGO	IL	60621	M	1	10348209	MICHAEL	MUHAMMAD

Messy Data

Note that this data is messy: Address is seperated into STRTNO, STRTDC, STRTNM, all of the headings are in caps, and some of the columns have no value for most officer's needs. While we can understand the raw data in context, what the department needs is clear information: Data processed in such a way that it is useable for everyone from line staff to management. This means we need to clean the data in order to get to more useful information.

Tidy Data

R can transform this data quickly and reliably. The end results of this can be quickly loaded in to this document

```
kable(head(cfo_june_cleaned, caption = "A Tidier Set of June CFO Data", align = c, trim = T)) %>%
  kable_styling(latex_options = c("striped", "scale_down", "hold_position"))
```

FName	LName	Address	AptNo	City	State	Zip	Sex	JEMSID	POFName	POLName
DEMARCUS	ABRAM	13240 S CORLISS	NA	CHICAGO	IL	60827	M	10326791	JOSEPH	NAEGELE
LATRELL	ALLEN	5616 S ABERDEEN ST	NA	CHICAGO	IL	60621	M	10335541	HANNAH	SIEGEL
XAVIER	ALLEN	10727 S CALUMET AVE	UNIT 1	CHICAGO	IL	60628	M	10342391	VICTOR	JUNIOUS
CAPRIA	ALLEN	5622 S HONORE ST	HOUSE	CHICAGO	IL	60636	F	10316032	DARRYL	DAWKINS
JULIAN	ALMANZA	2511 N LAWNDALE AVE	NA	CHICAGO	IL	60647	M	10341183	ANTWAN	JONES
JOSE	ALVAREZ	3567 W PALMER STREET	D	CHICAGO	IL	60647	M	10347745	YVONNE	PULIDO

There are two things about this image that should be explained. First, the code chunk is turned on to illustrate how the software works. Secondly, the following table iss a low-level version of cleaning the data. It means that each young person refered to a CFO in JUNE is only represented once and only one kind of datum exists per cell. More plainly, tidy data means the data is properly organized and makes sense to both machines and people.

This means we can do more interesting analysis of the data. For example, this the data can display referrals by zipcode as a graph or as a table.

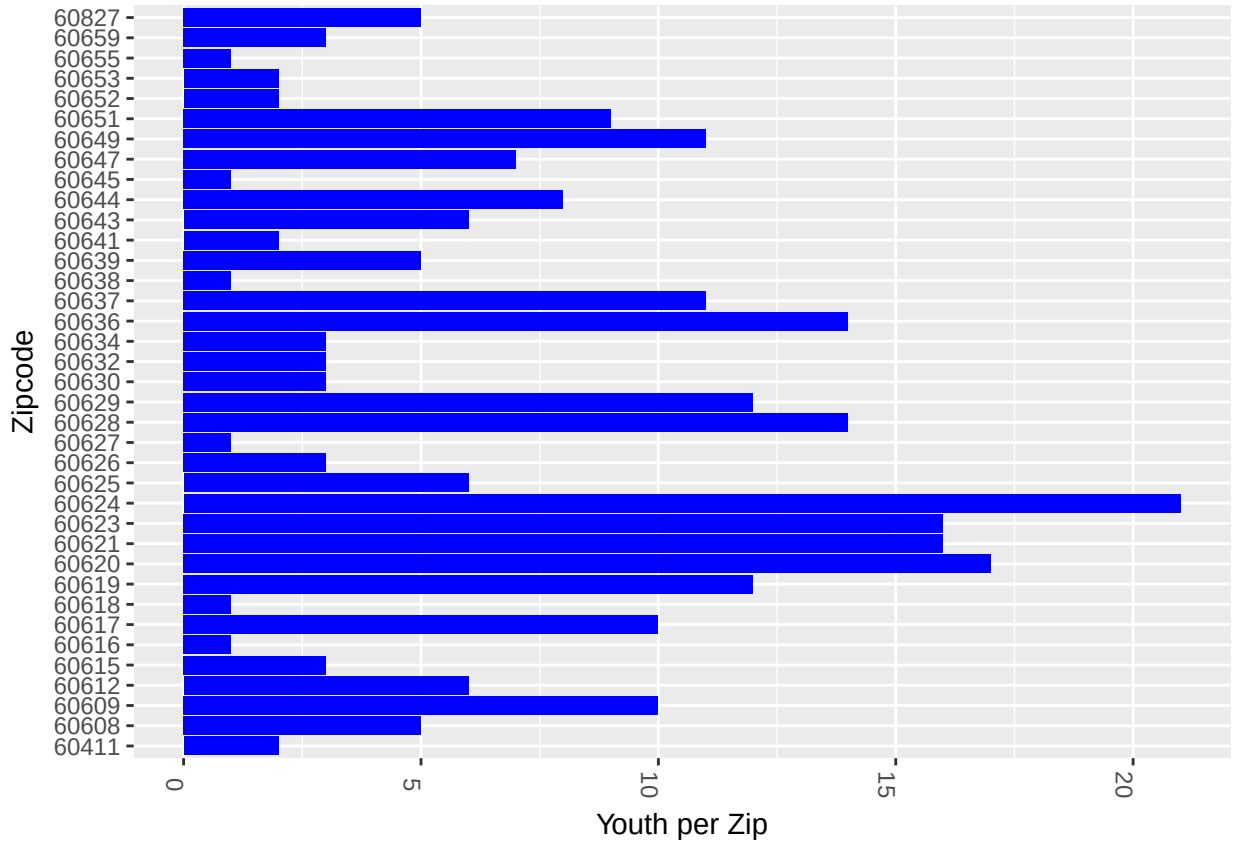


Figure 1: Referral by Zip

Table 2: June CFO: Referrals by Zip

Zip	Youth_per_zip
60624	21
60620	17
60621	16
60623	16
60628	14
60636	14
60619	12
60629	12
60637	11
60649	11
60609	10
60617	10
60651	9
60644	8
60647	7
60612	6
60625	6
60643	6
60608	5
60639	5
60827	5
60615	3
60626	3
60630	3
60632	3
60634	3
60659	3
60411	2
60641	2
60652	2
60653	2
60616	1
60618	1
60627	1
60638	1
60645	1
60655	1

All of this information is generated from the same software that crunches the numbers. Formatting these reports will take time; however, once they are formatted, adding and subtracting information will be significantly easier.

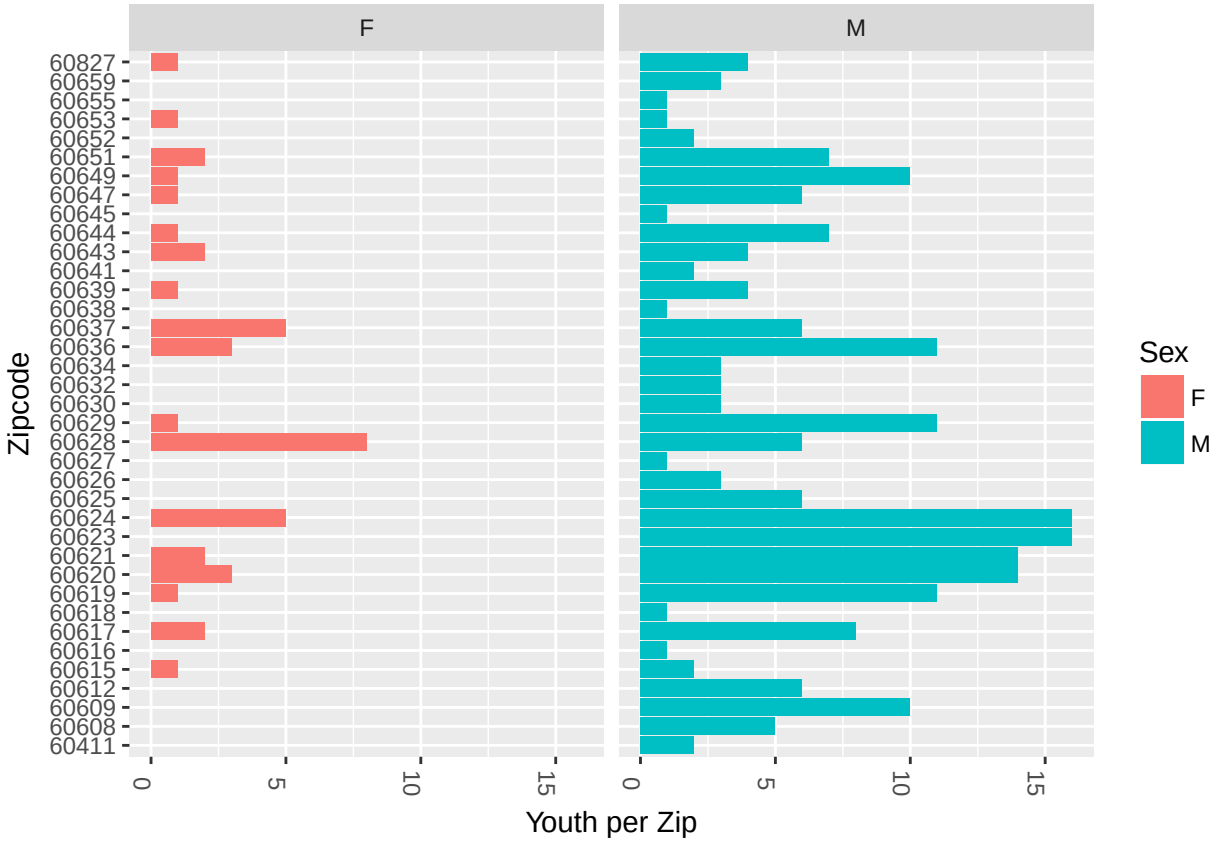
For example, we can also see which POs referred clients in June.

Table 3: Number of Referrals per PO From JEMS

POFName	POLName	PO_Referrals
LISA	BLOECHEL	10
HANNAH	SIEGEL	7
RUSSELL	AKIS	7
TONNETTE	JONES	7
JONATHAN	WILLIS	6
ZOLOTTIE	BOWLING	6
ALLISON	BOWE	5
BRANDON	MORTON	5
BRYAN	GASTON	5
DARRYL	DAWKINS	5
DOMINIQUE	SCALZETTI	5
ERNEST	JONES	5
HECTOR	ESCALERA	5
KEVIN	KREUSER	5
TESA	NEWTON-HART	5
YESSENIA	RIVERA	5
AARON	CAMPBELL	4
EDGAR	NIETO	4
FRANCISCO	ADAME	4
GEORGE	COX	4
JOSEPH	NAEGELE	4
JOY	KREUSER	4
KEITH	WHEELER	4
MICHAEL	MUHAMMAD	4
MICHAEL	SHOVEN	4
PAMELA	HUDSON	4
RANCE	HOPKINS	4
ROSALINDA	BANUELOS	4
TANDRA	TYLER	4
VICTOR	JUNIOUS	4
ANTWAN	JONES	3
CEDRIC	BELL	3
GEORGANNE	STRUSS	3
JAMES	SMITH	3
JASON	SMITH	3
JOHANNA	ALMARAZ	3
JUAN	ARGUELLES	3
LATERRIAN	HILL	3
MICHELLE	BAILEY	3
NICHOLETTE	VARGAS	3
RODNEY	PURDY-BLAKE	3
ROLANDO	GALINDO	3
SHANNON	CARROLL	3
THEODIS	CHAPMAN	3
TYRONE	HUTSON	3
VICKI	JONES	3
YVONNE	PULIDO	3
AMY	O'ROURKE	2
ANTHONY	LEWIS	2
BONNI	BOHL	2
CRYSTAL	DOMINGUEZ	2
DEDRICK	ROBERTS	2
DIEGO	RODRIGUEZ	2
GABRIEL	REDIC	2
JULIE	PERFETTI	2

Or we can get a graph of clients by Zip code, diveded by gender.

Clients by Gender Bar Plot



There are some issues to work out with this approach to the department stats. This include":"

- Formatting the report so it meets department standards.
  - This will take time, but formatting these reports is yet-another-language to learn
- Cleaning the data
  - Access to JEMS and the JEMS Backend is essential to do this work
  - Data will need to be cleaned, per the previous example
  - The department should work to establish better data storage practices
- Free software, the R package and RStudio, need to be installed on machines
  - Learning R is not difficult, but, it is necessary.
  - Other free software packages may need to be installed for PDF creation.

Despite these issues, I believe that statistics and data can still collected, cleaned, and transformed into useful information, regardless of stafffing concerns. Shifting away from Excell based analysis also opens up additional opportunties for data analysis, including text-mining, which can help in QA, without any increase to capital or operating expenses.