Boston City 311 Service Request

How to make Boston better


Thank You!!
Business Problem
Team 6
ADS Final Project
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By Nikita Khamkar
Rashmi Yadav
Prateek Mane
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Business Problem

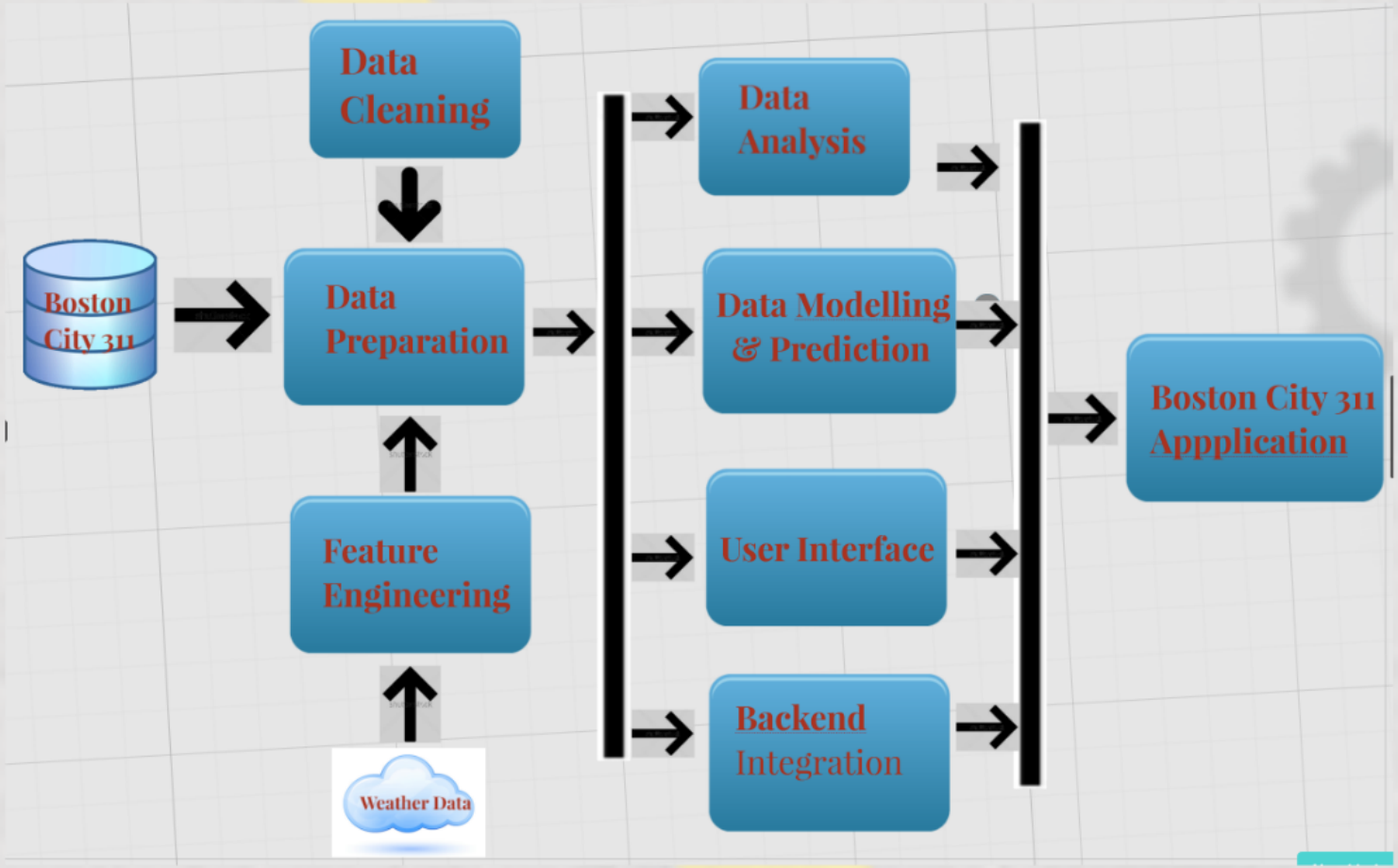
The Task is to build a model which predicts the number of days required for each 311 request to get completed.

Business Questions

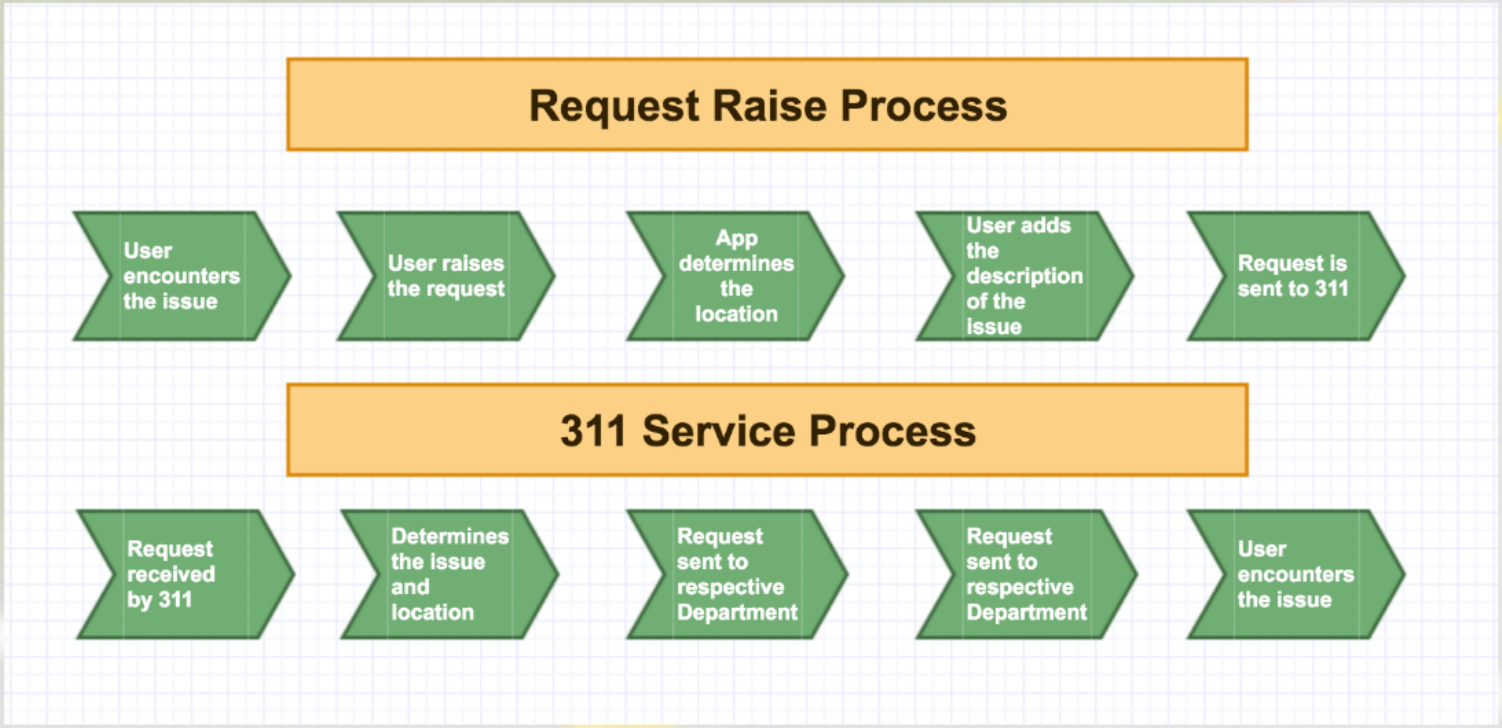
- Non - Emergency issues faced by boston residents, visitors and business users.
- Number of complaints through different sources over last 6 years
- Analyzing the present services provided by 311 for raised complaints.

How valid are the request for different reasons and type

Application Flow



Working of System



Technologies Used

Phase	Framework/Language/Tools
Data Cleansing	R, DataWatch
Model	Microsoft Azure ML Studio
Data Visualization	Tableau, PowerBI
Website	HTML5, BootStrap, CSS, Jquery, Ajax
	NodeJS, Python
Deployment	AWS EC2

Boston 311 Service Request Dataset

CASE_ENQUIRY_ID : Unique Id for Each case/issue that has been raised
OPEN_DT : Date on which the case was requested at 311
TARGET_DT : the date that was prdicted by the 311 service provider to solve the raised issue
CLOSED_DT : Date On which the issue was solved
OnTime_Status : This columns describes whether the issue is solved ontime or is overdue
CASE_STATUS : This column describes if the status of the issue is open or close
CLOSURE_REASON : If the case is solved what is the reason for its closure for eg. the street light was repaired or if the case is invalid
CASE_TITLE : Title to the case raised for eg : request for street cleaning
SUBJECT : Public work Department, park
REASON : Reason why the issue was raised for eg: street cleaning
TYPE : Type of issue requested
Department : PWDx, ISD
SubmittedPhoto & ClosedPhoto : if any picture was submitted for the request raised
Location : Location where the incident has occurred
fire_district : No. of fire district in that location
pwd_district : No. of pwd district in that location
city_council_district : No. of city council district in that location
police_district : No. of Police district in that location
neighborhood : Neighboorhood description
LOCATION_STREET_NAME : Street name where the incident has occured
LOCATION_ZIPCODE : Zipcode of the location
LATITUDE & LONGITUDE
Source : from where the request is made

Data Preprocessing

Data Cleaning

Feature Engineering

Data Cleaning

Changing date format to make some calculation

```
# changing the format of the open, target and closed date

df$OPEN_DT <- as.Date(as.POSIXct(df$OPEN_DT,format =  "%m/%d/%y %H:%M"))
df$TARGET_DT <- as.Date(as.POSIXct(df$TARGET_DT,format =  "%m/%d/%y %H:%M"))
df$CLOSED_DT <- as.Date(as.POSIXct(df$CLOSED_DT,format =  "%m/%d/%y %H:%M"))
```

```
#calculating days solved and days targetted
df$daysSolved <- as.Date(df$CLOSED_DT)-as.Date(df$OPEN_DT)
df$daysTargeted <- as.Date(df$TARGET_DT)-as.Date(df$OPEN_DT)
```

Replacing 0 with 1 in days solved to avoid anomaly

```
#replacing the days SOLVED if its 0 replace with 1

df$daysSolved <- ifelse(df$daysSolved == 0,1,df$daysSolved)
```

Removing outliers

```
## replacing outliers

df <-  df[!is.na(df$daysSolved),]

df <-  df[!is.na(df$neighborhood),]
```

Invalid cases and zip code replacement

```
### remove all the invalid cases

df$CLOSURE_REASON <- sub(".*invalid.*","NA",ignore.case = T,df$CLOSURE_REASON)

index <- with(df, which(df$CLOSURE_REASON=="NA", arr.ind=TRUE))

## creat a new column which will tell wheather a case is invalid or valid

df$flag <- ifelse(df$CLOSURE_REASON == "NA",1,0 )
```

```
### replacing the zip code

for (i in 1:664430){
  if (df$neighborhood[i]=="Charlestown" & is.na(df$LOCATION_ZIPCODE[i])) {
    df$LOCATION_ZIPCODE[i] <-  2129
  }
}
for (i in 1:664430){
  if (df$neighborhood[i]=="Allston / Brighton" & is.na(df$LOCATION_ZIPCODE[i])) {
    df$LOCATION_ZIPCODE[i] <-  2135
  }
}
for (i in 1:664430){
  if (df$neighborhood[i]=="Back Bay" & is.na(df$LOCATION_ZIPCODE[i])) {
    df$LOCATION_ZIPCODE[i] <-  2116
  }
}
```

Removing NA rows from the dataset

```
### remove rows where the fire districh, police district, city district council and pwd district is null

sum(is.na(df$fire_district) & is.na(df$police_district)& is.na(df$pwd_district) & is.na(df$city_council_distr

df <- df[!with(df,is.na(df$fire_district) & is.na(df$police_district)& is.na(df$pwd_district) & is.na(df$city
```

Finding Open Date, Month, Year, Weekday and Weekend

```
### find the date, month, year of the open date column
df$opendate <- format(df$OPEN_DT,'%d')
df$openmonth <- format(df$OPEN_DT,'%m')
df$openyear <- format(df$OPEN_DT,'%Y')
```

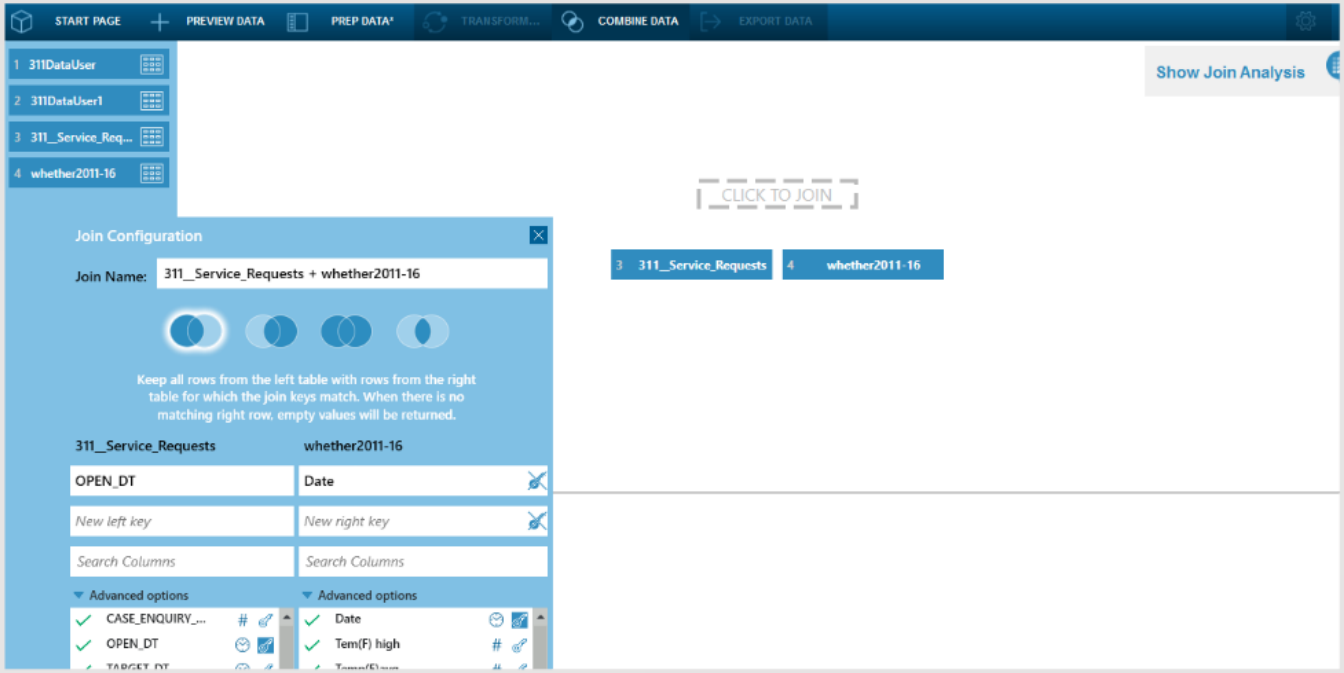
```
### find whether the day is a weekday or a weekend

df$openweekday <- weekdays(df$OPEN_DT)
df$openweekdaynum <- ifelse(df$openweekday == 'Saturday' | df$openweekday == 'Sunday',1,0)
```

Data Featuring

Added weather Data to predict the number of days required to solve a issue in a location
Weather Data Source: http://www.wunderground.com

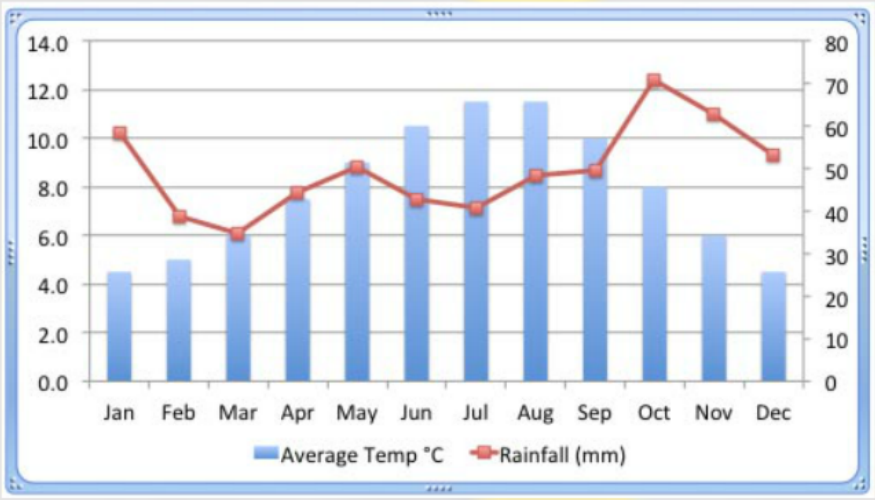
This Data consisted of Temperature, Humidity, Wind speed and Visibility of Boston area
Merged the weather data with 311 service request data in Data Watch tool.
More data cleaning in Data Watch Tool



Data Analysis & Visualization

Tool Used : tableau

https://public.tableau.com/profile/publish/311_Service_Request/Story1#!/publish-confirm



Model Creation & Deployment

Model Deployment
Prediction Model is created and deployed on Azure
Applied Boosted Decision Tree Regression nd Neural Network Algorithm

Boosted Decision Tree algorithm had more accurancy and less error for 311 Service Request Data

The model is identified by a unique API key.

Website Deployment
Website was deployed on AWS EC2 instance.
Website – http://52.39.27.198:4030
GitHub -

LIVEDATA *Streaming*

Smart Technology for Data in Motion

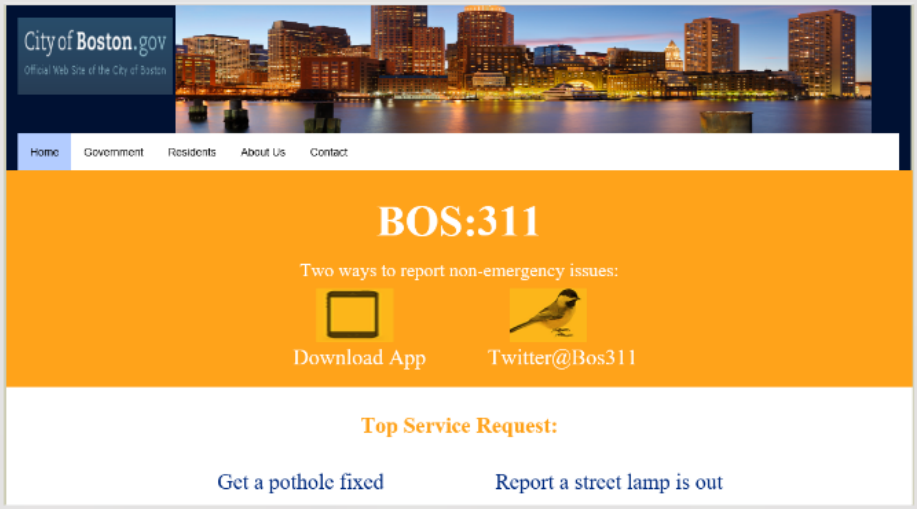
End Point: https://data.cityofboston.gov/api/views/awu8-dc52/rows.json

Azure

- ***Event hub***
- ***Azure Stream Analytics***
- ***Azure SQL***

Boston 311 Service Application

Lets have a look at the application that can make our city better !!!



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ANY QUESTION??


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