

US-Mexico Border Apprehensions Sweave Report

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1 CNN report Summary

US-Mexico border apprehensions have been steadily declining since 2000, and in April of 2017 they reached historic lows. These downward trends and record lows can be accredited to President Trump's election. The data shows that President Trump's aggression towards immigration laws is having a deterring effect, and migrants are less enticed to enter the country. DHS credits the administration policy as the lowest apprehensions prior to this past April were in December of 2011. This new low is 7,000 apprehensions less than the previous. In a year since April 2016, apprehensions were down 62%. Here you can find the monthly summaries of apprehensions by sector in a time series from 2000 to 2017 depicting the changes throughout time.

Below is a link to the original story and Video that is linked to these Apprehensions

<https://www.cnn.com/2017/05/09/politics/border-crossings-apprehensions-down-trump/index.html>

The following graph represents a Summary of the Apprehensions made at the US-Mexico border between the years 2000 through the year 2017. Each green marker represents the average apprehension rate for that year.

1.1 Figure 1

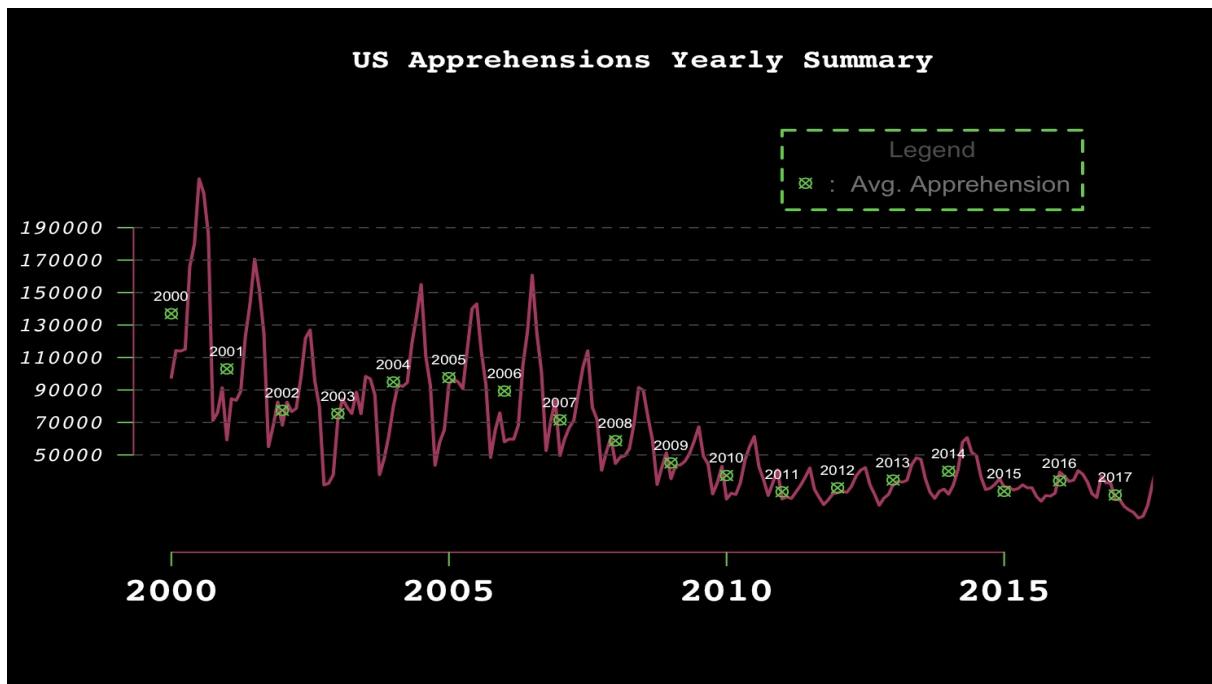


Figure 1: Us Apprehension Summary Plot

It is seen from the figure above that Apprehensions throughout time have been slowly decreasing, and it is now as low as it once was back in the year 2011. This is being accredited to Donald Trump's aggression on border patrol and the desire to build a higher wall to prevent the US from having Mexicans or anybody fleeing their country to illegally cross the border into the states

1.2 Statistical Tests

Below are some statistical tests on the data on the boarder apprehensions from 2000 to 2017.

```
> summ <- read.csv('PB monthly summaries.csv')
> t.test(summ)

One Sample t-test

data: summ
t = 21.149, df = 233, p-value < 2.2e-16
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
51572.25 62168.34
sample estimates:
mean of x
56870.3

> qqnorm(summ[,7])
> summ$year=NULL
> summary(summ)

          October      November      December      January
Min.   :25612   Min.   :22405   Min.   :18983   Min.   : 21514
1st Qu.:33371   1st Qu.:32048   1st Qu.:25262   1st Qu.: 27358
Median :44561   Median :37524   Median :34408   Median : 51765
Mean   :50876   Mean   :43752   Mean   :36674   Mean   : 64269
3rd Qu.:64491   3rd Qu.:56319   3rd Qu.:43523   3rd Qu.: 91122
Max.   :91410   Max.   :76196   Max.   :71252   Max.   :185979

          February      March       April       May
Min.   : 18754   Min.   :12195   Min.   :11127   Min.   : 14519
1st Qu.: 32445   1st Qu.:43487   1st Qu.:42524   1st Qu.: 41217
Median : 61347   Median :78556   Median :66926   Median : 64958
Mean   : 75078   Mean   :92433   Mean   :82641   Mean   : 73899
3rd Qu.:107219  3rd Qu.:139034  3rd Qu.:125384  3rd Qu.:103444
Max.   :211328   Max.   :220063   Max.   :180050   Max.   :166296

          June        July       August      September
Min.   : 16087   Min.   :18187   Min.   :22288   Min.   : 22537
1st Qu.: 33325   1st Qu.:29598   1st Qu.:30526   1st Qu.: 27515
Median : 55858   Median :46658   Median :46032   Median : 42104
Mean   : 58129   Mean   :55020   Mean   :55583   Mean   : 48953
3rd Qu.: 77874   3rd Qu.:78628   3rd Qu.:84004   3rd Qu.: 66016
Max.   :115093   Max.   :113956  Max.   :114312  Max.   : 97744

>
```

2 Top three Month Periods with the most Apprehensions

Looking at the data and being able to manipulate and run a quick analysis on the apprehensions for both 2010 and 2017 we came up with the following conclusions for the most apprehensions in those years respectively by using the following script:

```
> data2010 = read.csv('BPApprehensions 2010.csv')
> data2017 = read.csv('PBApprehensions 2017.csv')
> ts1 = read.csv('PBmonthlysummaries.csv' , row.names = 1) #Reads in Csv
> mat = as.matrix(ts1)

#Top 3 Apprehensions per years 2010 & 2017
> max_apps_2010 = tail(sort(mat["2010" ,]) ,3)
> max_apps_2017 = tail(sort(mat["2017" ,]) ,3)
```

Figure 2: Code Executed To find Max Apprehensions

The following is the output of the code executed above:

Top 3 highest Apprehensions for the year 2010 are:	Top 3 highest Apprehensions for the year 2017 are:
61361 for the month of March	46184 for the month of October
55237 for the month of April	47211 for the month of November
47045 for the month of May	43251 for the month of December

Figure 3: Max Apprehensions For the Years 2010 and 2017

3 Change in Maximum

Using simple statistical tests like those demonstrated in class we were able to compare the sector with the most apprehensions for 2010 and with the sector with the most apprehensions in 2017. Depicted in the graph above It is noted that the maximum apprehensions for the year 2010 was 61361 for the month of March and the maximum apprehensions for the year 2017 was 47211 for the month of November. The difference in Apprehensions was a total of 14150 people that were being detained or sent back home.

4 Data Visualizations

Using R's built-in plotting methods, we are able to visualize US-Mexico Apprehension data, comparing the 2010 and 2017 statistics by month and sector. By using simple statistical tests like those demonstrated in class we are able to demonstrate side by side visualizations of the years 2010 and 2017 comparing the data by sector.

In the following plots you will be able to visualize the differences in years According to sector Beginning with:

4.1 Big Bend

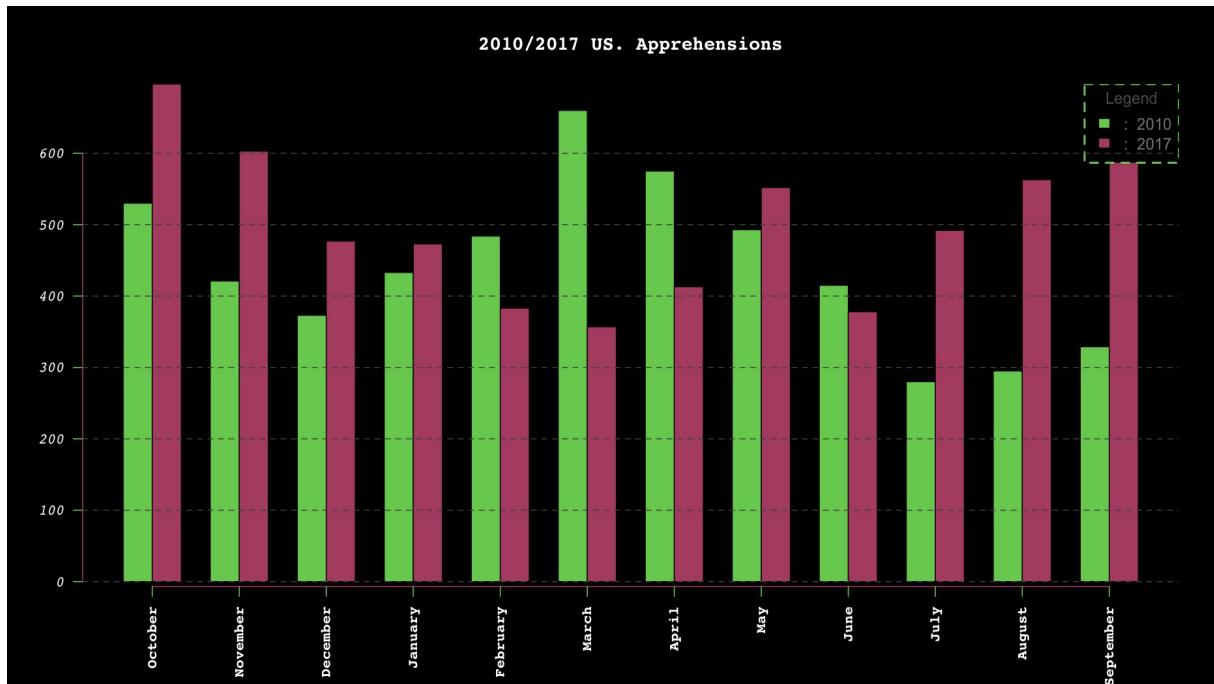


Figure 4: Sector: Big Bend Apprehensions Plot

October	November	December	January	February	March	April	May	June	July	August	September
530	421	373	433	484	660	575	493	415	280	295	329
697	603	477	473	383	357	413	552	378	492	563	614

Figure 5: Sector: Big Bend Apprehensions Table

4.2 Del Rio

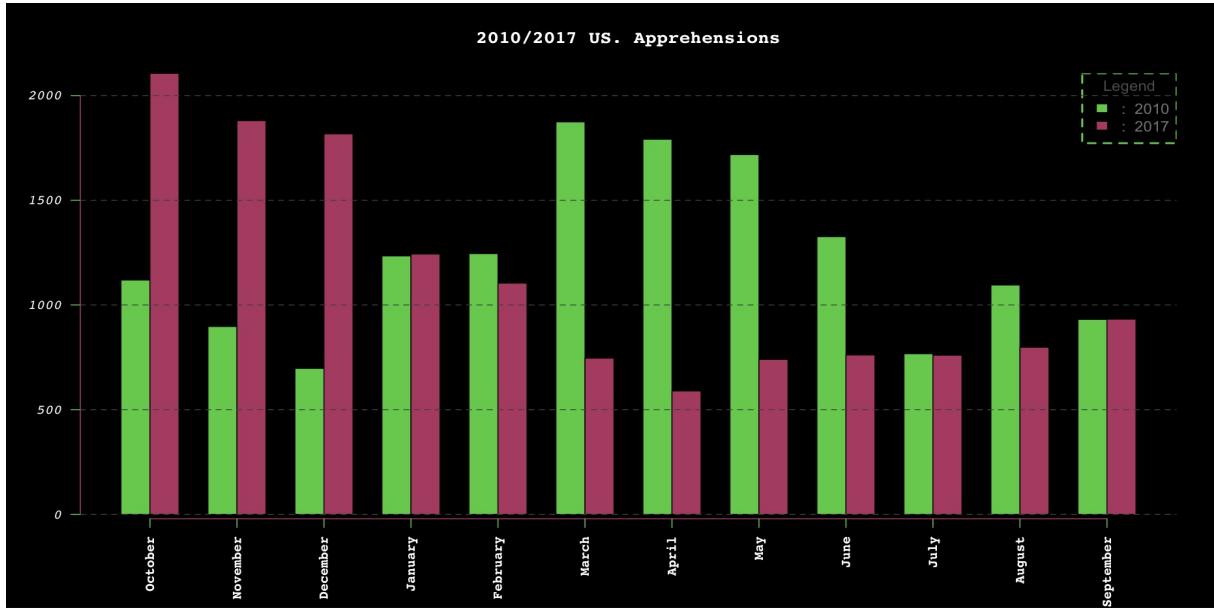


Figure 6: Sector: Del Rio Apprehensions Plot



Figure 7: Del Rio

October	November	December	January	February	March	April	May	June	July	August	September
1119	897	697	1234	1245	1874	1791	1718	1326	767	1095	931
2106	1880	1817	1243	1104	746	589	740	761	760	798	932

Figure 8: Sector: Del Rio Apprehensions Table

4.3 El Centro

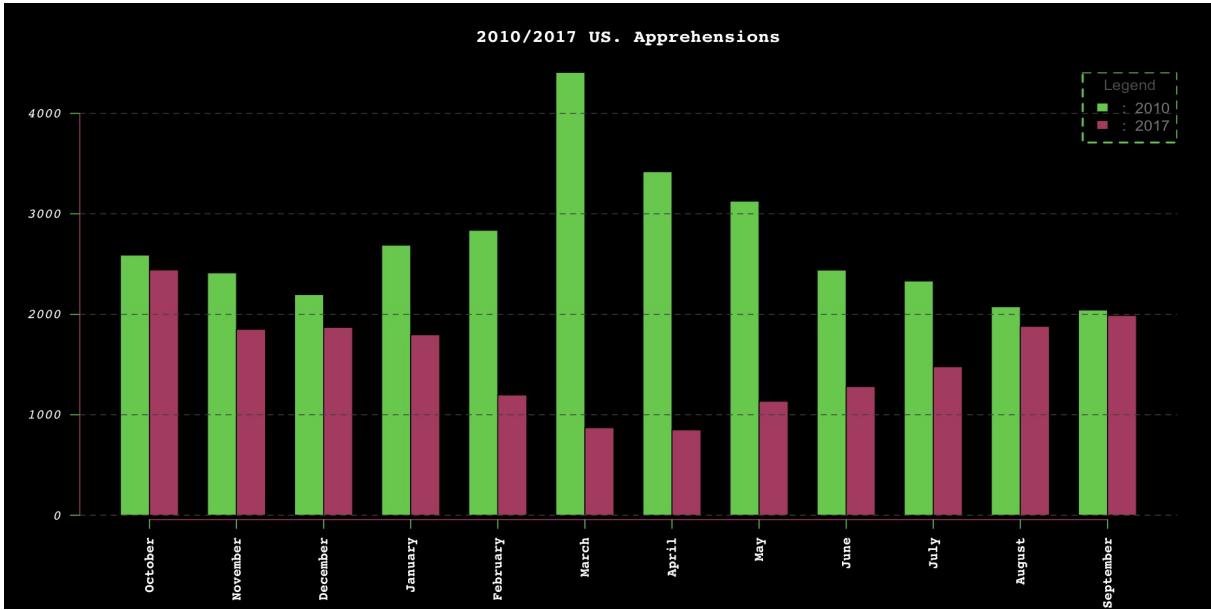


Figure 9: Sector: El Centro Apprehensions Plot



Figure 10: El Centro

October	November	December	January	February	March	April	May	June	July	August	September
2589	2412	2196	2688	2836	4408	3419	3126	2440	2331	2075	2042
2441	1850	1870	1796	1196	871	849	1134	1280	1478	1880	1988

Figure 11: Sector: El Centro Apprehensions Table

4.4 El Paso

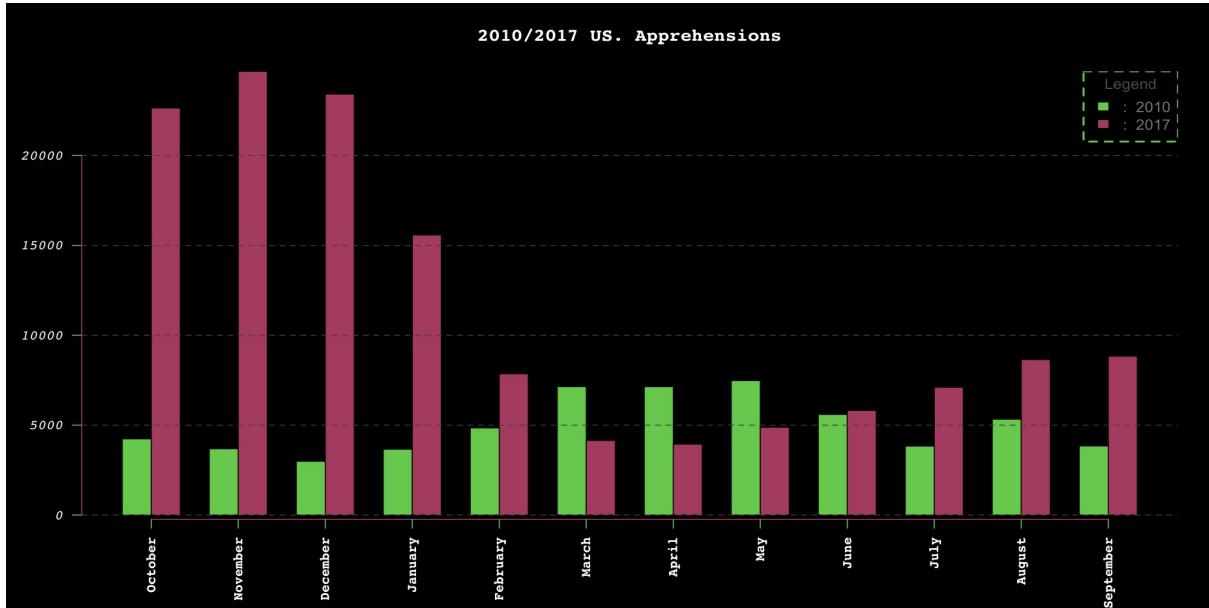


Figure 12: Sector: El Paso Apprehensions Plot



Figure 13: El Paso

October	November	December	January	February	March	April	May	June	July	August	September
1007	894	725	1124	1140	1528	1359	1380	1005	725	732	632
3973	4105	3948	2779	1575	978	906	1032	1180	1395	1782	1540

Figure 14: Sector: El Paso Apprehensions Table

4.5 Laredo

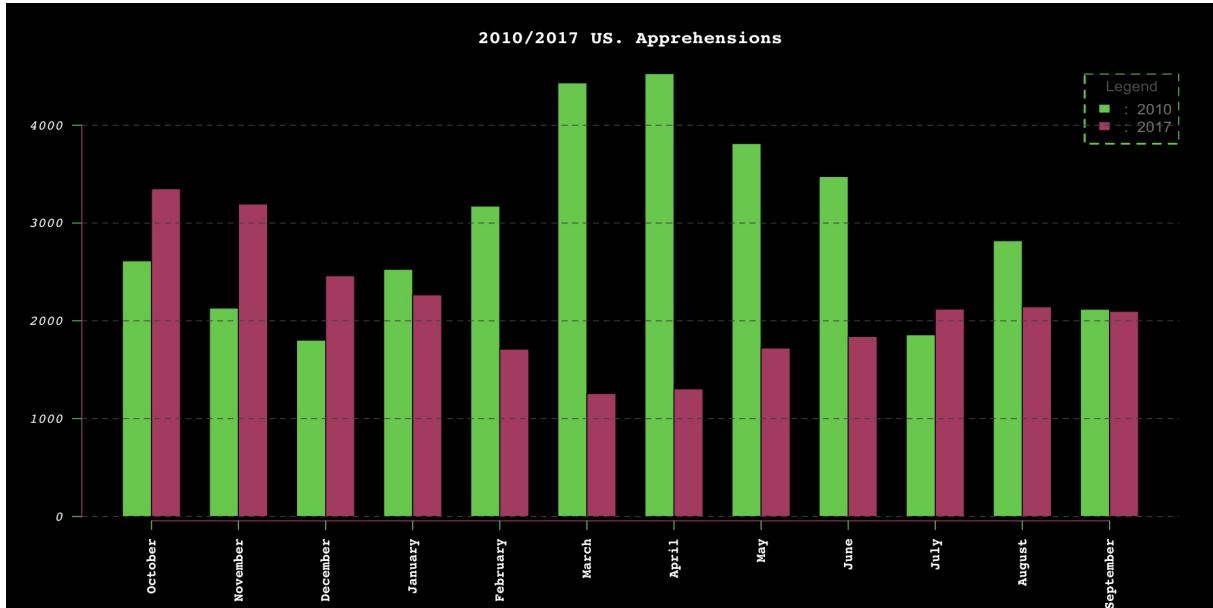


Figure 15: Sector: Laredo Apprehensions Plot



Figure 16: Laredo

October	November	December	January	February	March	April	May	June	July	August	September
2613	2130	1802	2526	3173	4433	4528	3813	3475	1857	2819	2118
3350	3194	2460	2265	1710	1256	1304	1722	1839	2120	2143	2097

Figure 17: Sector: Laredo Apprehensions Table

4.6 Rio Grande Valley

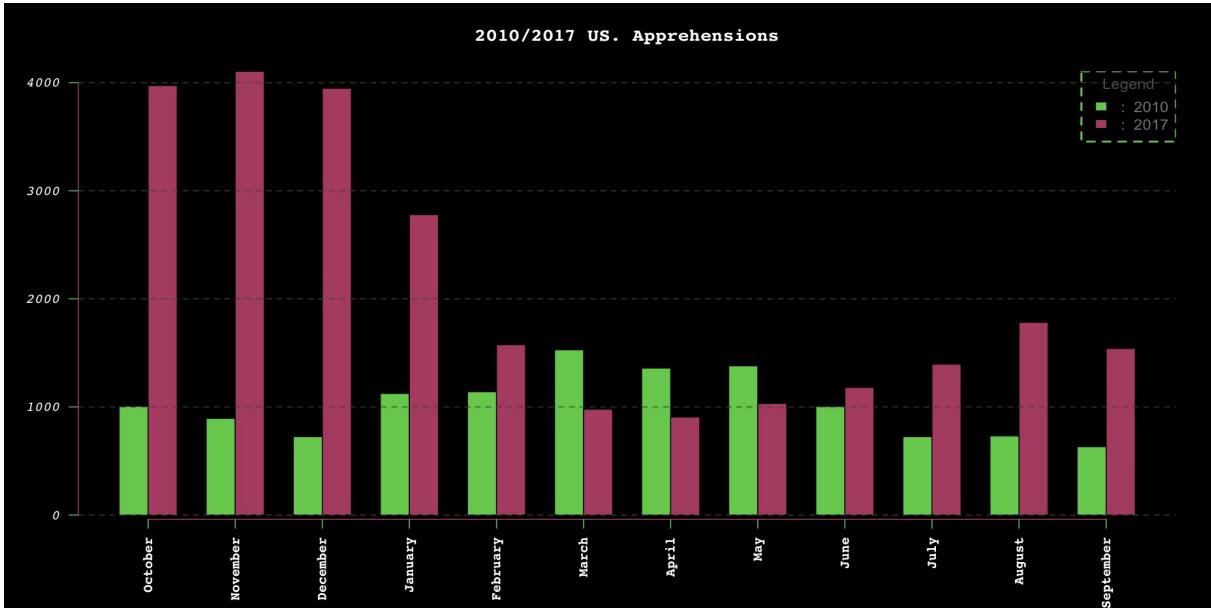


Figure 18: Sector: Rio Grande Valley Apprehensions Plot



Figure 19: Rio Grande Valley

October	November	December	January	February	March	April	May	June	July	August	September
4236	3688	2987	3658	4845	7141	7139	7477	5595	3832	5329	3839
22642	24686	23418	15580	7855	4147	3942	4882	5817	7107	8650	8836

Figure 20: Sector: Rio Grande Valley Apprehensions Table

4.7 SanDiego

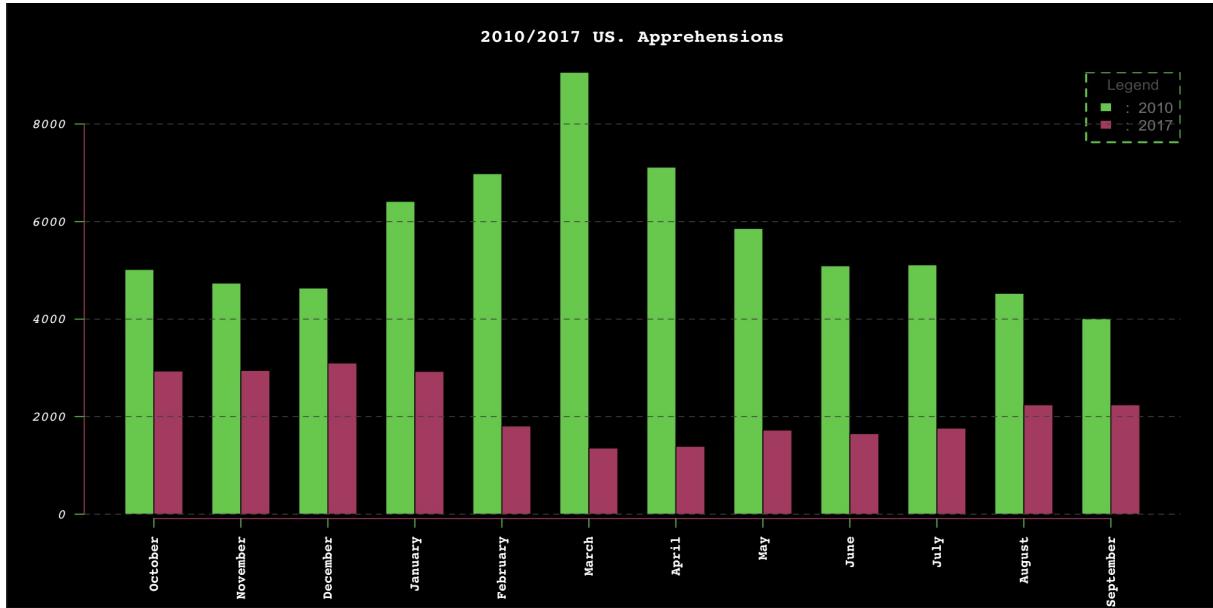


Figure 21: Sector: SanDiego Apprehensions Plot



Figure 22: SanDiego

October	November	December	January	February	March	April	May	June	July	August	September
5017	4738	4636	6413	6982	9061	7115	5858	5092	5113	4528	4012
2934	2947	3099	2927	1808	1356	1392	1724	1652	1764	2241	2242

Figure 23: Sector: SanDiego Apprehensions Table

4.8 Tucson

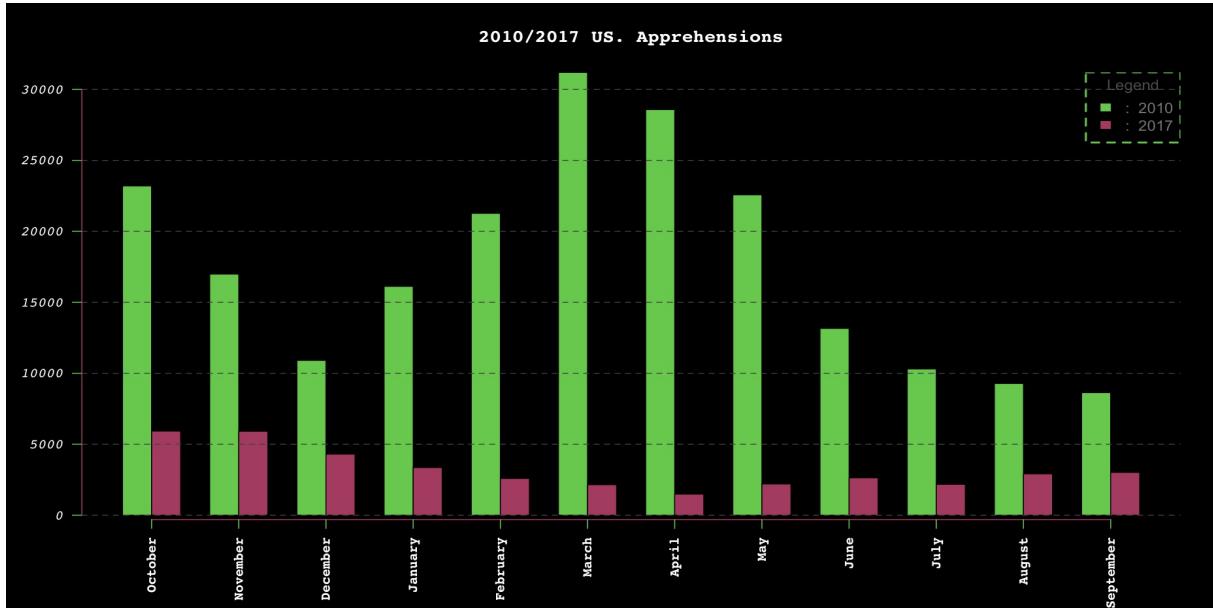


Figure 24: Sector: Tucson Apprehensions Plot



Figure 25: Tucson

October	November	December	January	February	March	April	May	June	July	August	September
23197	16986	10907	16122	21266	31197	28579	22572	13160	10303	9280	8633
5924	5912	4303	3357	2589	2148	1487	2199	2632	2177	2913	3016

Figure 26: Sector: Tucson Apprehensions Table

4.9 Yuma

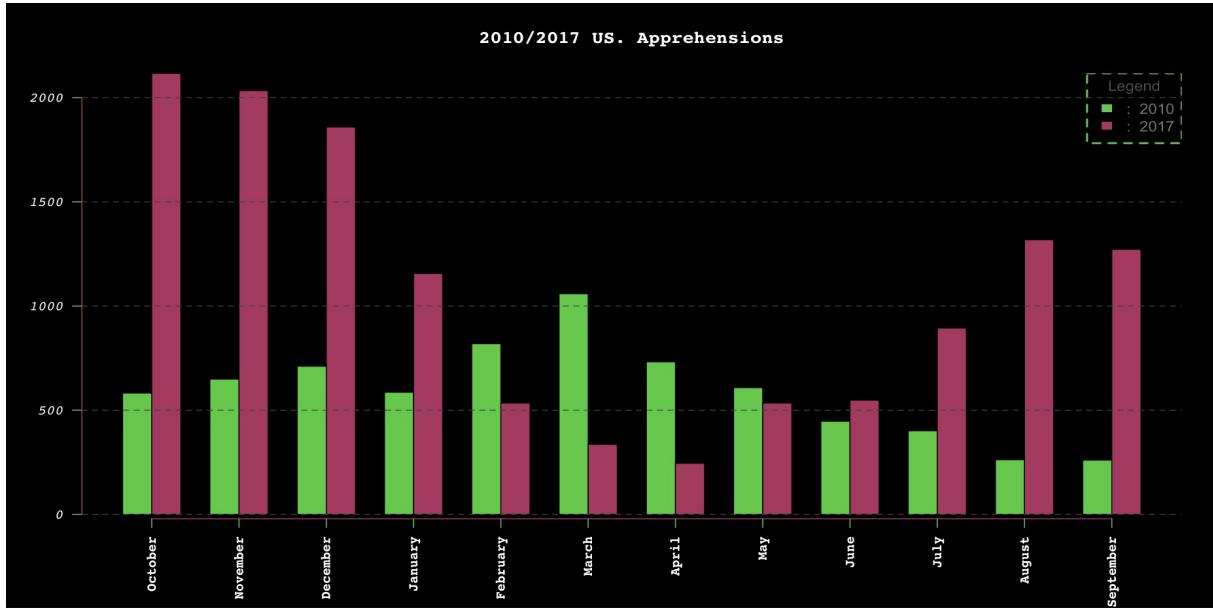


Figure 27: Sector: Yuma Apprehensions Plot



Figure 28: Yuma

October	November	December	January	February	March	April	May	June	July	August	September
582	649	711	586	819	1059	732	608	447	401	262	260
2117	2034	1859	1156	534	336	245	534	548	894	1318	1272

Figure 29: Sector: Yuma Apprehensions Table

4.10 Statistical Tests

Below are some statistical tests on the 2010 and 2017 data.

```
> data2010 <- read.csv('BP Apprehensions 2010.csv')
> data2017 <- read.csv('PB Apprehensions 2017.csv')
> a10.data = data2010$April
> a17.data = data2017$April
> t.test(a10.data, a17.data, paired = TRUE)

Paired t-test

data: a10.data and a17.data
t = 1.7273, df = 8, p-value = 0.1224
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
-1642.025 11444.247
sample estimates:
mean of the differences
4901.111

> var.test(a10.data, a17.data)

F test to compare two variances

data: a10.data and a17.data
F = 63.321, num df = 8, denom df = 8, p-value = 3.939e-06
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
14.28314 280.71787
sample estimates:
ratio of variances
63.32087

> data2010$Sector= NULL
> summary(data2010)

          October        November       December       January
Min.    : 530      Min.    : 421      Min.    : 373      Min.    : 433
1st Qu.: 1007    1st Qu.: 894      1st Qu.: 711      1st Qu.: 1124
Median : 2589    Median : 2130     Median : 1802     Median : 2526
Mean   : 4543    Mean   : 3646     Mean   : 2782     Mean   : 3865
3rd Qu.: 4236    3rd Qu.: 3688     3rd Qu.: 2987     3rd Qu.: 3658
Max.   :23197    Max.   :16986     Max.   :10907     Max.   :16122

          February        March        April         May
Min.    : 484      Min.    : 660      Min.    : 575      Min.    : 493
1st Qu.: 1140    1st Qu.: 1528     1st Qu.: 1359     1st Qu.: 1380
Median : 2836    Median : 4408     Median : 3419     Median : 3126
Mean   : 4754    Mean   : 6818     Mean   : 6137     Mean   : 5227
3rd Qu.: 4845    3rd Qu.: 7141     3rd Qu.: 7115     3rd Qu.: 5858
Max.   :21266    Max.   :31197     Max.   :28579     Max.   :22572

          June         July        August       September
Min.    : 415      Min.    : 280      Min.    : 262      Min.    : 260
1st Qu.: 1005    1st Qu.: 725      1st Qu.: 732      1st Qu.: 632
Median : 2440    Median : 1857     Median :2075     Median :2042
```

Mean : 3662	Mean : 2845	Mean : 2935	Mean : 2533
3rd Qu.: 5092	3rd Qu.: 3832	3rd Qu.: 4528	3rd Qu.: 3839
Max. : 13160	Max. : 10303	Max. : 9280	Max. : 8633

```
> data2017$Sector= NULL
> summary(data2017)
```

October	November	December	January	February
Min. : 697	Min. : 603	Min. : 477	Min. : 473	Min. : 383
1st Qu.: 2117	1st Qu.: 1880	1st Qu.: 1859	1st Qu.: 1243	1st Qu.: 1104
Median : 2934	Median : 2947	Median : 2460	Median : 2265	Median : 1575
Mean : 5132	Mean : 5246	Mean : 4806	Mean : 3508	Mean : 2084
3rd Qu.: 3973	3rd Qu.: 4105	3rd Qu.: 3948	3rd Qu.: 2927	3rd Qu.: 1808
Max. : 22642	Max. : 24686	Max. : 23418	Max. : 15580	Max. : 7855
March	April	May	June	July
Min. : 336	Min. : 245	Min. : 534	Min. : 378	Min. : 492
1st Qu.: 746	1st Qu.: 589	1st Qu.: 740	1st Qu.: 761	1st Qu.: 894
Median : 978	Median : 906	Median : 1134	Median : 1280	Median : 1478
Mean : 1355	Mean : 1236	Mean : 1613	Mean : 1787	Mean : 2021
3rd Qu.: 1356	3rd Qu.: 1392	3rd Qu.: 1724	3rd Qu.: 1839	3rd Qu.: 2120
Max. : 4147	Max. : 3942	Max. : 4882	Max. : 5817	Max. : 7107
August	September			
Min. : 563	Min. : 614			
1st Qu.: 1318	1st Qu.: 1272			
Median : 1880	Median : 1988			
Mean : 2476	Mean : 2504			
3rd Qu.: 2241	3rd Qu.: 2242			
Max. : 8650	Max. : 8836			