

Fire Department Incidents for the City of Las Vegas

An Analysis by Team 4:

- *George Alonzo*
- *Anji Asthana*
- *Saeger Godson*
- *Margot Rudy*

Agenda

- ▶ Project Background
- ▶ Our Hypothesis
- ▶ Retrieving, Assembling, and Cleaning Data
- ▶ Project Scope
- ▶ Limitations
- ▶ Telling the Story
- ▶ Hypothesis Testing
- ▶ Conclusion

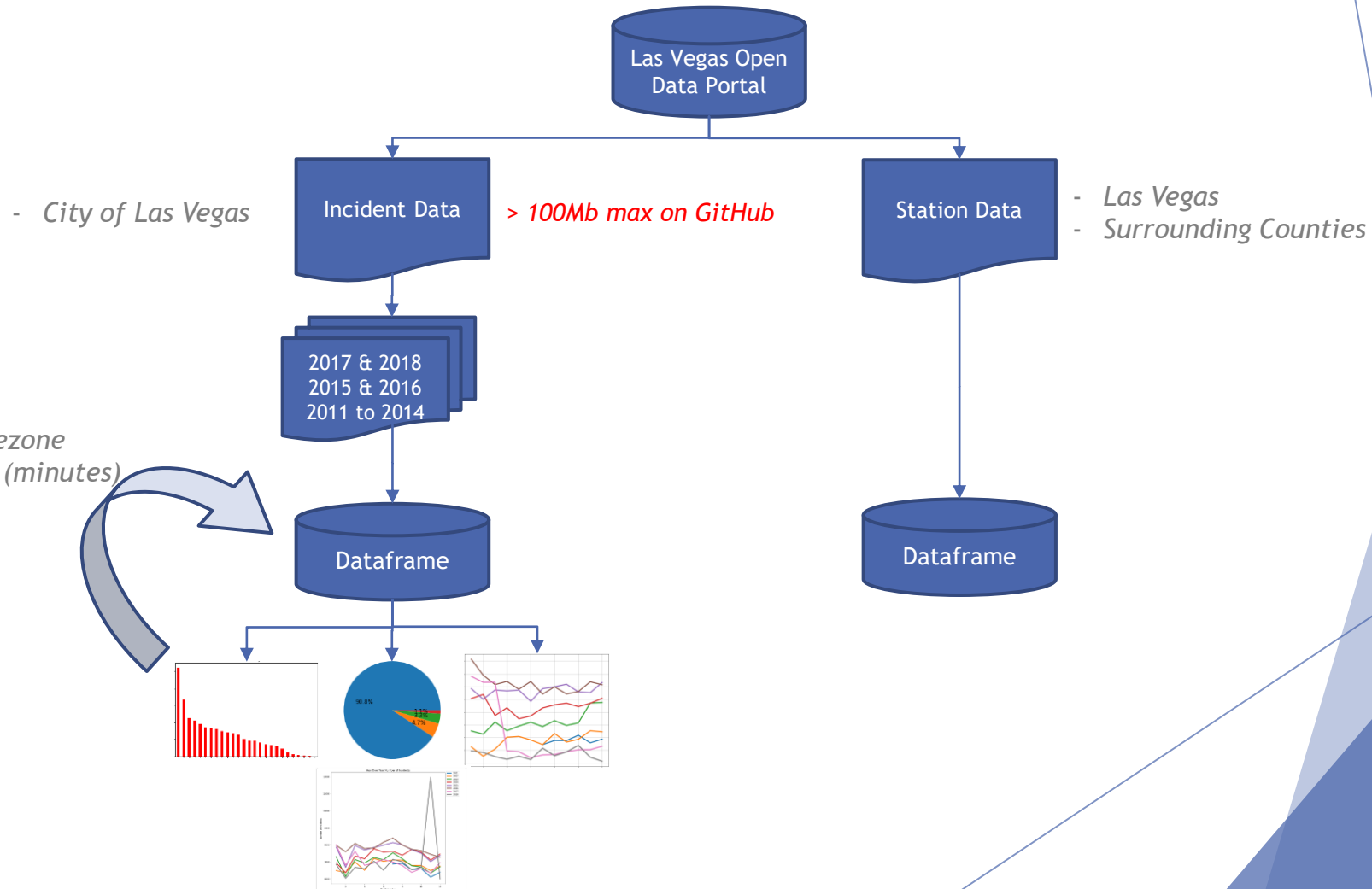
Project Background

- ▶ Data Availability
 - ▶ Kaggle
 - ▶ Direct from Source
- ▶ Project Selection Criteria
- ▶ Initial Analysis -> Validate Data Quality/Quantity -> Develop a Hypothesis

Our Hypothesis

- ▶ Response times for the Las Vegas Fire Department (LVFD) have improved (were reduced) over 2011 to 2018.
 - ▶ Continuous Improvement?
 - ▶ Department Sizing?

Retrieving, Assembling, and Cleaning Data



Project Scope

- ▶ July 2011 - December 2018
- ▶ City of Las Vegas only

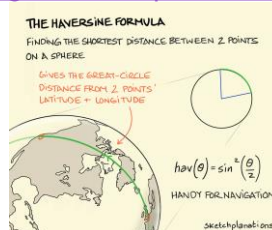
EXCLUSIONS:

- ▶ Census Data (Correlation w/ Population)
 - ▶ Per Capita data included; No significant variation throughout the years
 - ▶ Residents (Full-Time vs. Seasonal)
 - ▶ Tourists
- ▶ Distances (Correlation w/ Distances)

Google Distance Matrix API limits & pricing (5.00 USD per 1000)

<https://developers.google.com/maps/documentation/distance-matrix/overview>

Haversine Formula

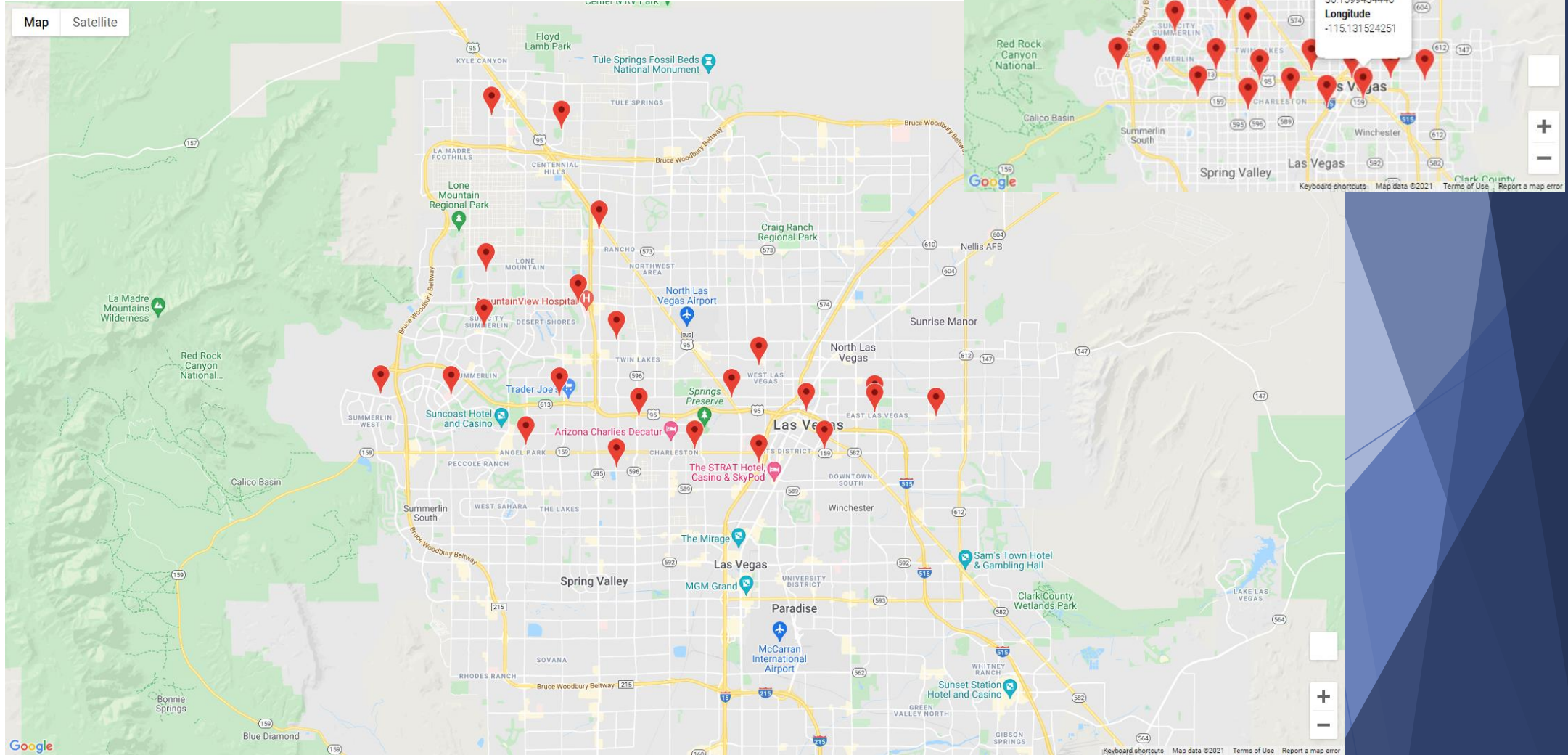


Limitations

- ▶ No data dictionary or metadata
- ▶ Ambiguous or incomplete data was excluded from analysis (No Assumptions!)
- ▶ No data prior to 2011
 - ▶ Historical trends
 - ▶ Impacts of the construction of new stations

Telling the Story

► Fire Station Locations (City of Las Vegas)



Telling the Story

► Fire Station Locations (City of Las Vegas)

BEFORE:

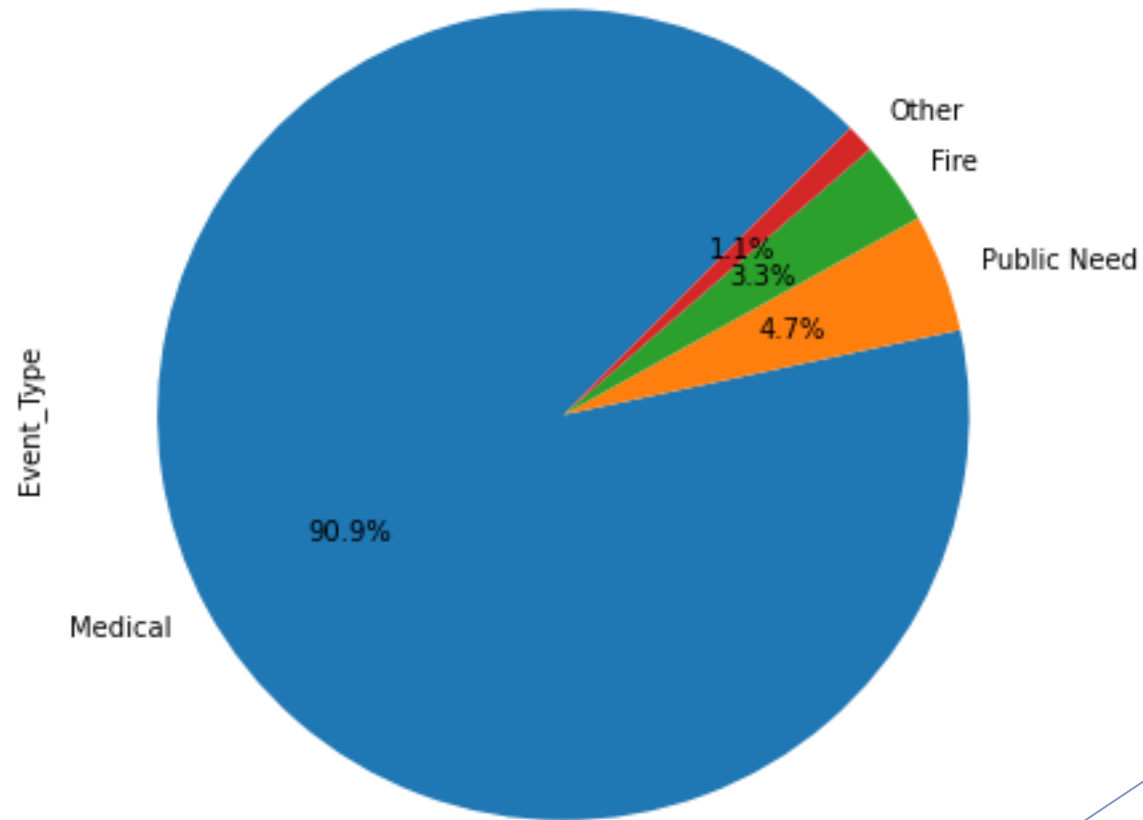
	Station	Response_Date	Event_Type	First_Unit_Assigned	First_Unit_Arrived	Location	Location_1
0	Station 4	2011/07/01 00:00:00+00	Medical	2011/07/01 00:01:00+00	7/1/2011 0:06	S Maryland Pky & E Carson Ave	(36.16462708, -115.1334076)
1	Station 44	2011/07/01 00:05:00+00	Medical	2011/07/01 00:06:00+00	7/1/2011 0:12	100 block of Lotus Blossom Ct	(36.17433167, -115.2525711)
2	Station 3	2011/07/01 00:22:00+00	Fire	2011/07/01 00:24:00+00	7/1/2011 0:27	N RANCHO DR & W WASHINGTON AVE	(36.18107986, -115.1791687)
3	Station 10	2011/07/01 00:22:00+00	Medical	2011/07/01 00:23:00+00	7/1/2011 0:29	2200 block of S Las Vegas Blvd	(36.1462059, -115.1557083)
4	Other	2011/07/01 00:23:00+00	Public Need	2011/07/01 00:24:00+00	7/1/2011 0:31	7300 block of Breezy Night Ct	(36.2447052, -115.2542267)

AFTER:

	BATTALION	CAPABILITY	OTHER_UNIT	CONSTRUCTION_YEAR	LONG	LAT	Objectid
0	1	ALS & ILS Eng401&501,Res401,501,601,100,Squad1,ILS...	BAT1,	6/23/1984	-115.140593	36.175147	1
1	10	ALS	BAT10	12/1989	-115.278456	36.161596	3
2	1	ALS	CBRN3	12/18/1980	-115.177234	36.180656	4
3	1	ALS & ILS	ILS4	12/1989	-115.131524	36.159943	5
4	10	ALS	EMS1,ILS5	9/11/2004	-115.195485	36.160133	6

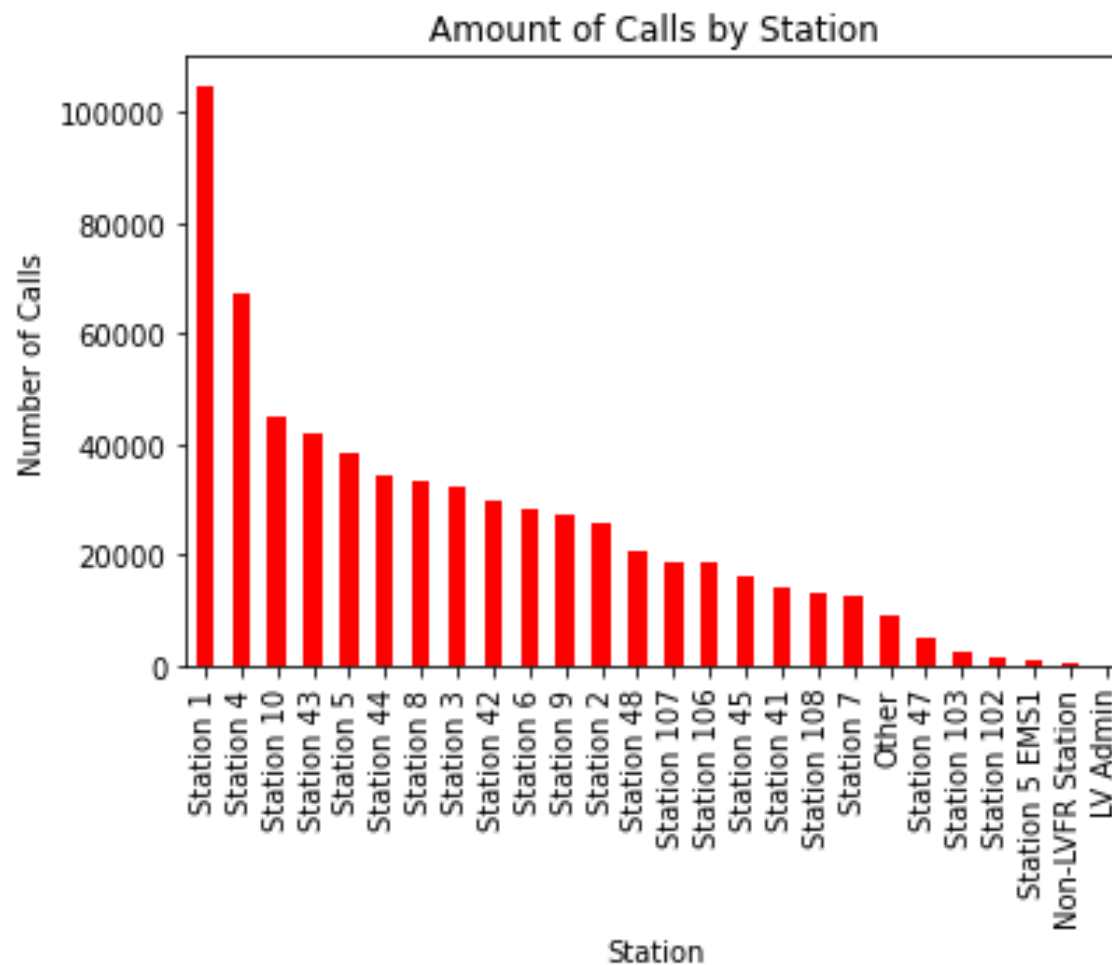
Telling the Story

► Types of Responses



Telling the Story

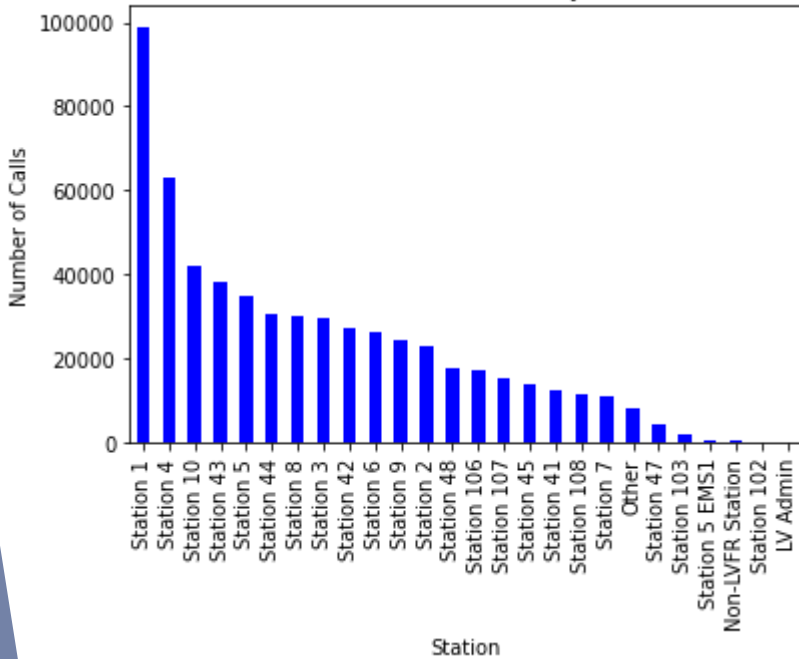
► Busiest Stations



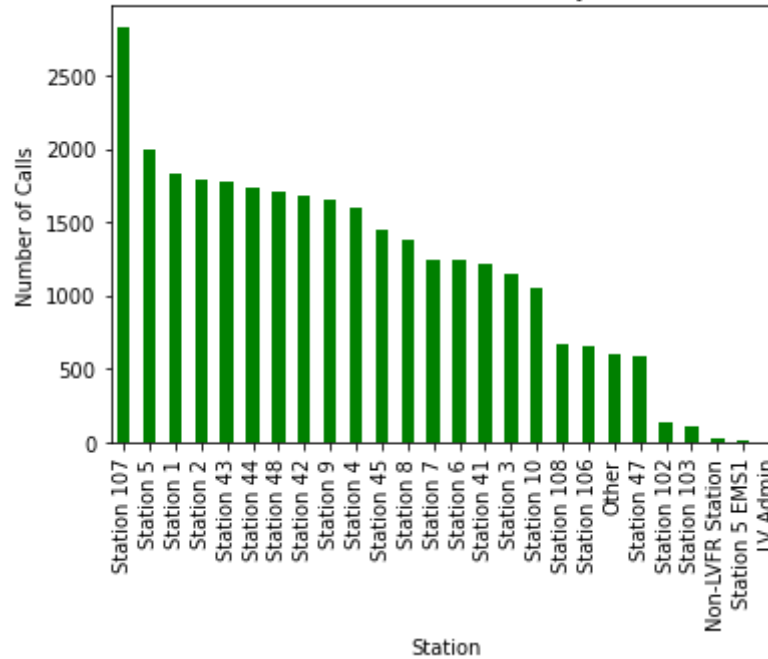
Telling the Story

► Busiest Stations

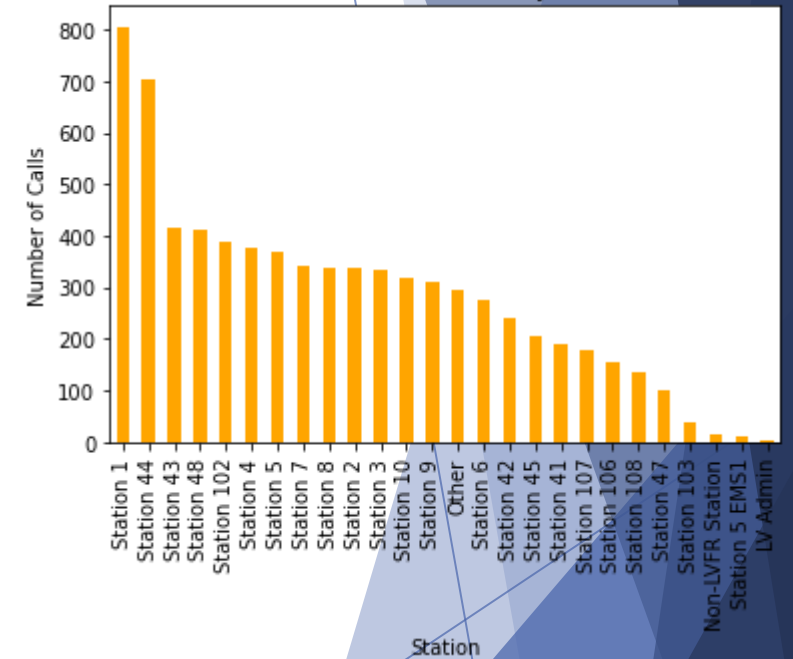
Amount of Medical Calls by Station



Amount of Public Need Calls by Station



Amount of Other Calls by Station

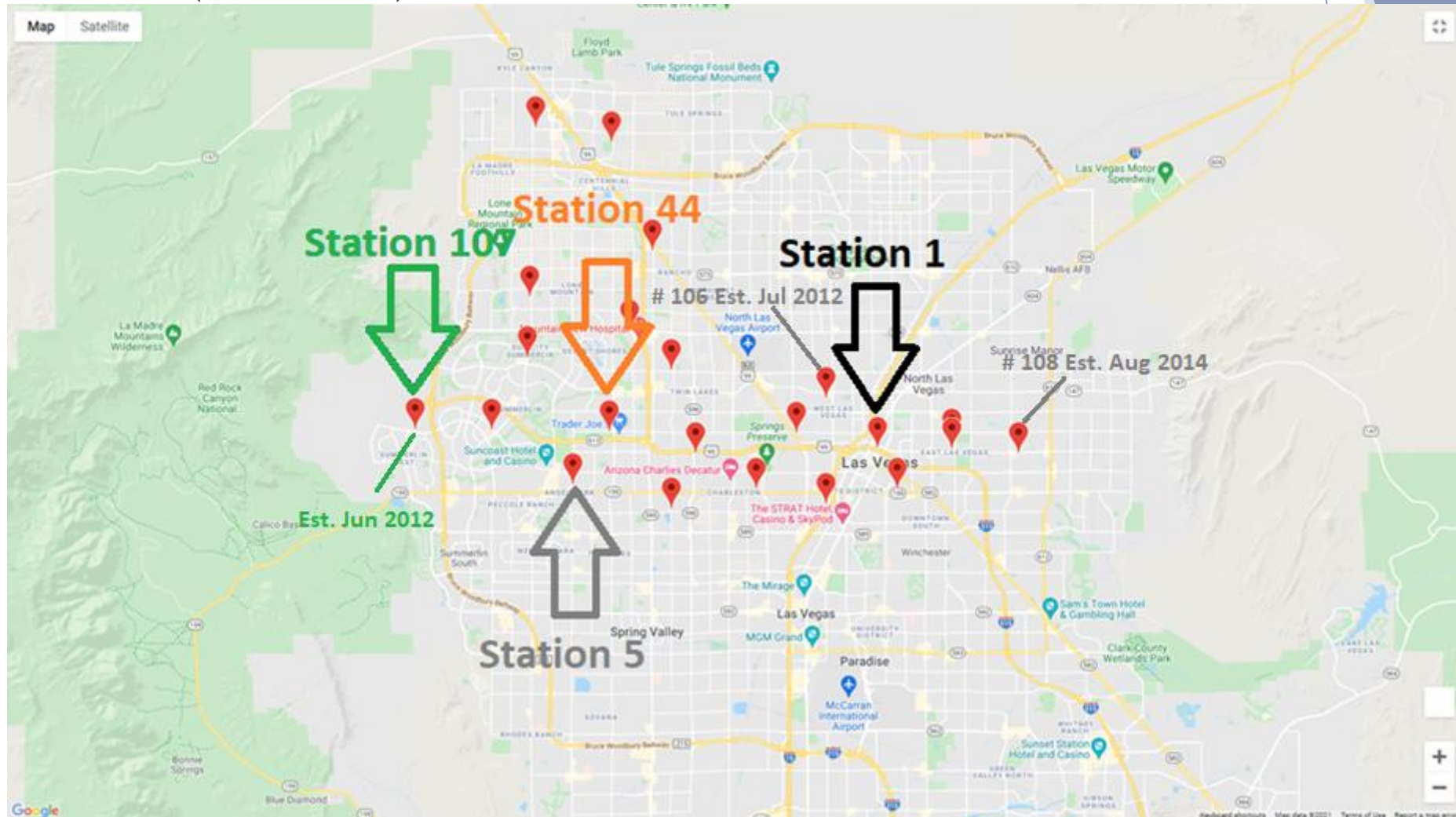


► Newest Stations:

- Station 108 (August 2014)
- Station 106 (July 2012)
- Station 107 (June 2012)

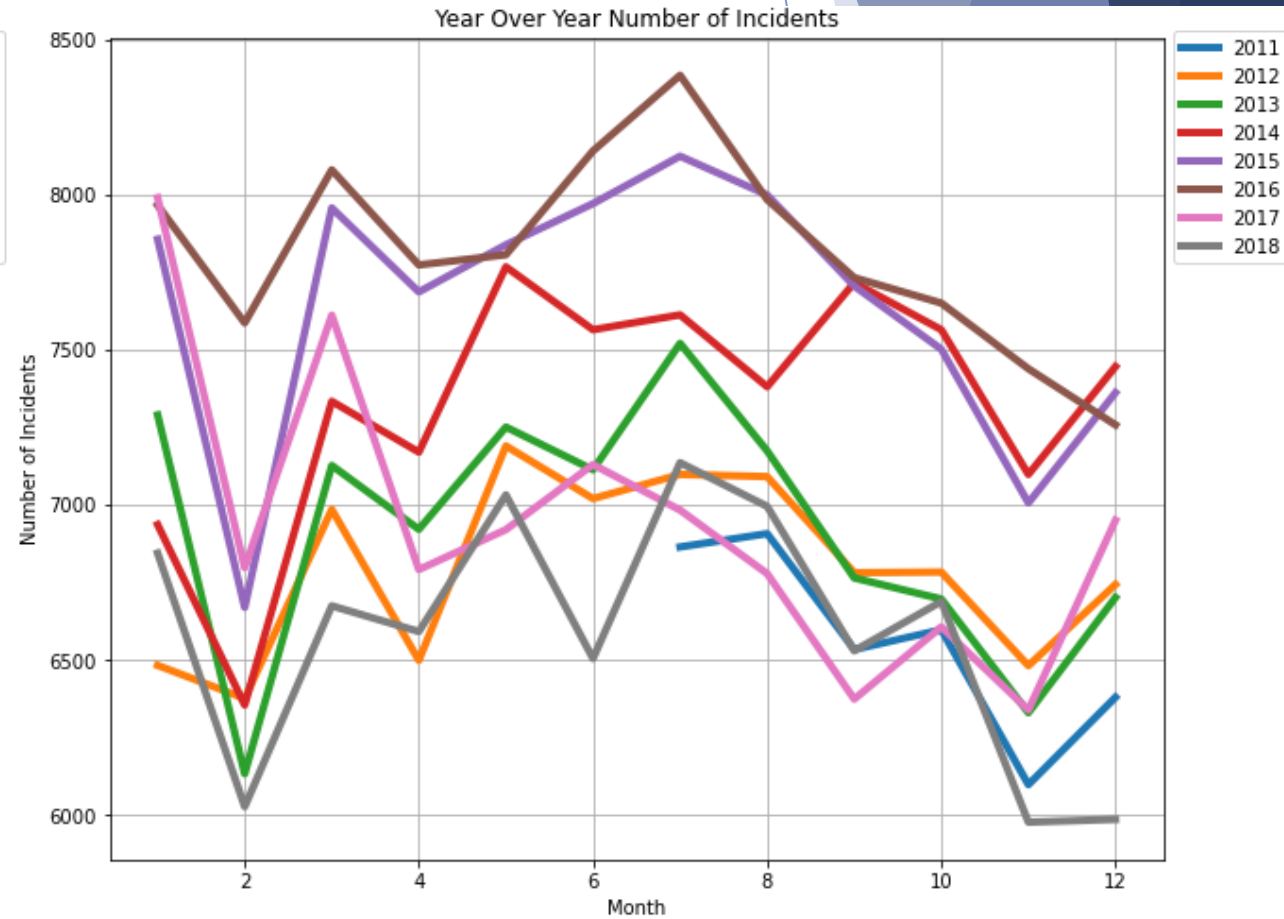
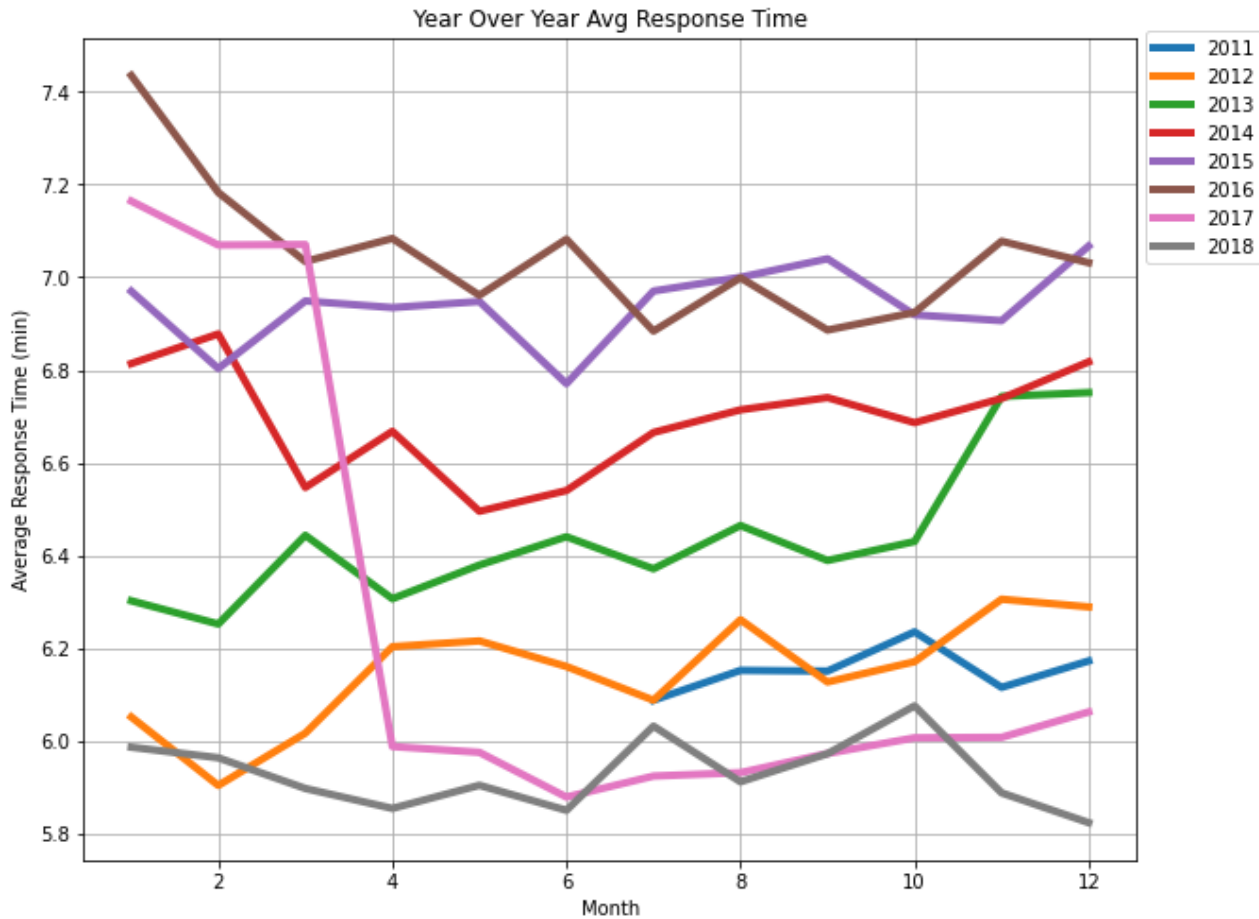
Telling the Story

► Busiest Stations (and Outlier)

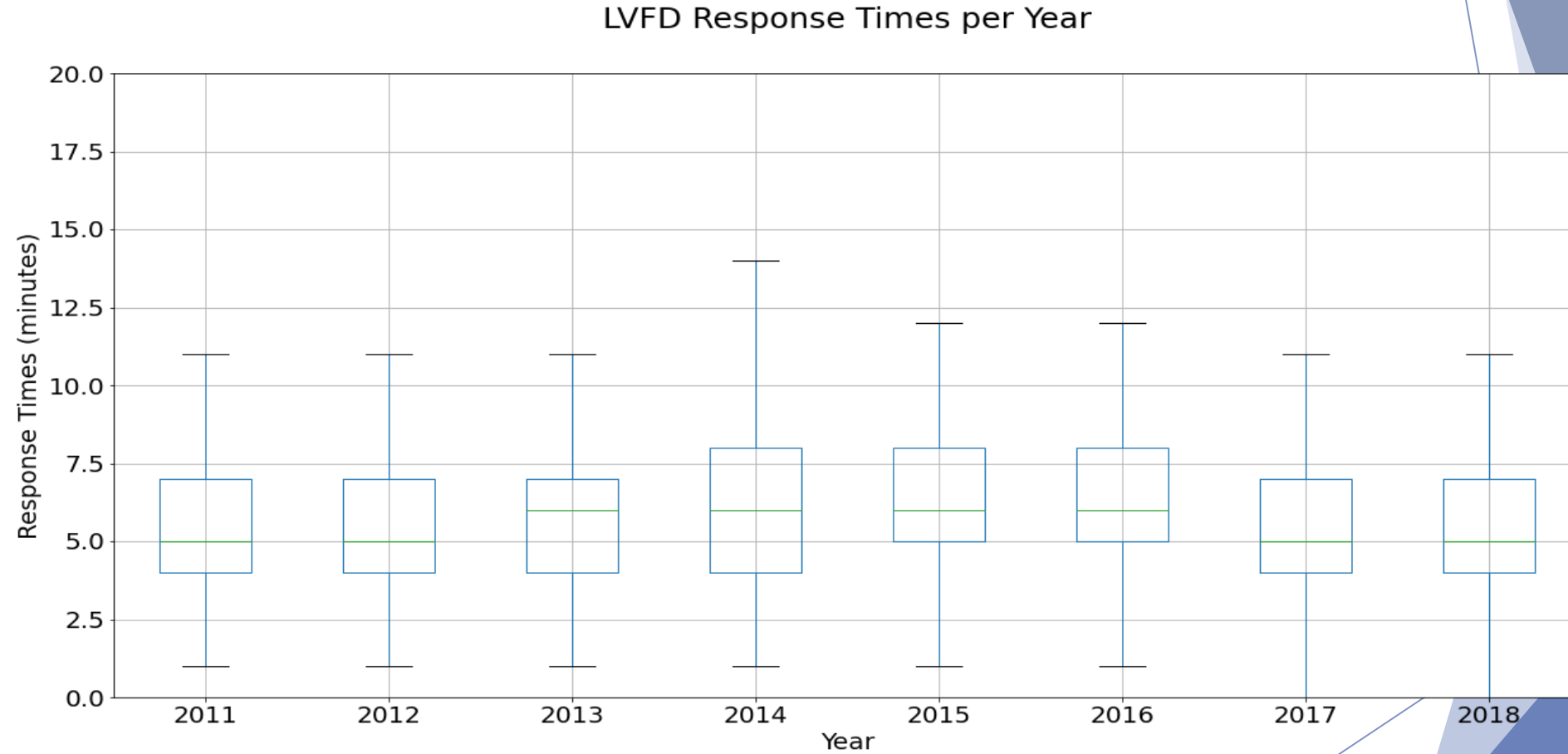


Telling the Story

► Year-Over-Year Comparisons



Hypothesis Testing



Conclusion

- ▶ H_a : Response times for the Las Vegas Fire Department (LVFD) have improved (were reduced) over 2011 to 2018.
- ▶ H_0 : There is no difference in response times for the LVFD over 2011 to 2018.
- ▶ ANOVA p-value: <0.001
- ▶ We reject the H_0 that there is no difference in response times for the LVFD over 2011 to 2018.