

Deconstructing San Francisco Building Permits

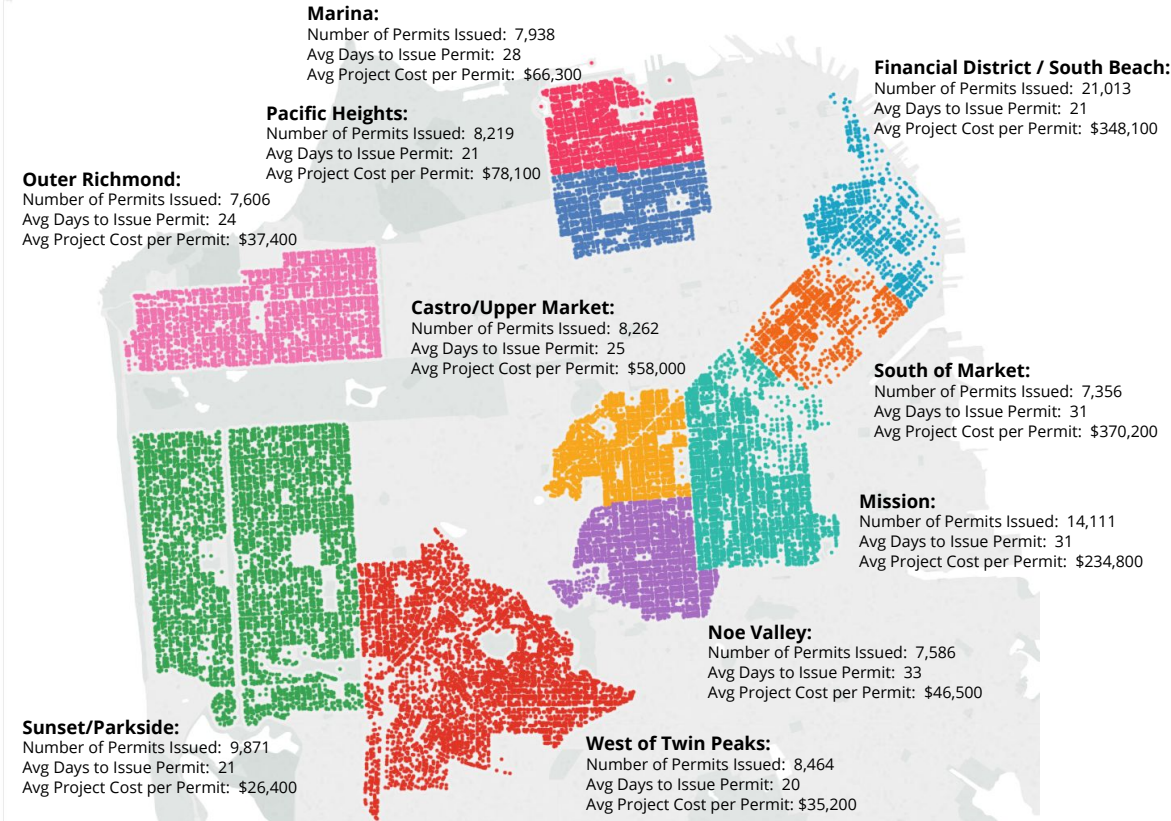
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Introduction

- **Context/Preliminary Analysis**: From 2013 to 2017, a total of 196,888 permits were submitted in SF. Over 89% of the permits were over the counter alterations permits. The number of permits filed varied over any given time period and location.
- **Significance**: By understanding when permits are filed, City of SF can optimize human resources allocation.
- **Question**: Which factors are related to variability in number of permits filed?
- **Hypothesis**: There are three primary drivers--*geography*, *seasonality*, and *economics*.
- **Method**: SF building permit data from Jan 2013 to Feb 2018 was obtained from Kaggle, and analysis was performed using python3, Tableau, and Excel. Historic weather and economic data were combined with permit data for seasonality and economic analysis, respectively (see references for sources).

Geography: The number of permits issued, wait times & project costs vary significantly by neighborhood

Top 10 Neighborhoods by Number of Permits Issued (2013-2017)

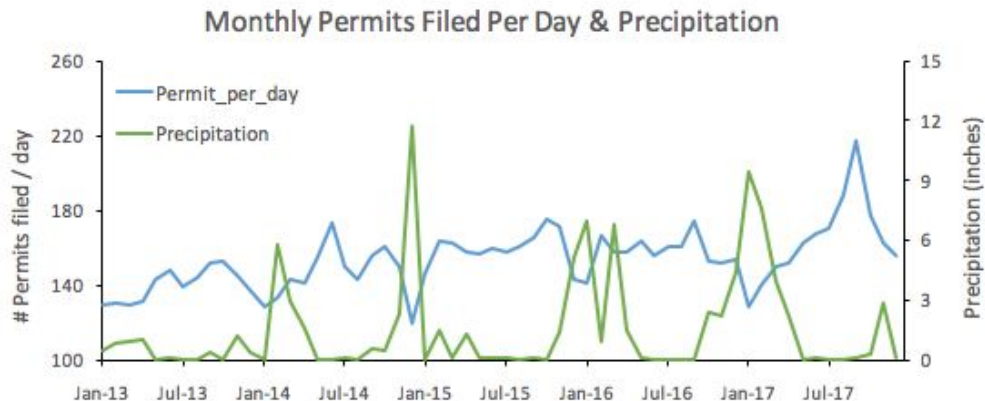
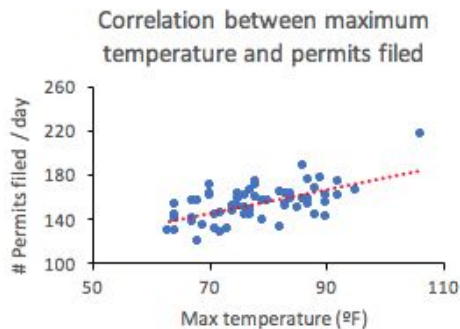
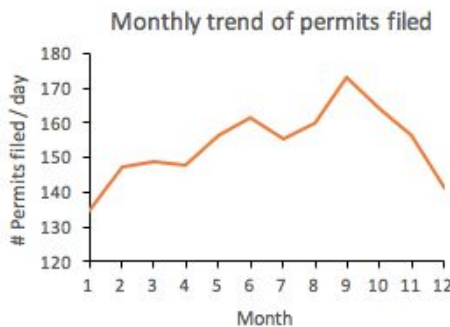


- Out of 41 total neighborhoods, the top 10 in number of permits issued are shown on the map, accounting for 52% of the permits issued in SF.
- Across all 41 neighborhoods, the avg number of days to issue a permit ranges from 7 to 51, with a mean of 27 days and standard deviation of 8 days.
- The city averages \$148,000 in project costs per permit. Only 3 out of the 10 neighborhoods on the map have a higher average than the city, suggesting there are more expensive projects elsewhere in the city.
- Financial District / South Beach has the most permits issued, roughly 7,000 more than Mission, yet Mission's avg permit wait time is 10 days longer. This could suggest Mission's permits are more complex, or Mission has less available resources.

Seasonality: Fewer permits are filed in rainy seasons

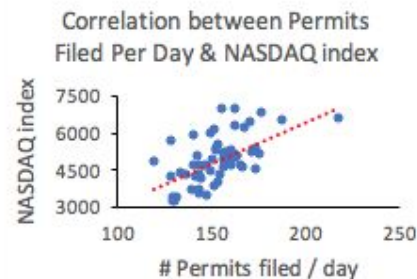
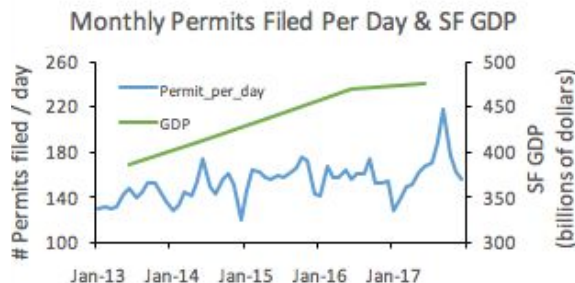
- On average, 154 permits are filed per day each month (stdev = 10).
- There appears to be a seasonal pattern, with less permits filed in Nov-April.
- Number of permits filed correlates with maximum temperature and inversely correlates with amount of precipitation.
- Precipitation & temperature are likely capturing cyclical seasonality of the data, matching that of real estate and construction industry.

* Number of permits filed adjusted for different number of working days (& excluding holidays)



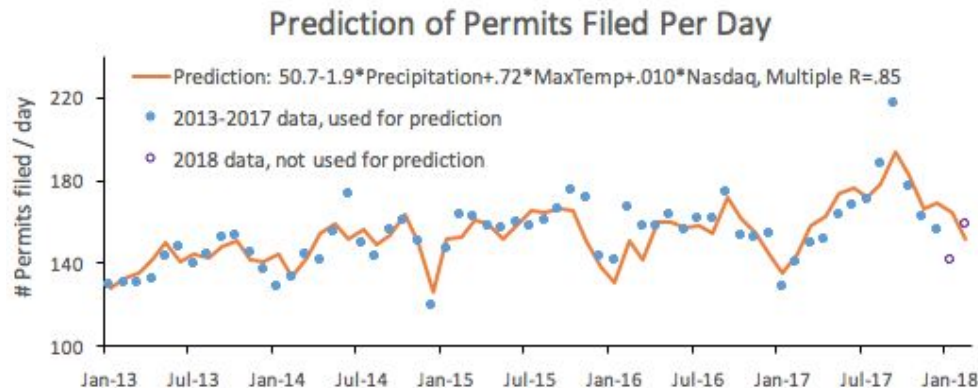
Economics: Permits filed increase in good economy

- Number of permits filed & SF GDP appears to increase steadily over time
- Number of permits filed correlates with general economic factors (measured by Nasdaq and other stock indices), likely capturing population/economic growth

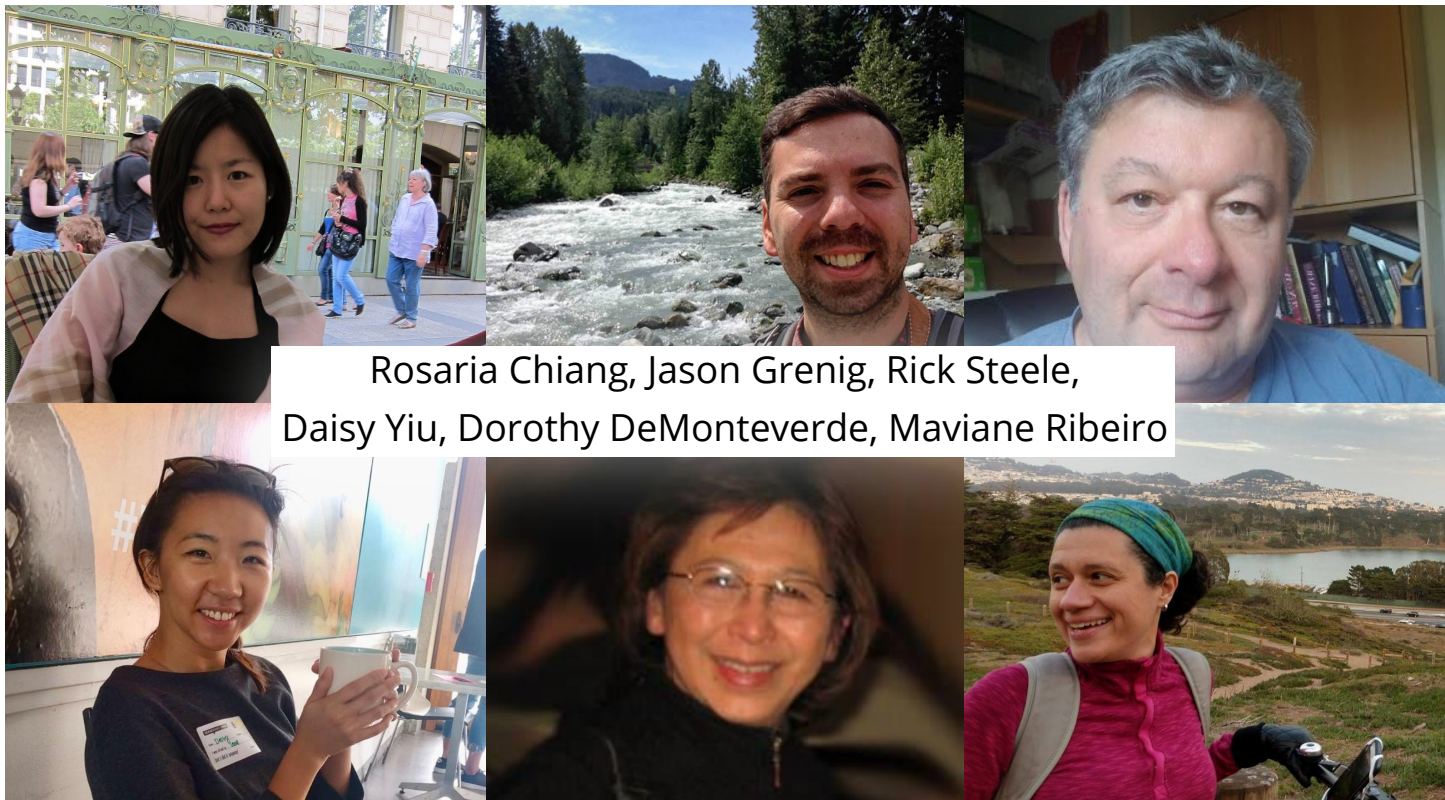


Volume of permits filed can be predicted

- Number of permits filed per month can be predicted by amount of precipitation, maximum temperature, and NASDAQ index
- Based on the multiple regression model, number of permits filed in Jan 2018 and Feb 2018 were predicted and compared to the data.



Group Photo - SF Bay Area Data Science Team



References

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