Olist

Technical Candidate: Ian Yu

Agenda

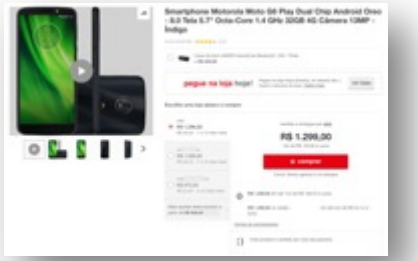
- Overview
- Data Wrangling
- EDA
- Time Series Analysis
- Post-Sales Analysis
- Future Development

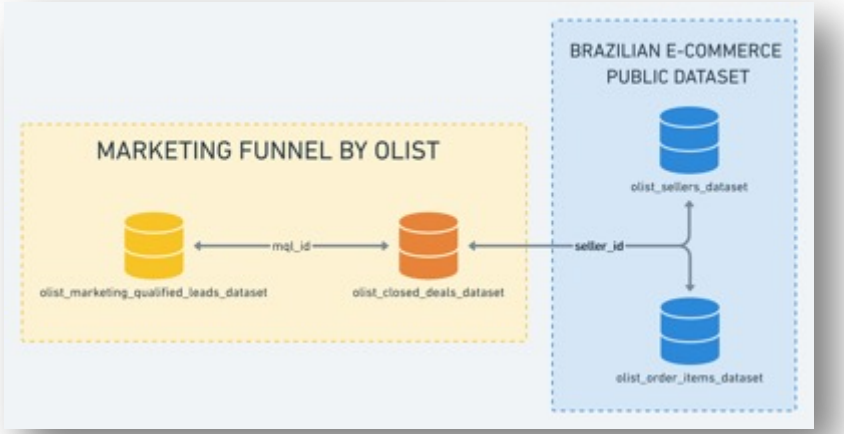
My Data Philosophy

Priorities

Context-Centric

Scalable Solution





Olist
Overview

Q. Funnel Analysis

Marketplace of Marketplaces

Customer-Led Growth

Post-Sales Analysis

Olist
Funnel

Only 1 Conversion Stage

SDR Qualifies Leads

SR Closes Deals

Missing Much Information

My Deliverables

Module `data.py` and Public S3

EDA Notebook

GitHub

Data Wrangling

Much Data is Missing

Features to Remember:

Declared Monthly Revenue

Lead Behaviour Profile is Internal Data

```
mql_id                          0.000000
seller_id                       0.000000
sdr_id                          0.000000
sr_id                           0.000000
won_date                        0.000000
business_segment                0.118765
lead_type                       0.712589
lead_behaviour_profile         21.021378
has_company                    92.517815
has_gtin                       92.399050
average_stock                  92.161520
business_type                   1.187648
declared_product_catalog_size  91.805226
declared_monthly_revenue        0.000000
dtype: float64
```

Top: Table Missing Values (%)

Right: Declared Monthly Revenue Count

```
0.0           94.655582
100000.0       0.593824
20000.0        0.356295
25000.0        0.356295
10000.0        0.356295
30000.0        0.356295
120000.0       0.237530
5000.0         0.237530
250000.0       0.237530
50000.0        0.237530
300000.0       0.237530
15000.0        0.237530
60000.0        0.237530
1000.0         0.118765
8000.0         0.118765
4000.0         0.118765
6.0            0.118765
180000.0       0.118765
50000000.0     0.118765
8000000.0      0.118765
200000.0       0.118765
210000.0       0.118765
150000.0       0.118765
130000.0       0.118765
500000.0       0.118765
6000.0         0.118765
40000.0        0.118765
Name: declared_monthly_rev
```

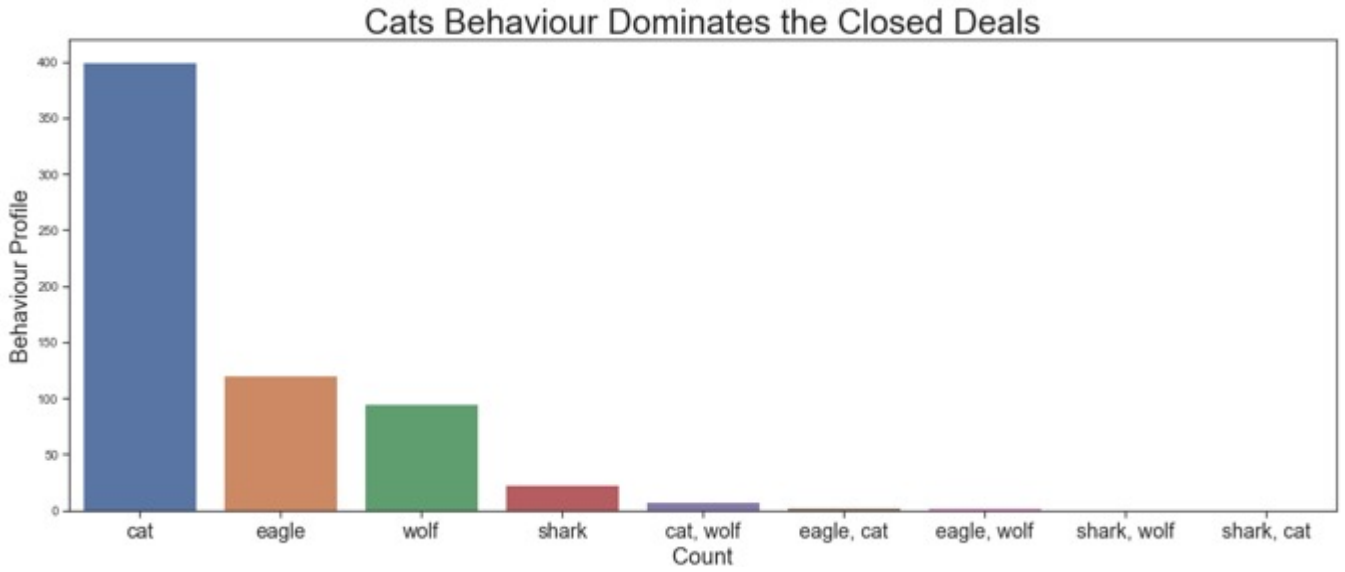
Lead Behaviour Profile

Total Missing Values: 21%

Can’t Do Predictive Modeling

High Bias If Used

3 SDRs Keep Missing Data



sdr_id	total closed	total missing profile	percentage
56bf83c4bb35763a51c2baab501b4c67	74	34	45.95%
fdb16d3cbbeb5798f2f66c4096be026d	34	27	79.41%
de63de0d10a6012430098db33c679b0b'	53	41	77.36%

Top: Lead Behaviour Profile count

Bottom: SDRs who keep fail at indicating Behaviour Profile

Lead Generation

Search accounts for 48.52% of Lead Generation

Successful SEO or Word of Mouth

Unclear Why Social Was Successful!

origin	leads generated
organic_search	28.70%
paid_search	19.82%
social	16.87%
other	16.36%
direct_traffic	6.23%
email	6.16%
referral	3.55%
display	1.47%
other_publicities	0.81%

So What?

Classify Declared Monthly Revenue In Broad Ranges

Why the 3 SDRs Are Not Able to Indicate Lead Behaviour Profile

Dive Deeper Into Social Activities

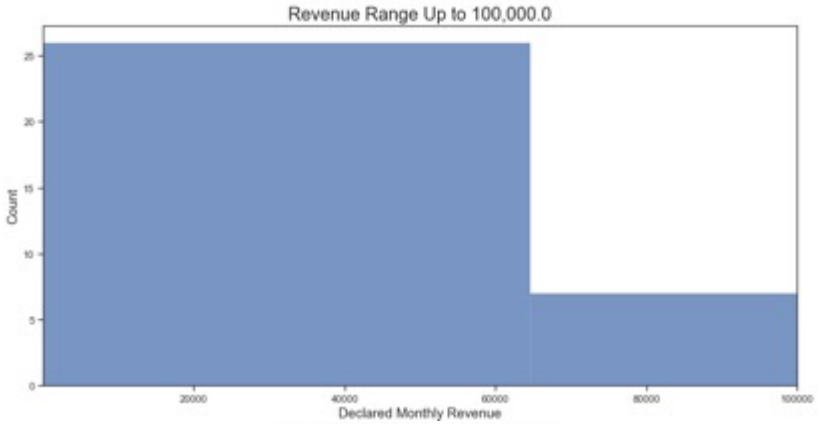
Exploratory Data Analysis

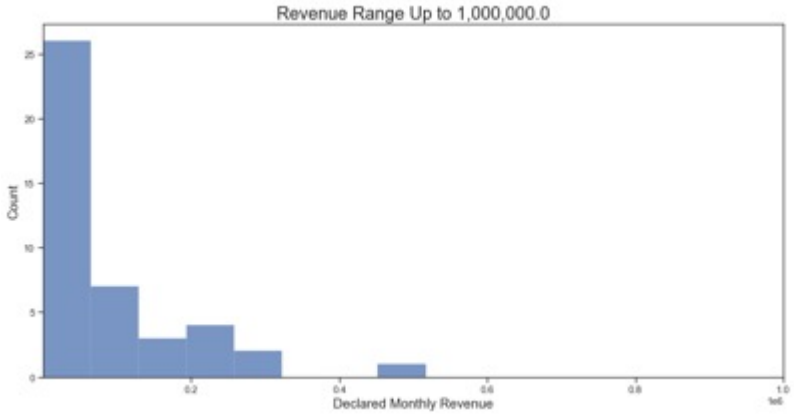
Declared Monthly Revenue Ranges

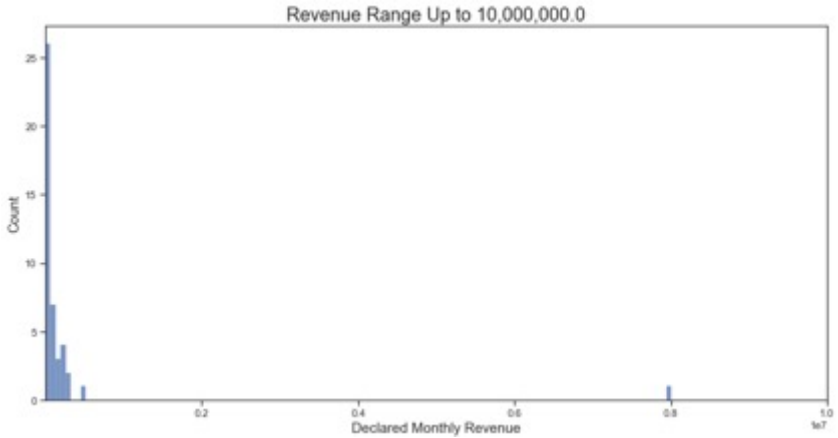
45 Samples out of 842

Most Are Under 60,000R

Ranges	Class
0-50,000R	Minor
50,000-300,000R	Small
300,000R+	Medium



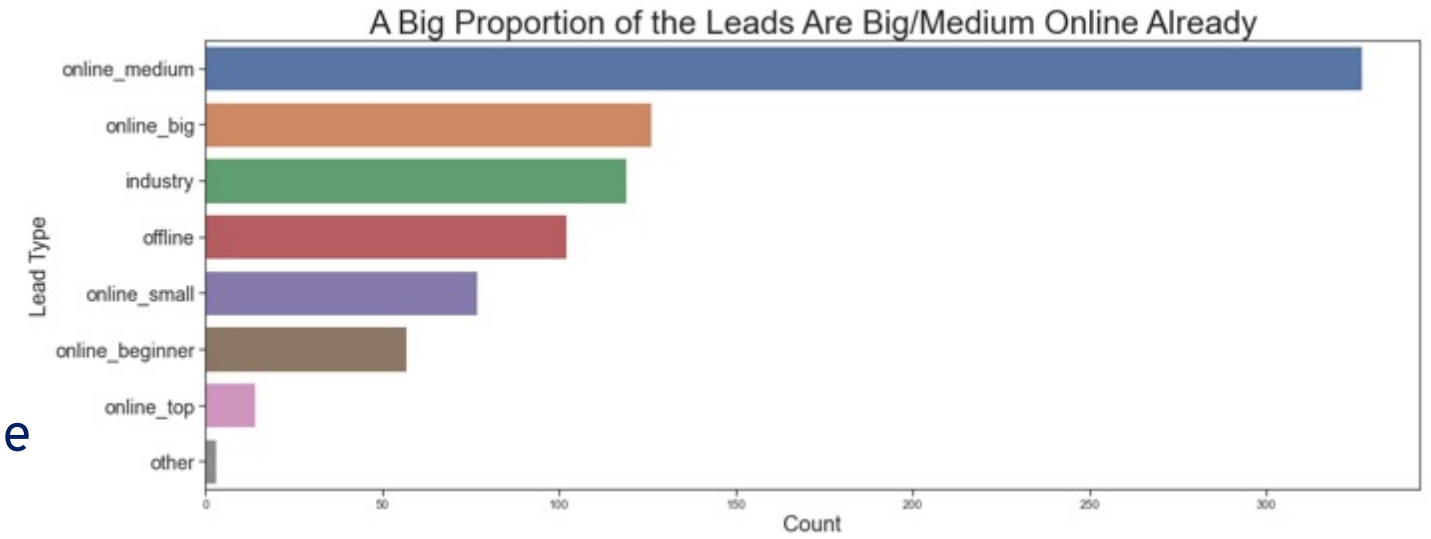




Lead Type

Big/Medium Online: 55%

They Should Know Their Revenue



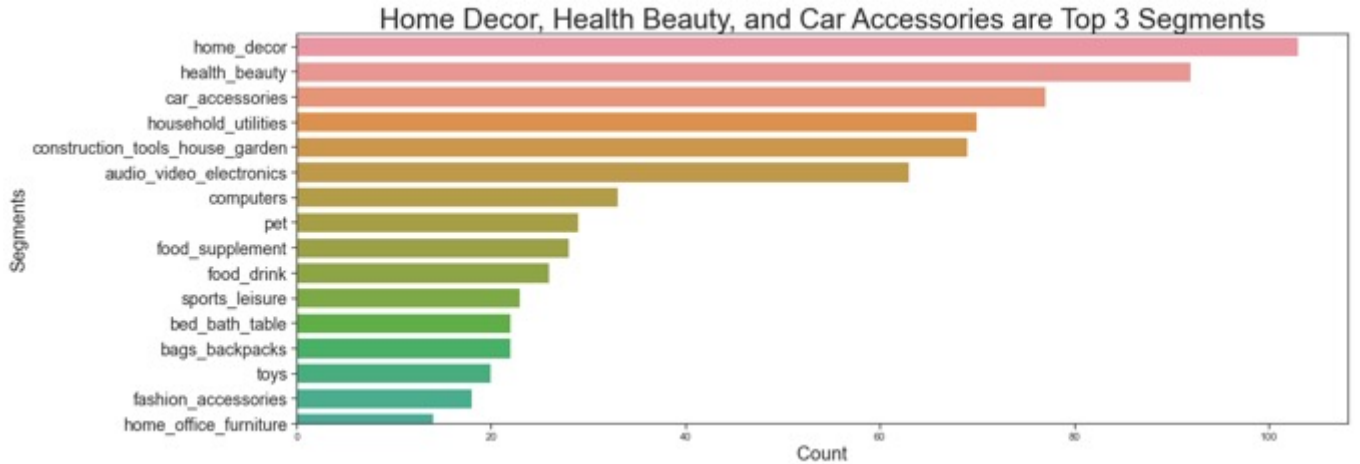
Why Declared Monthly Revenue Has 94% of Missing Values?

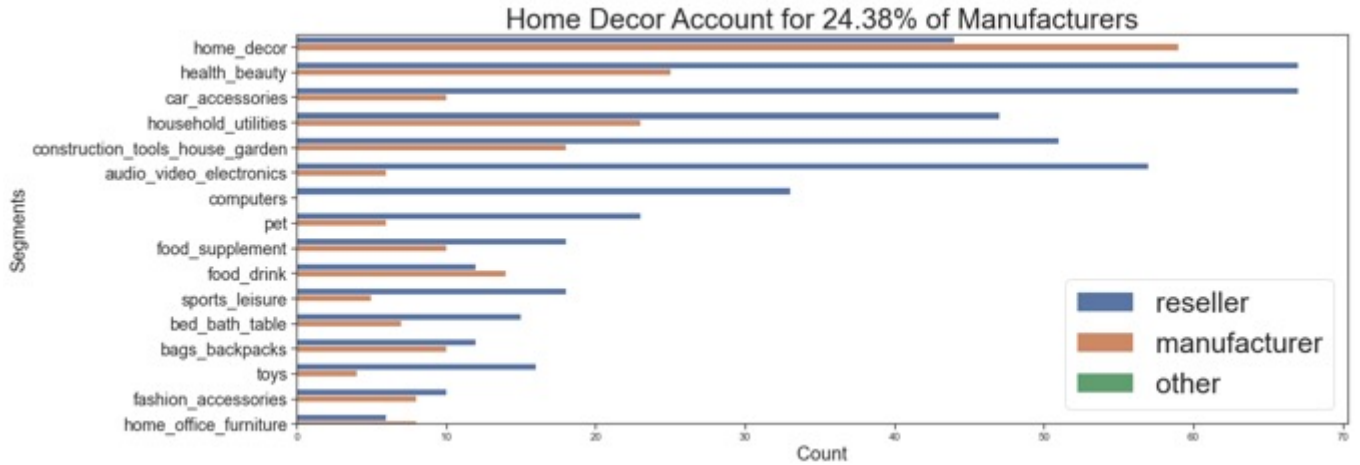
Business Segment

30% Manufacturers

70% Resellers

¼ of Manufacturers are Home Décor





Lead-to-Closed Origin

Search: 48% >>> 55%

Social Dropped in Proportion: 7%

Could Be a Costly Origin!

Marketing Qualified Leads Origin

organic_search	28.7000
paid_search	19.8250
social	16.8750
other	16.3625
direct_traffic	6.2375
email	6.1625
referral	3.5500
display	1.4750
other_publicities	0.8125

Name: origin, dtype: float64

Closed Deals Media Origin

organic_search	32.121212
paid_search	23.393939
other	23.272727
social	9.090909
direct_traffic	6.545455
referral	2.909091
email	1.696970
display	0.606061
other_publicities	0.363636

Name: origin, dtype: float64

Percentage Difference

direct_traffic	0.307955
display	-0.868939
email	-4.465530
organic_search	3.421212
other	6.910227
other_publicities	-0.448864
paid_search	3.568939
referral	-0.640909
social	-7.784091

Name: origin, dtype: float64

Sales
Duration

MQL-Closed: ~10% (Why?)

1/3 of the Deals Closed on the 7th Day

Momentum Forever Below 1 on 23rd day

Sales
Duration

Top 5 Average: 22 Days

Overall Average: 105 Days

Super Sales: Number 6

sr_id	declared_monthly_revenue	lead_to_close
9e4d1098a3b0f5da39b0bc48f9876645	0.000000	17.000000
fbf4aef3f6915dc0c3c97d6812522f6a	0.000000	21.966102
c638112b43f1d1b86dcabb0da720c901	0.000000	22.727273
060c0a26f19f4d66b42e0d8796688490	0.000000	25.218750
6565aa9ce3178a5caf6171827af3a9ba	0.000000	26.013699
4ef15afb4b2723d8f3d81e51ec7afefe	383053.435115	30.183206
85fc447d336637ba1df43e793199fbc8	1562.500000	33.703125
9ae085775a198122c5586fa830ff7f2b	0.000000	41.489796
2695de1affa7750089c0455f8ce27021	1754.385965	44.596491
d3d1e91a157ea7f90548eef82f1955e3	5062.500000	47.625000
495d4e95a8cf8bbf8b432b612a2aa328	7000.000000	49.850000
56bf83c4bb35763a51c2baab501b4c67	12500.000000	55.125000
de63de0d10a6012430098db33c679b0b	154326.923077	62.884615
a8387c01a09e99ce014107505b92388c	24038.692308	96.653846
068066e24f0c643eb1d089c7dd20cd73	7037.037037	122.333333
34d40cdaf94010a1d05b0d6212f9e909	19000.000000	172.000000
b90f87164b5f8c2cfa5c8572834dbe3f	0.000000	175.000000
4b339f9567d060bcea4f5136b9f5949e	31250.000000	194.500000
9d12ef1a7eca3ec58c545c678af7869c	43333.333333	214.333333
9749123c950bf8363ace42cb1c2d0815	103571.428571	234.000000
0a0fb2b07d841f84fb6714e35c723075	6000.000000	306.000000
6aa3b86a83d784b05f0e37e26b20860d	8000.000000	321.000000

So What?

Explore SDRs Are Not Recording Declared Monthly Revenue

Home Décor Manufacturers May Present Opportunities

Shorten Average Duration of Sales Cycle

Need Data on Lost Deals

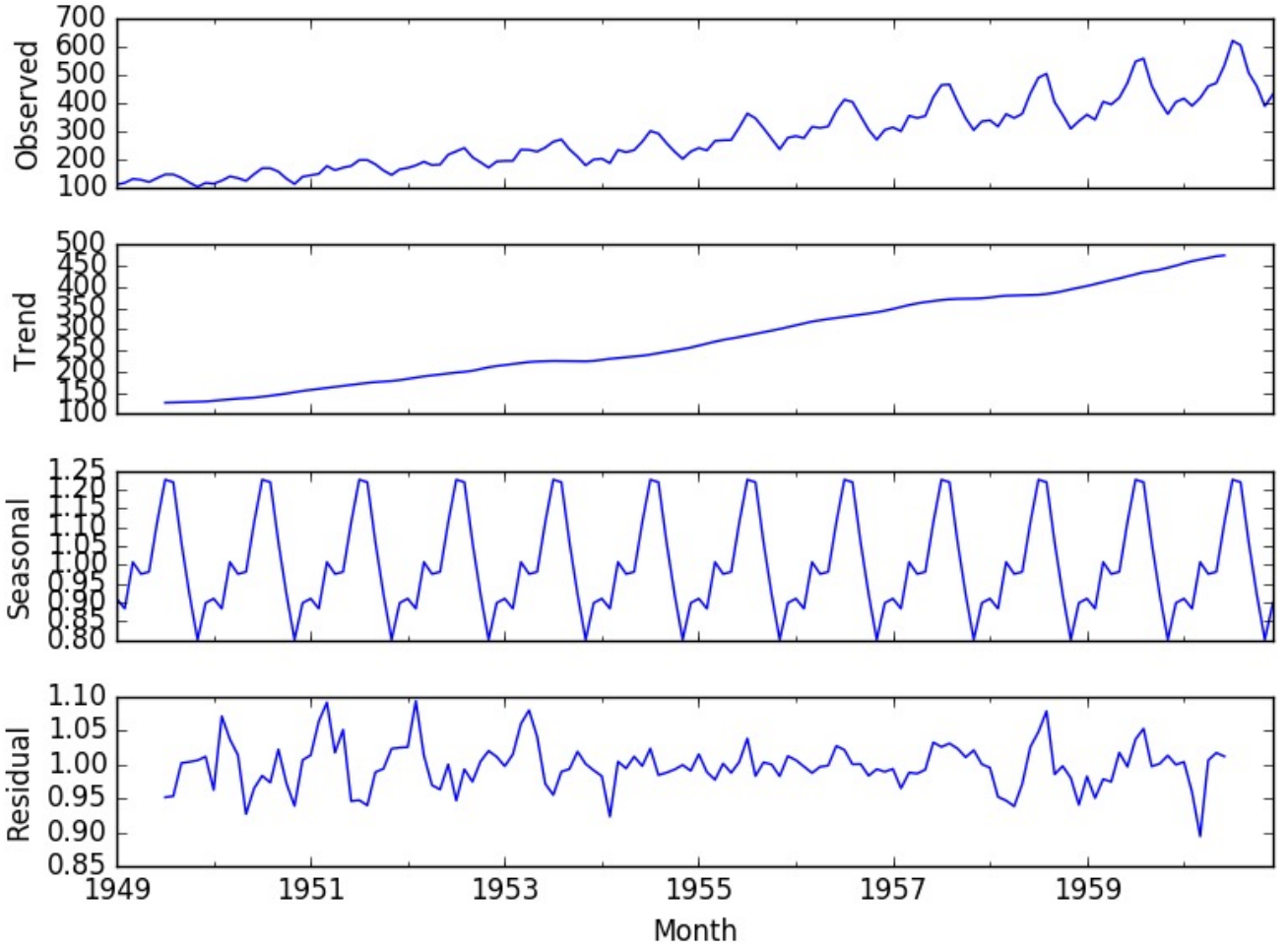
Time Series Analysis

What Is TSA?

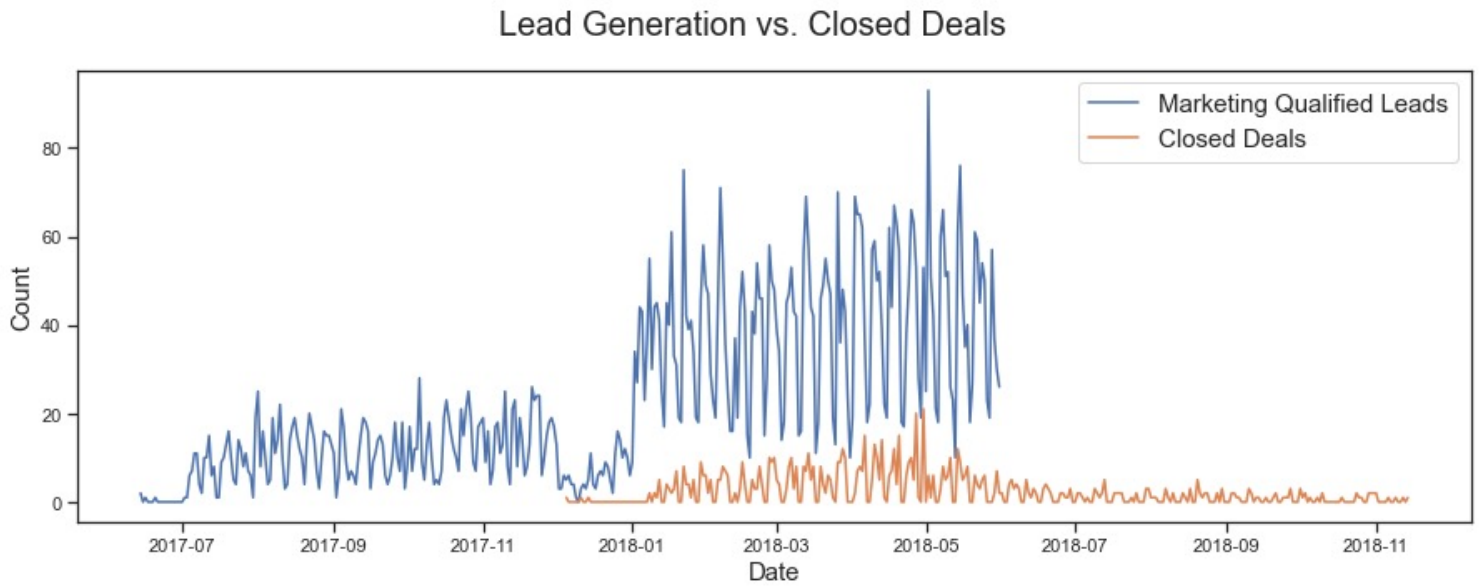
Trend

Seasonality

Noise/Residual



Is Closed Deals Stationary?



Lead Generation is Not Stationary

Closed Deals Became Stationary by Mid June

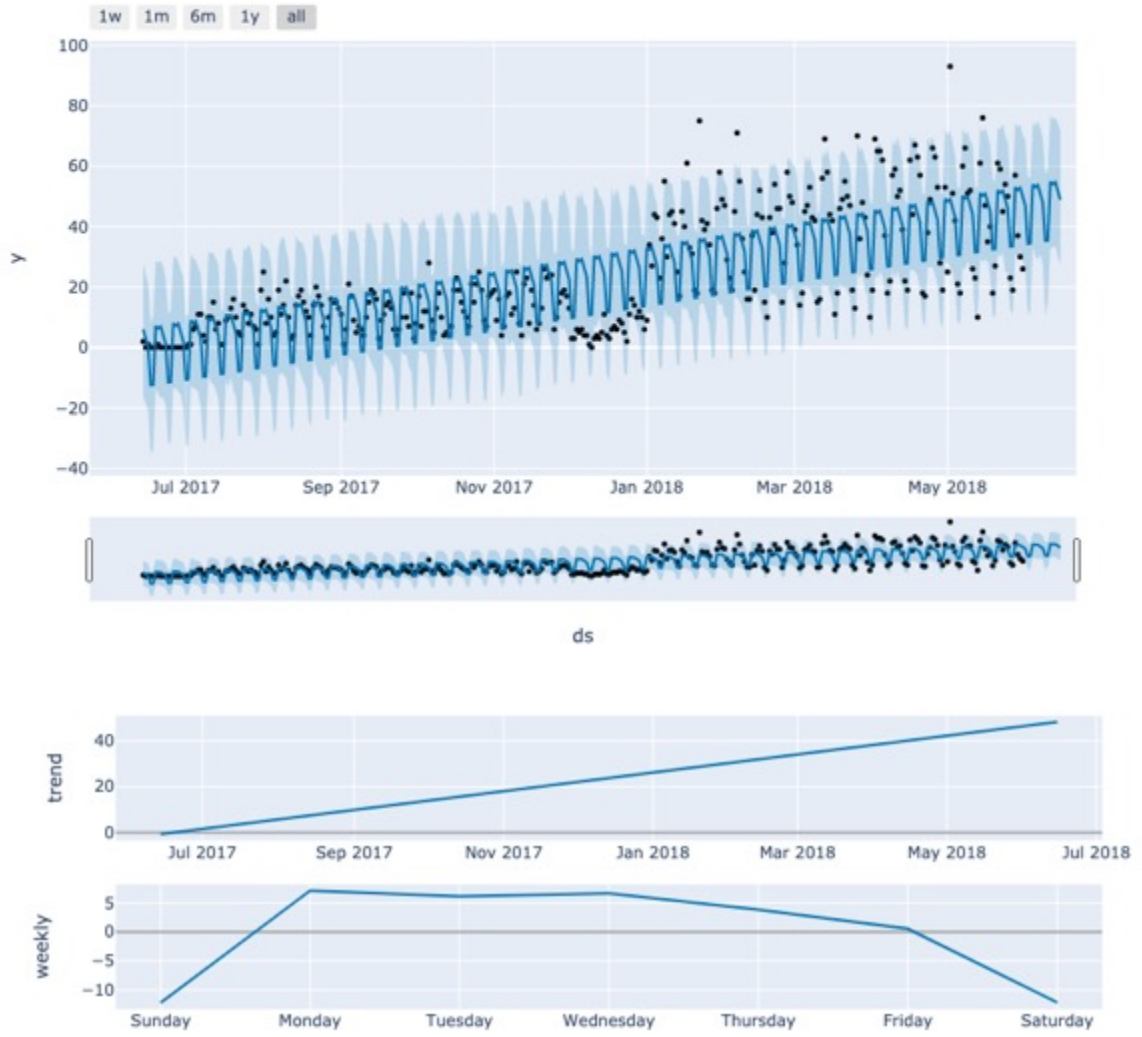
```
From May
ADF Statistic: -1.684110
p-value: 0.439318

From June
ADF Statistic: -2.834552
p-value: 0.053505

From July
ADF Statistic: -3.511988
p-value: 0.007684
```

FBProphet
MQL

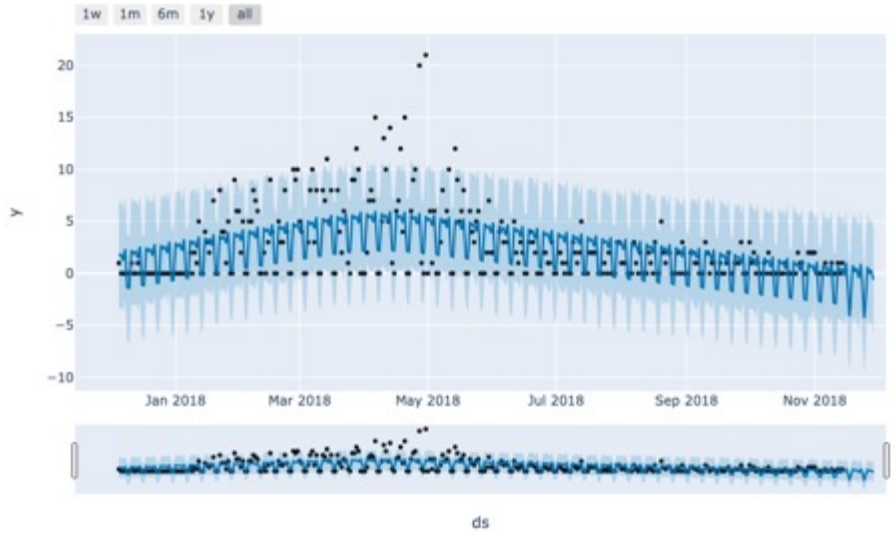
General Uptrend

Monday Generates Leads

Can’t Determine Yearly Seasonality



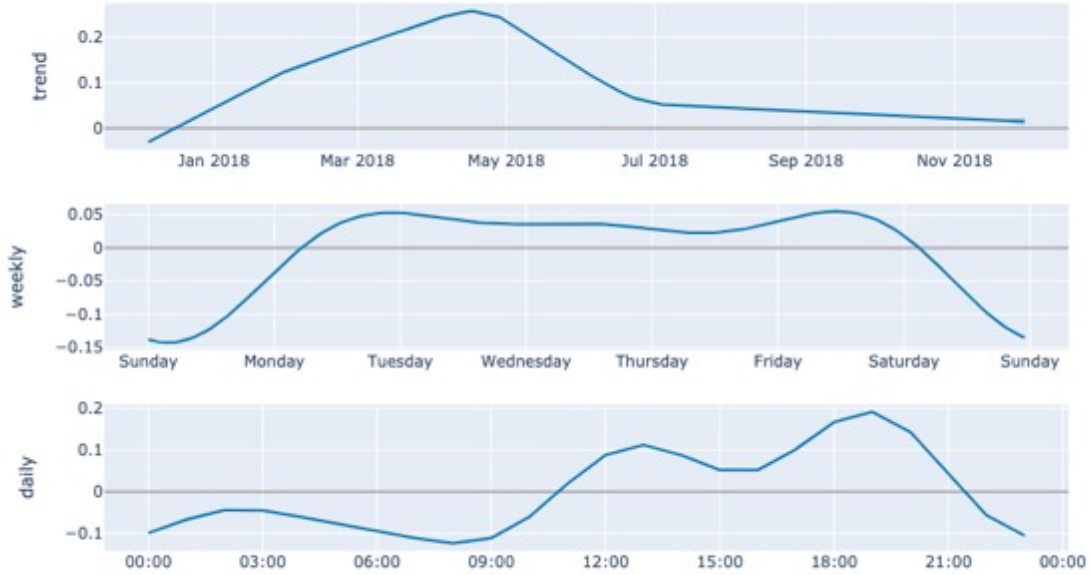
FBProphet
Closed Deals



Humbling Trend

Start and End of Week Close Deals

Lunch / Dinner Time



So What?

Need At Least 2 Years Worth of Data

Q: Is Monday Generating Leads Through Social?

Explore Validity of Closing on Meal-Time

Post-Sales Analysis

Post-Sales Analysis

Single Seller Analysis

Flexible to Individual or Holistic

Tools to Follow-up with Customers

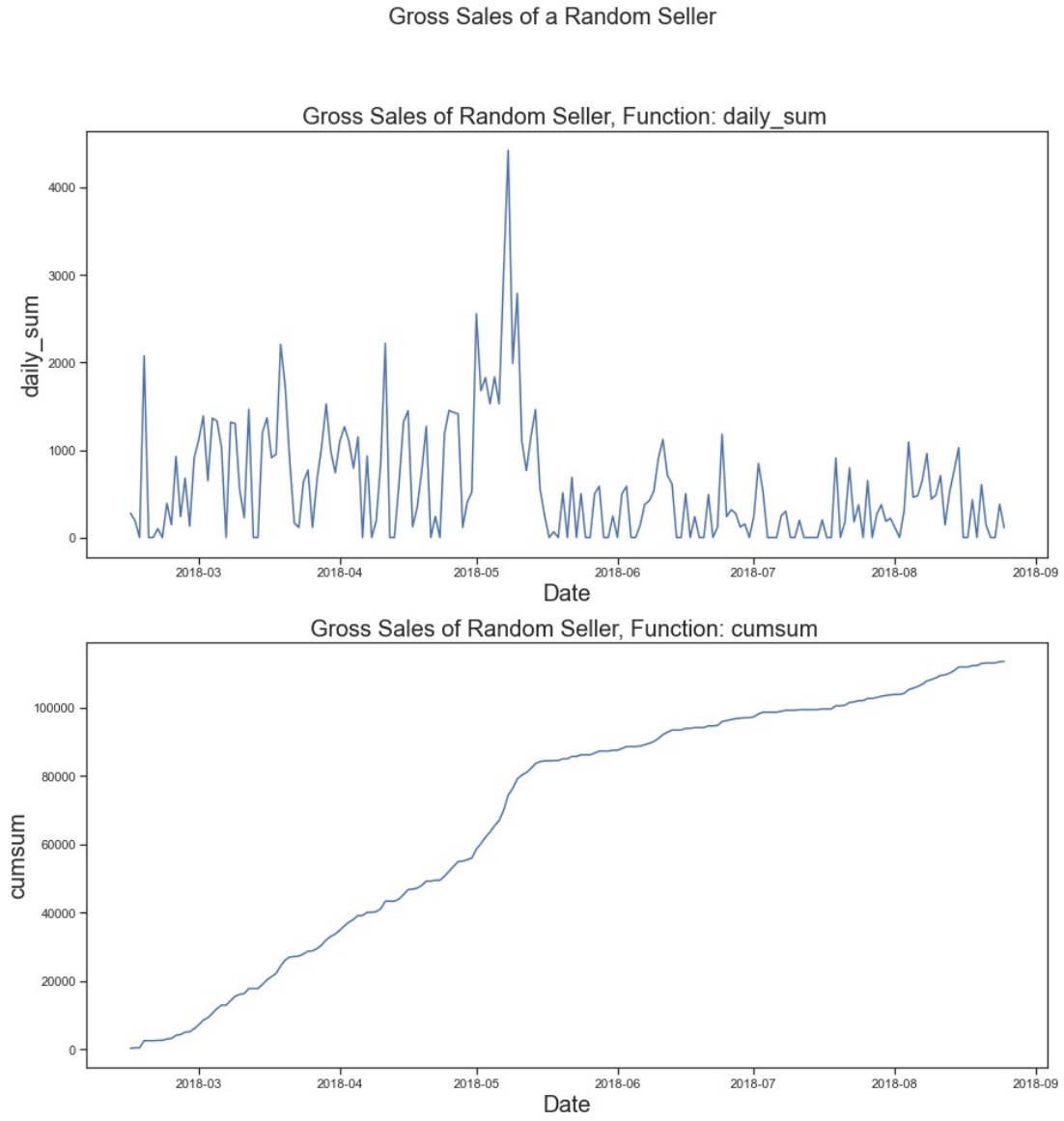
```
#####################################################################
# Post-Sales Analysis: Aims to be Developed Into a Post-Sales Class #
#####################################################################


def single_seller(ps, feature='price', seller_id = None, resample = '1D', function = 'cumsum'):
    '''
    A custom function that helps examine a seller's performance over time
    '''
    if seller_id == None:
        seller = random.choice([x for x in ps['seller_id']])
    else:
        seller = seller_id

    sum_ = pd.DataFrame(ps[ps['seller_id']==seller][feature].resample(resample).sum())

    if function == 'daily_sum':
        return sum_

    elif function == 'daily_mean':
        return sum_.mean()

    elif function == 'cumsum':
        return sum_.cumsum()

    elif function == 'total_growth':
        start = float(sum_.cumsum().iloc[0])
        end = float(sum_.cumsum().iloc[-1])
        return ((end - start) / start)

    else:
        raise Exception("Invalid function")
```

Analyze a Random Seller

Daily Sales or Cumulative Gross Sales

Seems to Have Cyclical Performance

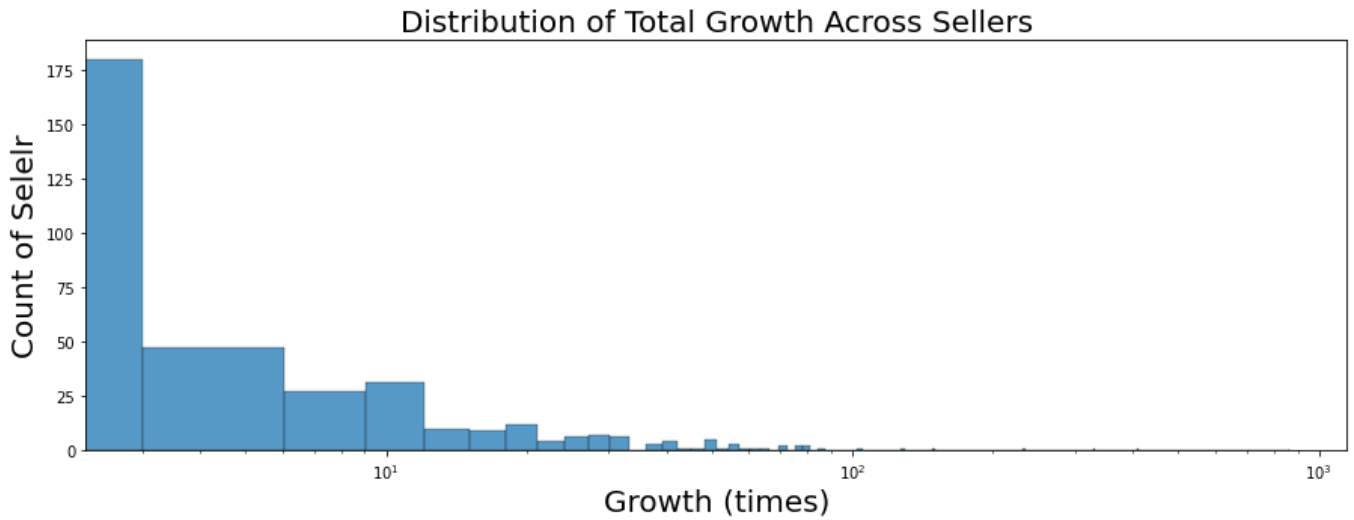
Reached 407.75 times of Total Growth



Aggregate Analysis

My Mistake (% vs. times)

In the given 216 Days



58% of the Sellers Reached 2+ Times Growth

30% Reached 10+ Times Growth

Future Development

Monitor Metrics

Metrics	Why?
MQL-Closed Conversion	Will it drop? (Recall TSA)
Average Closing Duration	Sales Representative Efficiency
Missing Lead Behaviour Profile	SDR Efficiency
Converting Proportion from Social	Potential Marketing Cost Dead Weight

Other Development

Develop `data.py`

Create a Knowledge Base & Wiki

More Statistical Analysis and Time Series Techniques

Machine Learning (Future)

Development environment > training model

Trained Model prediting the acutal outcome

Production environment