

# IVRS Thresholds

November 1, 2019

```
[1]: from datetime import datetime as dt, timedelta as td
import calendar as ca
from math import ceil
import mpanel as mp
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from matplotlib.pyplot import figure
%matplotlib inline
import warnings
warnings.filterwarnings('ignore')

pd.options.display.float_format = '{:,.2f}'.format
```

```
[14]: # Get the start and end dates for the previous period of measurement: returns
      ↪ Start & End dates of previous month
def get_s_e(duration, current_date=dt.now()):
    ey = int(current_date.strftime('%Y'))
    em = int(current_date.strftime('%m'))
    if em <= duration:
        sy = ey - 1
        sm = 13 - duration
    else:
        sy = ey
        sm = em - duration
    s = str(sy)+'-'+str(sm).zfill(2)+'-01'
    e = str(ey)+'-'+str(em).zfill(2)+'-01'
    return [s,e]

# Owing to multiple timestamp columns, this is to bring all to one column
def ts_normaliser(row):
    try:
        if row['TimeStamp'] != 'NoVal':
            ts = int(row['TimeStamp'])
        elif row['Timestamp'] != 'NoVal':
            ts = int(row['Timestamp'])
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        elif row['timestamp'] != 'NoVal':
            ts = int(row['timestamp'])
        else:
            ts = dt.strptime(row['time'], '%Y-%m-%d %H:%M:%S')
            ts = ts + td(hours=5) + td(minutes=30)
            ts = dt.timestamp(ts*1000)
            if len(str(ts)) >= 13:
                ts /= 1000
    except:
        print(row, '\nNone having proper ts value')
    return ts

# Extract day from timestamp
def get_day(row):
    ts = int(row['TimeStamp'])
    d = dt.fromtimestamp(ts).strftime('%d')
    return int(d)

# Extract hour from timestamp
def get_hour(row):
    ts = int(row['TimeStamp'])
    h = dt.fromtimestamp(ts).strftime('%H')
    return int(h)

# Extract month from timestamp
def get_month(row):
    ts = int(row['TimeStamp'])
    m = dt.fromtimestamp(ts).strftime('%m')
    return int(m)

```

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[3]: # All relevant data for all alerts will be queried in a single query to
      ↪ minimize api calls
def get_orders_data(analysis_duration=1):
    timeslots = get_s_e(analysis_duration)
    start = timeslots[0]
    end = timeslots[1]
    events = ['Order Success', 'Order Failure', 'Successful Payment']
    where = 'properties["SdkMerchant"] == "niki"'
    columns = ['SubDomain', 'SessionId', 'Amount', 'TimeStamp', 'Timestamp',
    ↪ 'timestamp', 'UserId', 'credits used', 'Language', 'event']
    print('Getting', events, 'data for', start, 'to', end, '\nColumns', columns)
    data = mp.read_events(start=start, end=end, where=where, columns=columns,
    ↪ events=events)
    return data

```

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[15]: # Cleanup Data and fix NaN values
def cleanup(data):
    data.fillna(value={'Amount': 0, 'credits used': 0}, inplace=True)
    data.fillna('NoVal', inplace=True)
    data['TimeStamp'] = data.apply(ts_normaliser, axis=1)
    data.drop(['Timestamp', 'timestamp', 'time'], axis=1, inplace=True)
    data.rename(columns={'credits used': 'CreditsUsed', 'event': 'Event'},
    →inplace=True)
    data['Day'] = data.apply(get_day, axis=1)
    data['Month'] = data.apply(get_month, axis=1)
    data['Hour'] = data.apply(get_hour, axis=1)
    return data

[25]: # Threshold calculation section

## Aggregation is done for each dataset (each alert type) depending on the
→metric and aggregation type specific to that alert:
## returns two observation sets: Dates 0-15 as FirstHalf of month and dates
→16-End as SecondHalf of month
def data_prep(row):
    data = row['Data']
    aggregation = row['Aggregation']
    if aggregation != 'None':
        metric = row['Metric']
        agg_column = row['AggColumn']
        data = data.groupby(['Month', 'Day', 'Hour'])[metric].agg({metric:
→aggregation}).reset_index().rename(columns={metric:agg_column})
        fh = data[data['Day'] <= 15]
        sh = data[data['Day'] > 15]
        return {'FirstHalf': fh, 'SecondHalf': sh}

## Threshold is calculated for each hour for each alert for the FirstHalf and
→SecondHalf of the month:
##
def thresh_calc(periods, alert, agg_column, all_thresholds):
    thresholds = {'Hour': [], 'Period': [], 'Threshold': [], 'Alert': []}
    for period, p_data in periods.items():
        print('Doing', period, 'for', alert)
        sample = p_data
        sample.drop(['Month', 'Day'], axis=1, inplace=True)
        hour_slots = sample.Hour.unique()
        for hour in hour_slots:
            sample_1 = sample[sample['Hour'] == hour]
            sample_1 = sample_1.set_index(['Hour'])
            thresholds['Hour'].append(hour)
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        thresholds['Threshold'].append(sample_1.describe(percentiles=[0.
↪80]))[agg_column]['80%'])
        thresholds['Period'].append(period)
        thresholds['Alert'].append(alert)
    thresholds = pd.DataFrame(thresholds).set_index(['Hour'])
    all_thresholds = all_thresholds.append(thresholds)
    return all_thresholds

```

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[6]: # Main Segment 1 --- Getting all data from MP
data = get_orders_data(analysis_duration=2)

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Getting ['Order Success', 'Order Failure', 'Successful Payment'] data for 2019-09-01 to 2019-11-01  
Columns ['SubDomain', 'SessionId', 'Amount', 'TimeStamp', 'Timestamp', 'timestamp', 'UserId', 'credits used', 'Language', 'event']

```

[20]: data.head()
data1 = cleanup(data)
data1.head()

```

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[20]: SubDomain      SessionId  Amount  TimeStamp \
0  giftcard  c901567276195334    0.00  1567276209
1  giftcard  c901567276195334    0.00  1567276343
2  giftcard  3001567276046212    3.00  1567276221
3  giftcard  3001567276046212    3.00  1567276346
4  postpaid  f1c1567276122307  102.00  1567276216

                                UserId  CreditsUsed  Language \
0  c90f9a32-52d2-4101-8da0-08ee293a5e2f          0.00        en
1  c90f9a32-52d2-4101-8da0-08ee293a5e2f          0.00        en
2  300dde9b-6db5-488b-888b-42aa9fd917e3          0.00        hi
3  300dde9b-6db5-488b-888b-42aa9fd917e3          0.00        hi
4  f1c66d4c-6b05-47fb-b751-914358076223          0.00        hi

                                Event  Day  Hour  Month
0  Successful Payment          1      0      9
1      Order Success          1      0      9
2  Successful Payment          1      0      9
3      Order Success          1      0      9
4  Successful Payment          1      0      9

```

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[21]: # Alert 1 - Over all credit usage
all_credits = data1[data1['Event'] == 'Order Success']
# Alert 2 - Failure Rate in hindi
sp = data1[(data1['Event'] == 'Successful Payment') & (data1['Language'] == '
↪hi')]
of = data1[(data1['Event'] == 'Order Failure') & (data1['Language'] == 'hi')]

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sp = sp.groupby(['Month', 'Day', 'Hour'])['SessionId'].count().
↳reset_index(name='Payments').sort_values(['Month', 'Day', 'Hour'],
↳ascending=[1, 1,1]).reset_index(drop=True)
of = of.groupby(['Month', 'Day', 'Hour'])['SessionId'].count().
↳reset_index(name='Failure').sort_values(['Month', 'Day', 'Hour'],
↳ascending=[1, 1,1]).reset_index(drop=True)
fails = sp.merge(of, left_on=['Month', 'Day', 'Hour'], right_on=['Month',
↳'Day', 'Hour'], how='left')
fails['Failure'].fillna(0, inplace=True)
fails['FailRate'] = fails['Failure']*1.0/fails['Payments']
fails.describe()
# Alert 3 - IVRS Credits refunded
# Alert 4 - HVT Failures
# Alert 5 - Manually marked pending cases
# Alert 6 - Offline TW Txns
tw_txns = data1[(data['Amount'] >= 5000) & (data1['Event'] == 'Order Success')]
tw_txns.head()

alert_set = {'Name': ['OverallCredits', 'FailuresHindi', 'ThinkWalnut'],
            'Data': [all_credits, fails, tw_txns],
            'Metric': ['CreditsUsed', 'FailRate', 'SessionId'],
            'Aggregation': ['sum', 'None', 'count'],
            'AggColumn': ['CreditsUsed', 'FailRate', 'SessionCount']}
alert_set = pd.DataFrame(alert_set)

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[26]: all_thresholds = pd.DataFrame()
for i, row in alert_set.iterrows():
    alert = row['Name']
    periods = data_prep(row)
    agg_column = row['AggColumn']
    all_thresholds = thresh_calc(alert=alert, periods=periods,
↳agg_column=agg_column, all_thresholds=all_thresholds)

all_thresholds.head()

```

Doing FirstHalf for OverallCredits  
 Doing SecondHalf for OverallCredits  
 Doing FirstHalf for FailuresHindi  
 Doing SecondHalf for FailuresHindi  
 Doing FirstHalf for ThinkWalnut  
 Doing SecondHalf for ThinkWalnut

```

[26]:
      Period  Threshold  Alert
Hour
0    FirstHalf    380.00 OverallCredits
1    FirstHalf     40.00 OverallCredits

```

2	FirstHalf	24.00	OverallCredits
3	FirstHalf	0.00	OverallCredits
4	FirstHalf	0.00	OverallCredits

```
[10]: all_thresholds.to_csv('test.csv', header=True)
```

## 1 Evaluation

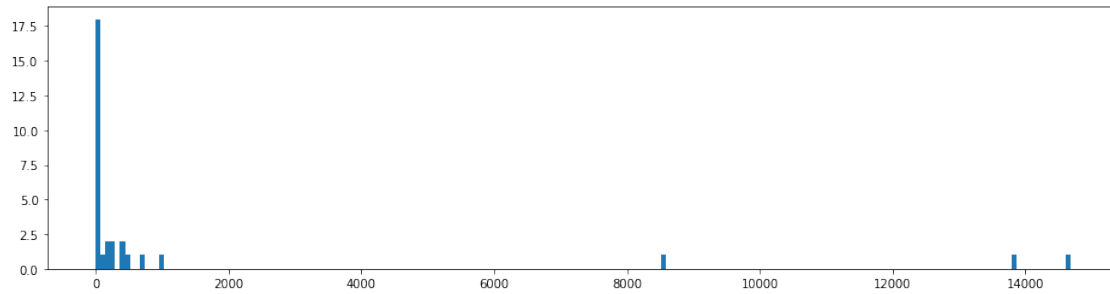
- This section is a statistical exploration of each dataset ## Histogram of aggregation values for each hour slot

```
[27]: for i, row in alert_set.iterrows():
    alert = row['Name']
    periods = data_prep(row)
    metric = row['Metric']
    agg_column = row['AggColumn']
    for period, value in periods.items():
        print('Info for', alert, period)
        sample = value
        sample.drop(['Day'], axis=1, inplace=True)
        hour_slots = sample.Hour.unique()
        for slot in hour_slots:
            figure(figsize=(16,4))
            print('Stats for hour', slot)
            sample_1 = sample[sample['Hour'] == slot]
            sample_1 = sample_1.set_index(['Hour'])
            print(sample_1.describe(percentiles=[0.25, 0.50, 0.75, 0.80]))
            values = sample_1[agg_column].values.tolist()
            plt.hist(values,200)
            plt.show()
```

Info for OverallCredits FirstHalf

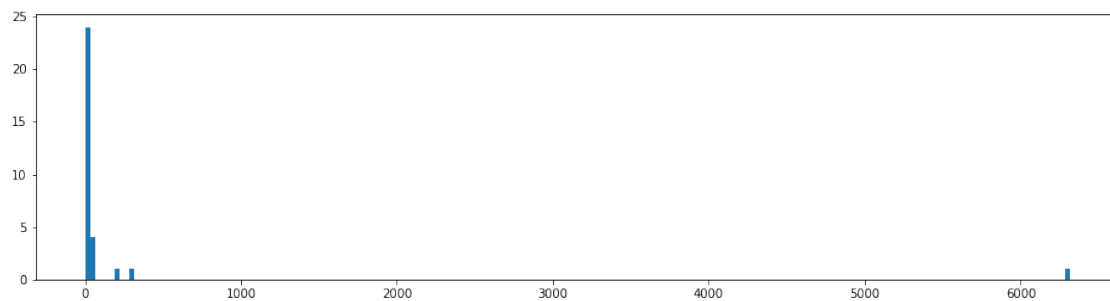
Stats for hour 0

	Month	CreditsUsed
count	31.00	31.00
mean	9.55	1,325.26
std	0.57	3,770.41
min	9.00	0.00
25%	9.00	4.50
50%	10.00	20.00
75%	10.00	316.00
80%	10.00	380.00
max	11.00	14,676.00



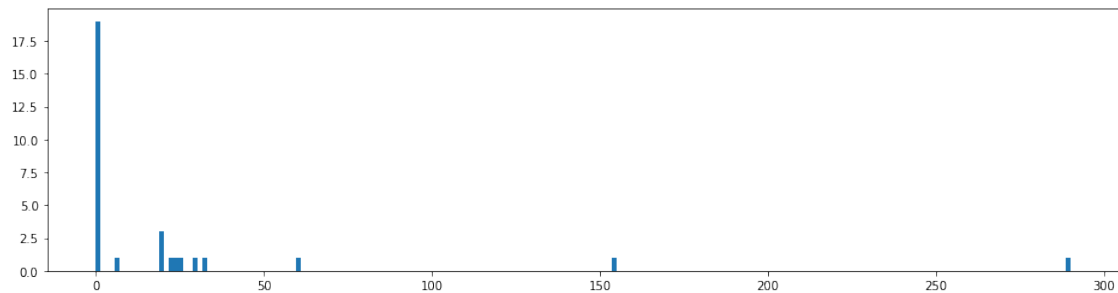
Stats for hour 1

	Month	CreditsUsed
count	31.00	31.00
mean	9.55	227.10
std	0.57	1,132.09
min	9.00	0.00
25%	9.00	0.00
50%	10.00	0.00
75%	10.00	12.00
80%	10.00	40.00
max	11.00	6,318.00



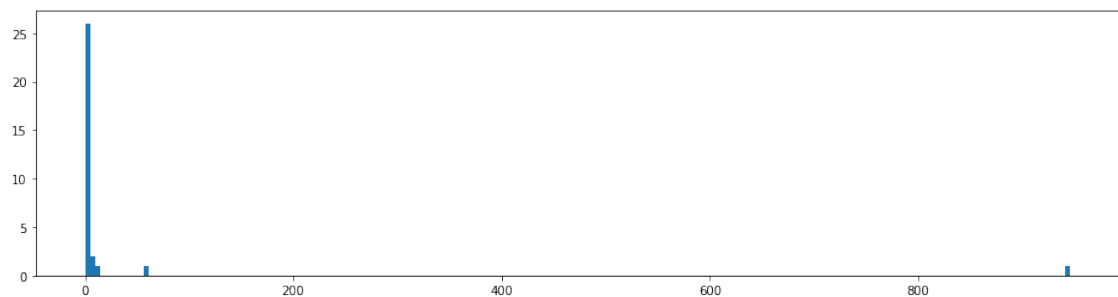
Stats for hour 2

	Month	CreditsUsed
count	31.00	31.00
mean	9.55	22.77
std	0.57	57.89
min	9.00	0.00
25%	9.00	0.00
50%	10.00	0.00
75%	10.00	21.50
80%	10.00	24.00
max	11.00	290.00



Stats for hour 3

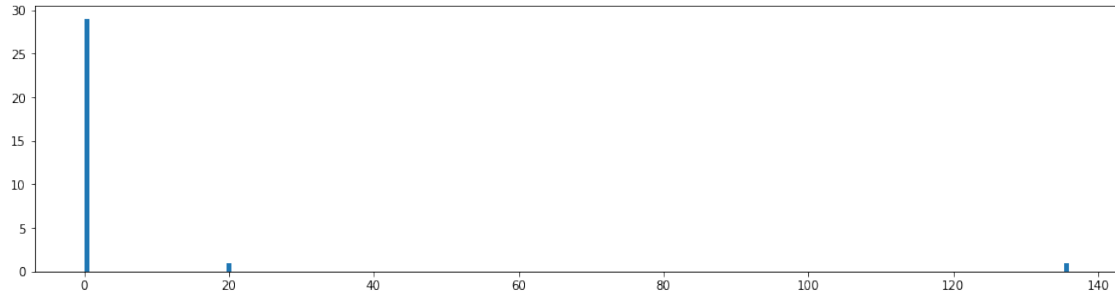
	Month	CreditsUsed
count	31.00	31.00
mean	9.55	33.42
std	0.57	169.73
min	9.00	0.00
25%	9.00	0.00
50%	10.00	0.00
75%	10.00	0.00
80%	10.00	0.00
max	11.00	946.00



Stats for hour 4

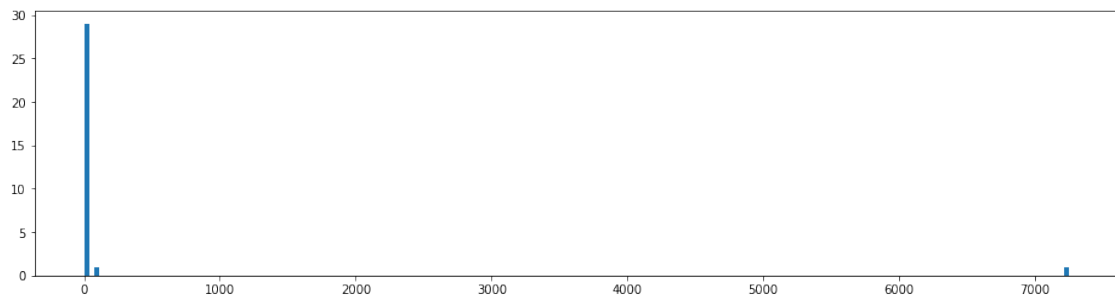
	Month	CreditsUsed
count	31.00	31.00
mean	9.55	5.03
std	0.57	24.57
min	9.00	0.00
25%	9.00	0.00
50%	10.00	0.00
75%	10.00	0.00
80%	10.00	0.00
max	11.00	136.00





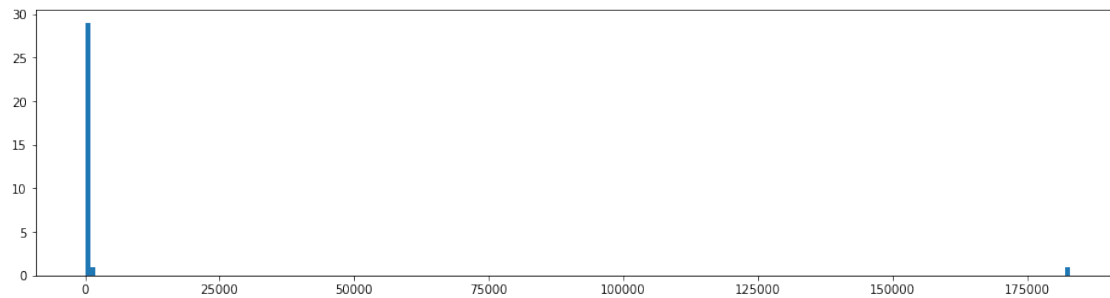
Stats for hour 5

	Month	CreditsUsed
count	31.00	31.00
mean	9.55	238.45
std	0.57	1,301.79
min	9.00	0.00
25%	9.00	0.00
50%	10.00	0.00
75%	10.00	0.00
80%	10.00	0.00
max	11.00	7,252.00



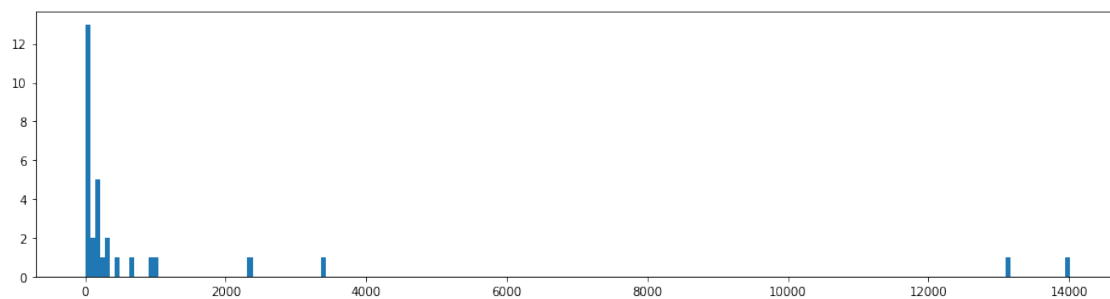
Stats for hour 6

	Month	CreditsUsed
count	31.00	31.00
mean	9.55	5,994.77
std	0.57	32,853.08
min	9.00	0.00
25%	9.00	0.00
50%	10.00	0.00
75%	10.00	74.50
80%	10.00	126.00
max	11.00	183,008.00



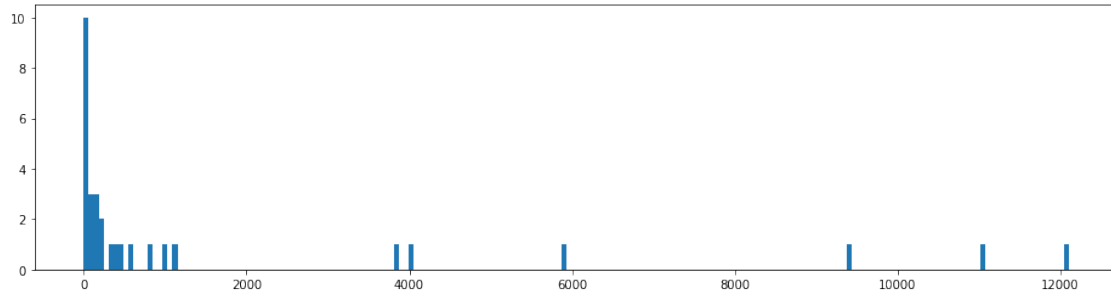
Stats for hour 7

	Month	CreditsUsed
count	31.00	31.00
mean	9.55	1,225.45
std	0.57	3,378.71
min	9.00	0.00
25%	9.00	0.00
50%	10.00	143.00
75%	10.00	393.50
80%	10.00	657.00
max	11.00	14,017.00



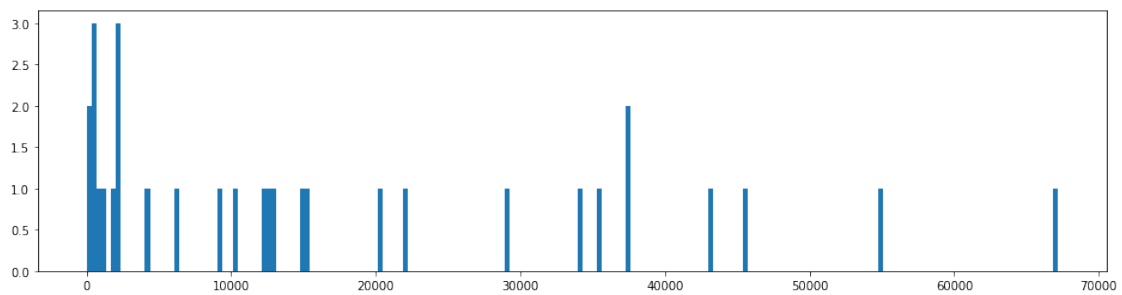
Stats for hour 8

	Month	CreditsUsed
count	31.00	31.00
mean	9.55	1,691.03
std	0.57	3,355.78
min	9.00	0.00
25%	9.00	37.50
50%	10.00	174.00
75%	10.00	922.50
80%	10.00	1,115.00
max	11.00	12,108.00



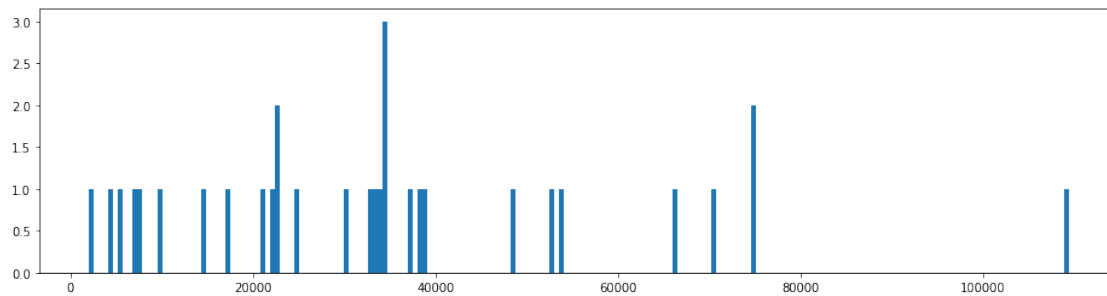
Stats for hour 9

	Month	CreditsUsed
count	31.00	31.00
mean	9.55	17,311.97
std	0.57	18,542.95
min	9.00	15.00
25%	9.00	1,946.50
50%	10.00	12,281.00
75%	10.00	31,548.50
80%	10.00	35,295.00
max	11.00	67,198.00



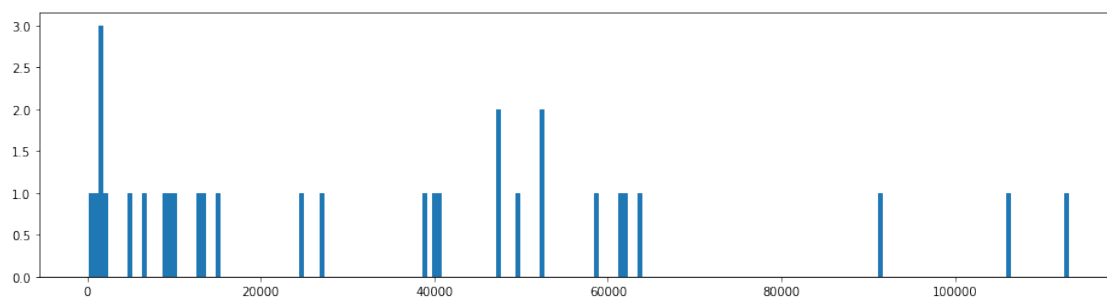
Stats for hour 10

	Month	CreditsUsed
count	31.00	31.00
mean	9.55	34,807.39
std	0.57	24,795.75
min	9.00	1,972.00
25%	9.00	18,968.50
50%	10.00	33,513.00
75%	10.00	43,508.50
80%	10.00	52,535.00
max	11.00	109,440.00



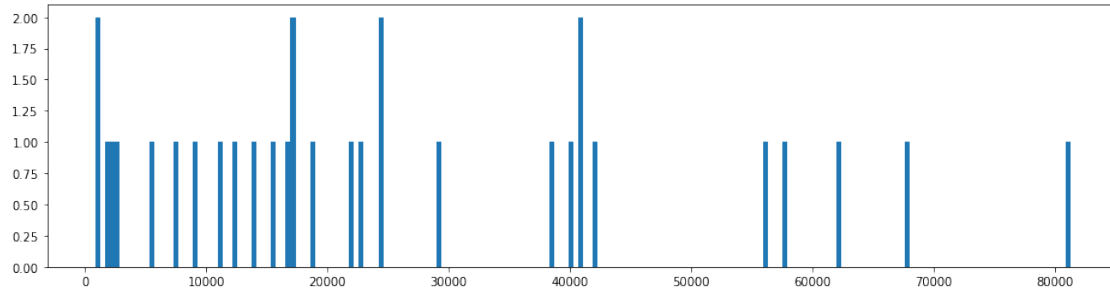
Stats for hour 11

	Month	CreditsUsed
count	31.00	31.00
mean	9.55	34,358.65
std	0.57	31,818.74
min	9.00	149.00
25%	9.00	7,787.50
50%	10.00	27,005.00
75%	10.00	52,440.00
80%	10.00	58,595.00
max	11.00	113,200.00



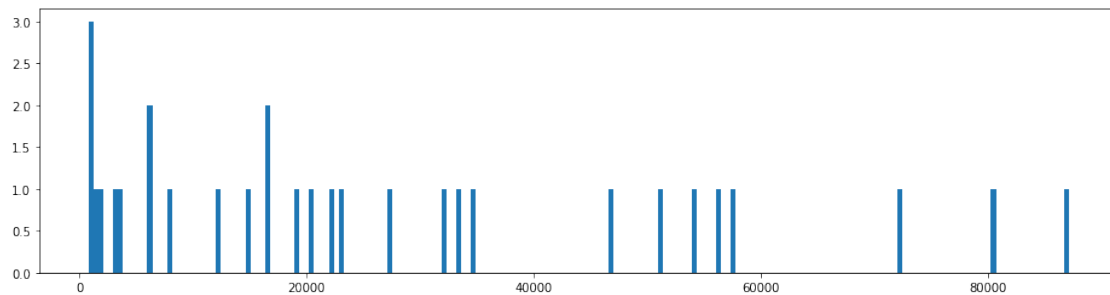
Stats for hour 12

	Month	CreditsUsed
count	31.00	31.00
mean	9.55	25,886.52
std	0.57	21,685.15
min	9.00	860.00
25%	9.00	10,095.00
50%	10.00	18,714.00
75%	10.00	40,339.00
80%	10.00	40,727.00
max	11.00	81,243.00



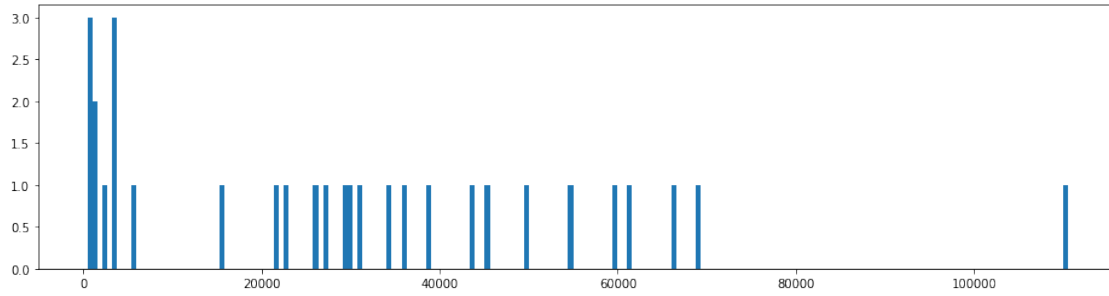
Stats for hour 13

	Month	CreditsUsed
count	30.00	30.00
mean	9.50	27,091.20
std	0.51	25,335.19
min	9.00	808.00
25%	9.00	6,161.75
50%	9.50	19,751.50
75%	10.00	43,831.00
80%	10.00	51,906.80
max	10.00	87,230.00



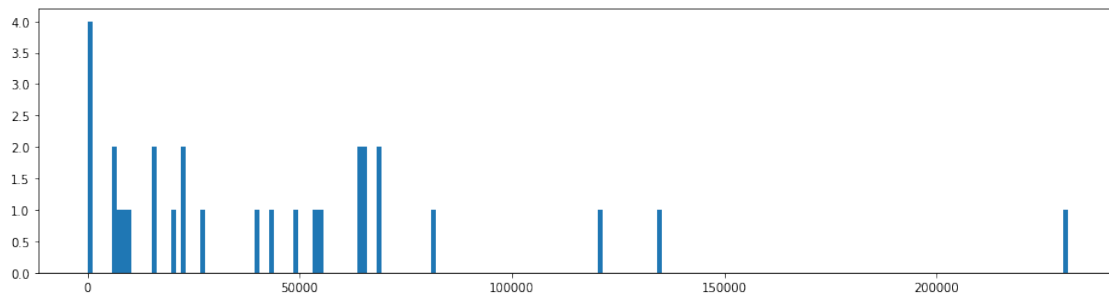
Stats for hour 14

	Month	CreditsUsed
count	30.00	30.00
mean	9.50	29,841.83
std	0.51	26,820.44
min	9.00	466.00
25%	9.00	3,430.25
50%	9.50	28,275.00
75%	10.00	44,877.00
80%	10.00	50,926.40
max	10.00	110,616.00



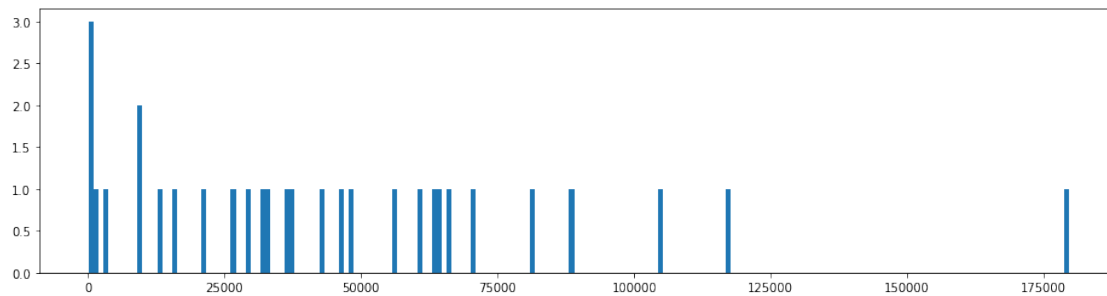
Stats for hour 15

	Month	CreditsUsed
count	30.00	30.00
mean	9.50	45,623.90
std	0.51	49,470.35
min	9.00	49.00
25%	9.00	8,641.25
50%	9.50	33,470.00
75%	10.00	65,013.50
80%	10.00	66,221.60
max	10.00	231,035.00



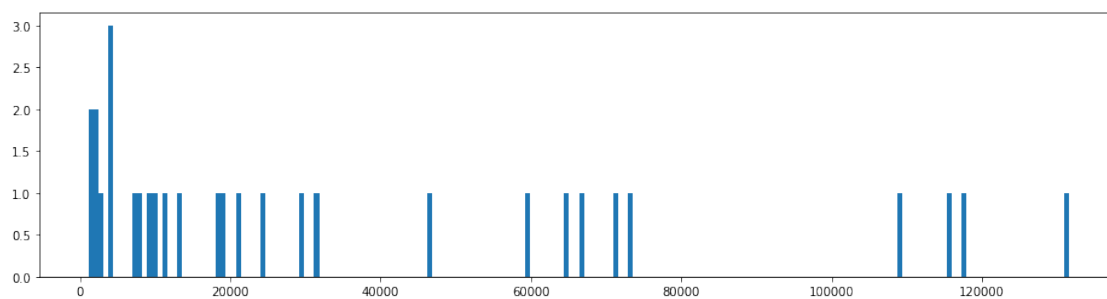
Stats for hour 16

	Month	CreditsUsed
count	30.00	30.00
mean	9.50	45,378.17
std	0.51	40,678.70
min	9.00	97.00
25%	9.00	13,998.00
50%	9.50	36,763.50
75%	10.00	63,976.50
80%	10.00	67,351.80
max	10.00	179,718.00



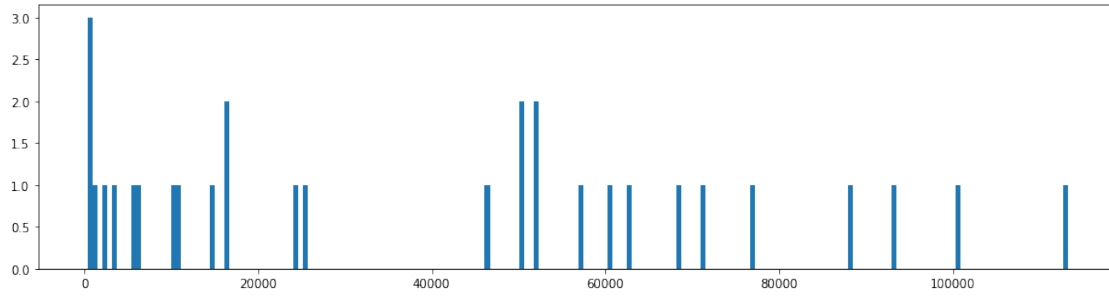
Stats for hour 17

	Month	CreditsUsed
count	30.00	30.00
mean	9.50	36,035.27
std	0.51	40,099.84
min	9.00	1,141.00
25%	9.00	4,904.25
50%	9.50	18,660.00
75%	10.00	63,660.00
80%	10.00	67,660.80
max	10.00	131,636.00



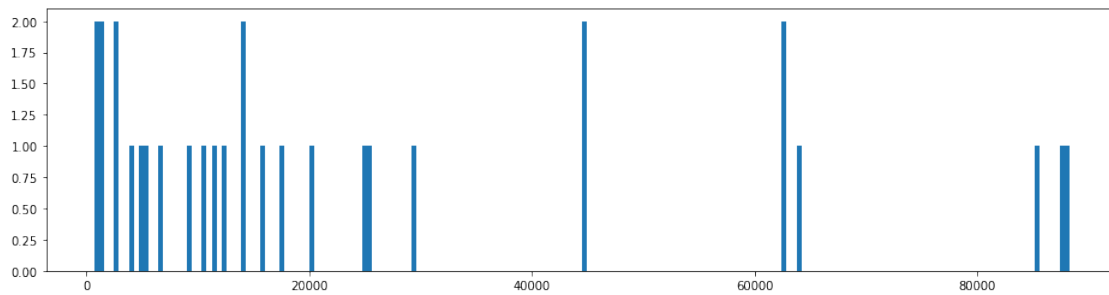
Stats for hour 18

	Month	CreditsUsed
count	30.00	30.00
mean	9.50	39,405.27
std	0.51	34,429.68
min	9.00	359.00
25%	9.00	7,200.25
50%	9.50	35,785.00
75%	10.00	62,420.25
80%	10.00	68,879.00
max	10.00	113,338.00



Stats for hour 19

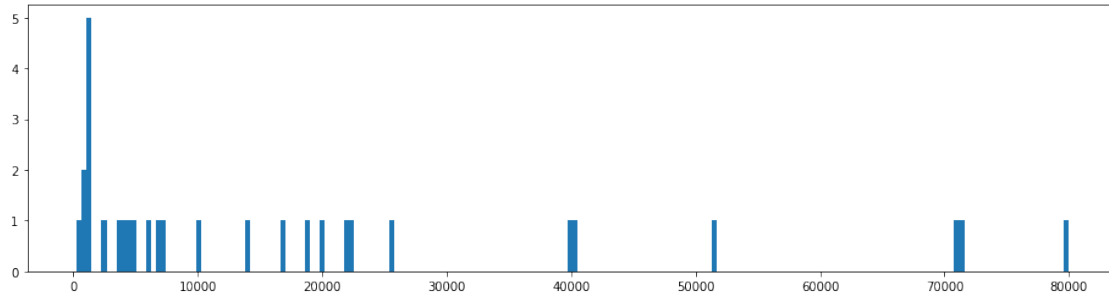
	Month	CreditsUsed
count	30.00	30.00
mean	9.50	25,858.30
std	0.51	28,045.55
min	9.00	740.00
25%	9.00	4,964.25
50%	9.50	13,945.50
75%	10.00	41,014.25
80%	10.00	48,467.20
max	10.00	88,230.00



Stats for hour 20

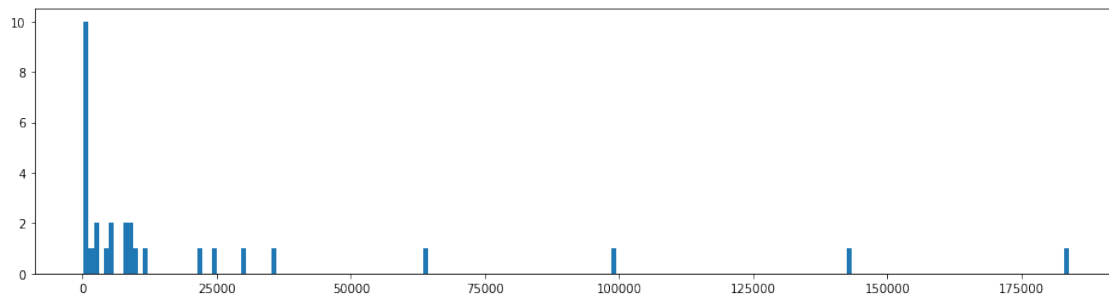
	Month	CreditsUsed
count	30.00	30.00
mean	9.50	18,387.03
std	0.51	23,064.11
min	9.00	285.00
25%	9.00	1,644.00
50%	9.50	7,163.00
75%	10.00	22,263.75
80%	10.00	28,440.00
max	10.00	79,955.00





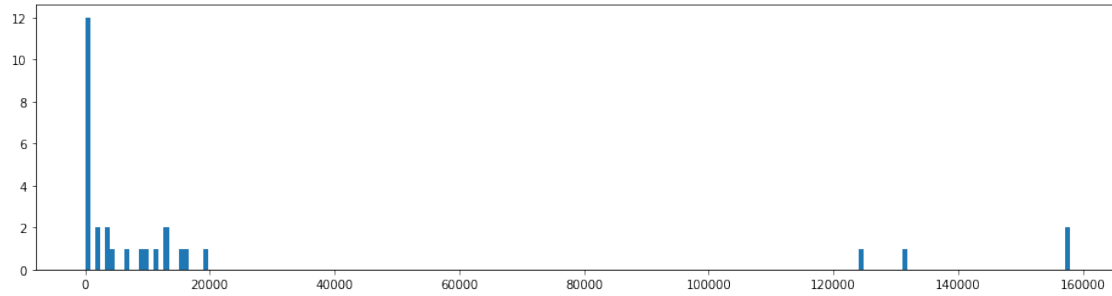
Stats for hour 21

	Month	CreditsUsed
count	30.00	30.00
mean	9.50	22,761.07
std	0.51	44,079.81
min	9.00	207.00
25%	9.00	1,081.00
50%	9.50	4,883.00
75%	10.00	19,199.00
80%	10.00	25,394.80
max	10.00	183,900.00



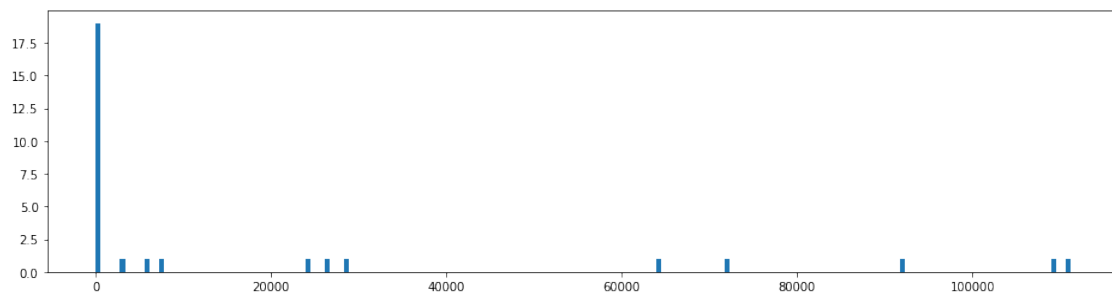
Stats for hour 22

	Month	CreditsUsed
count	30.00	30.00
mean	9.50	23,374.97
std	0.51	48,289.26
min	9.00	0.00
25%	9.00	159.75
50%	9.50	3,458.00
75%	10.00	13,089.00
80%	10.00	15,502.00
max	10.00	157,953.00



Stats for hour 23

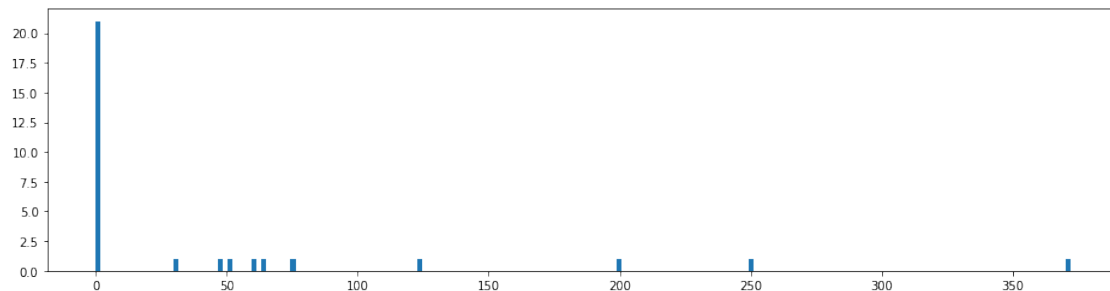
	Month	CreditsUsed
count	30.00	30.00
mean	9.50	18,214.50
std	0.51	34,393.85
min	9.00	0.00
25%	9.00	33.50
50%	9.50	224.50
75%	10.00	19,878.75
80%	10.00	26,963.20
max	10.00	111,177.00



Info for OverallCredits SecondHalf

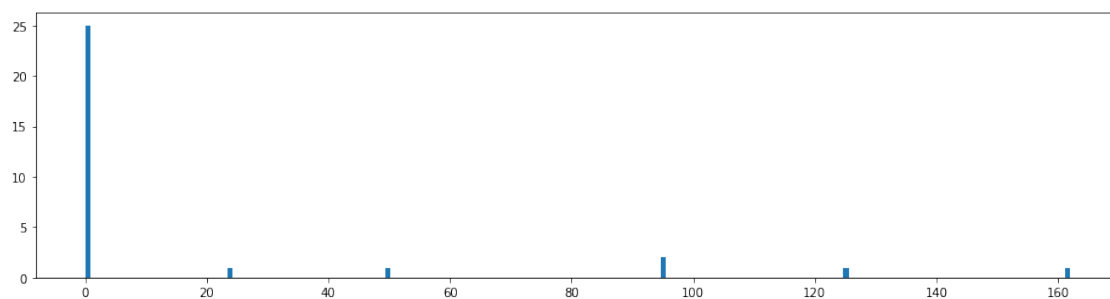
Stats for hour 0

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	41.16
std	0.51	86.24
min	9.00	0.00
25%	9.00	0.00
50%	10.00	0.00
75%	10.00	50.00
80%	10.00	60.00
max	10.00	372.00



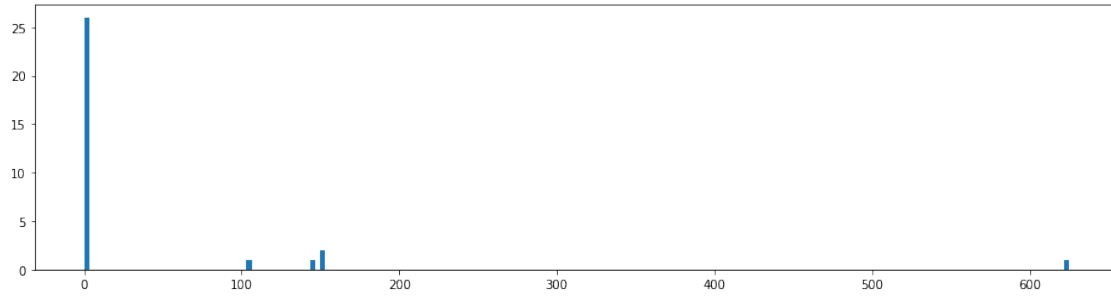
Stats for hour 1

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	17.77
std	0.51	42.11
min	9.00	0.00
25%	9.00	0.00
50%	10.00	0.00
75%	10.00	0.00
80%	10.00	0.00
max	10.00	162.00



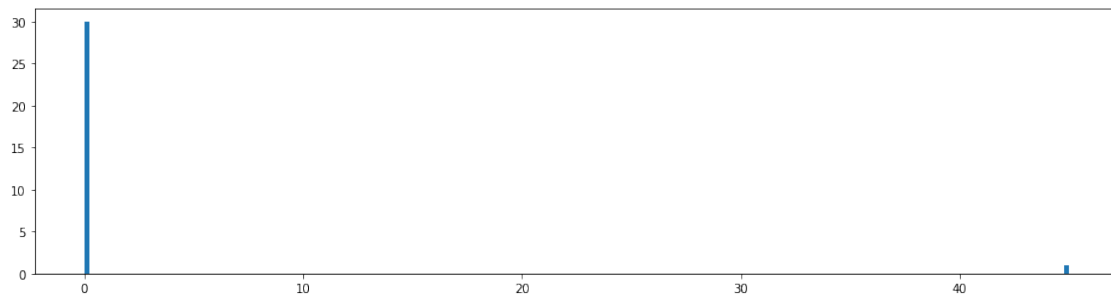
Stats for hour 2

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	37.90
std	0.51	118.76
min	9.00	0.00
25%	9.00	0.00
50%	10.00	0.00
75%	10.00	0.00
80%	10.00	0.00
max	10.00	625.00



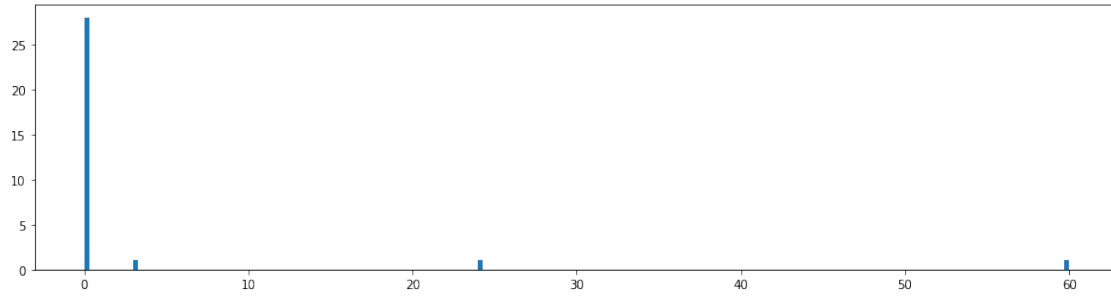
Stats for hour 3

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	1.45
std	0.51	8.08
min	9.00	0.00
25%	9.00	0.00
50%	10.00	0.00
75%	10.00	0.00
80%	10.00	0.00
max	10.00	45.00



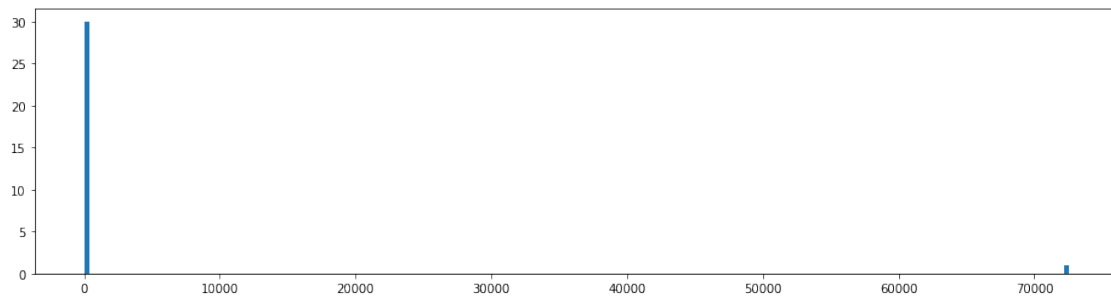
Stats for hour 4

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	2.81
std	0.51	11.46
min	9.00	0.00
25%	9.00	0.00
50%	10.00	0.00
75%	10.00	0.00
80%	10.00	0.00
max	10.00	60.00



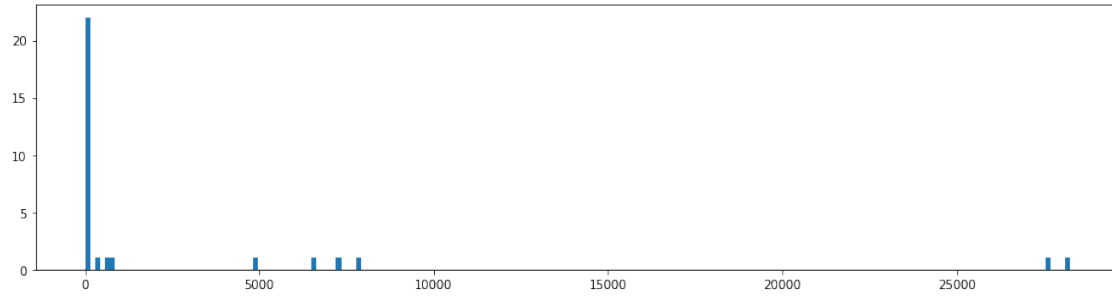
Stats for hour 5

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	2,349.16
std	0.51	13,031.35
min	9.00	0.00
25%	9.00	0.00
50%	10.00	0.00
75%	10.00	0.00
80%	10.00	0.00
max	10.00	72,564.00



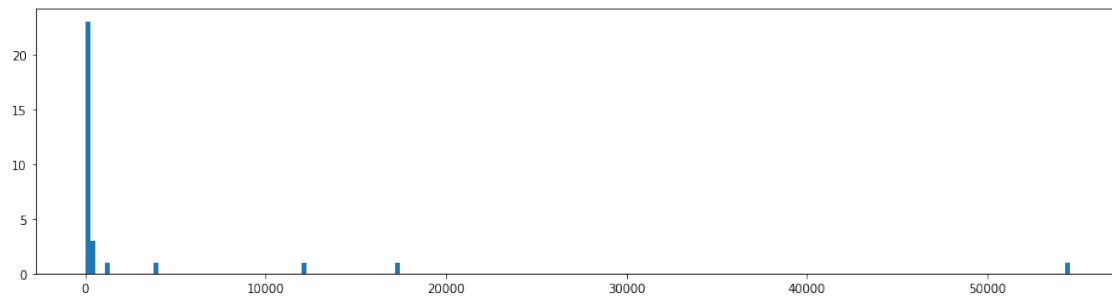
Stats for hour 6

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	2,721.13
std	0.51	7,100.70
min	9.00	0.00
25%	9.00	0.00
50%	10.00	0.00
75%	10.00	511.00
80%	10.00	733.00
max	10.00	28,254.00



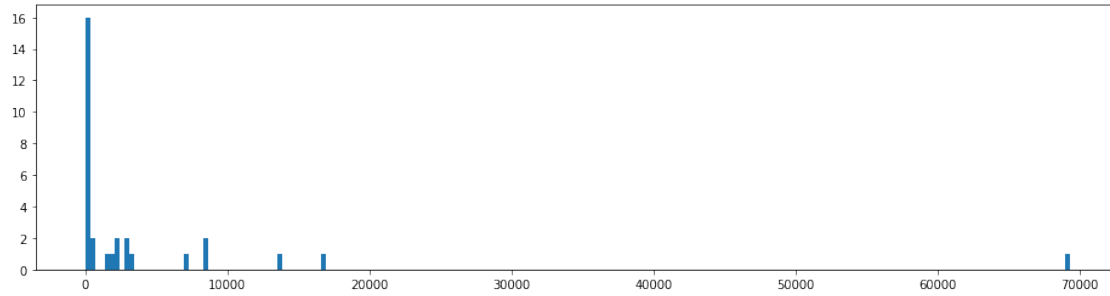
Stats for hour 7

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	2,940.26
std	0.51	10,287.43
min	9.00	0.00
25%	9.00	0.00
50%	10.00	20.00
75%	10.00	281.50
80%	10.00	482.00
max	10.00	54,578.00



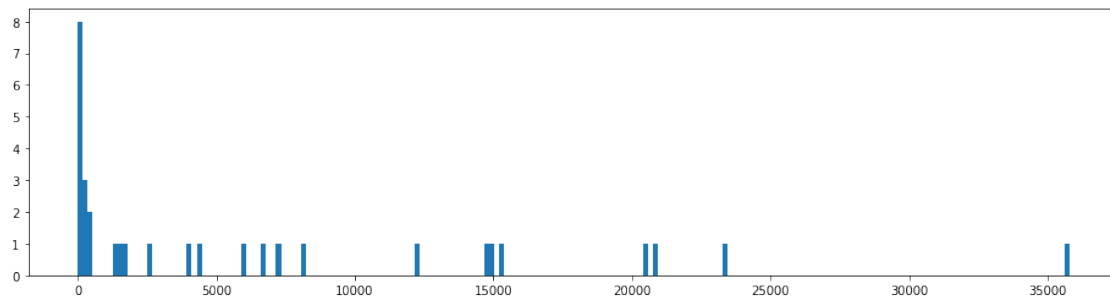
Stats for hour 8

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	4,609.84
std	0.51	12,715.71
min	9.00	0.00
25%	9.00	57.50
50%	10.00	243.00
75%	10.00	2,866.00
80%	10.00	3,395.00
max	10.00	69,339.00



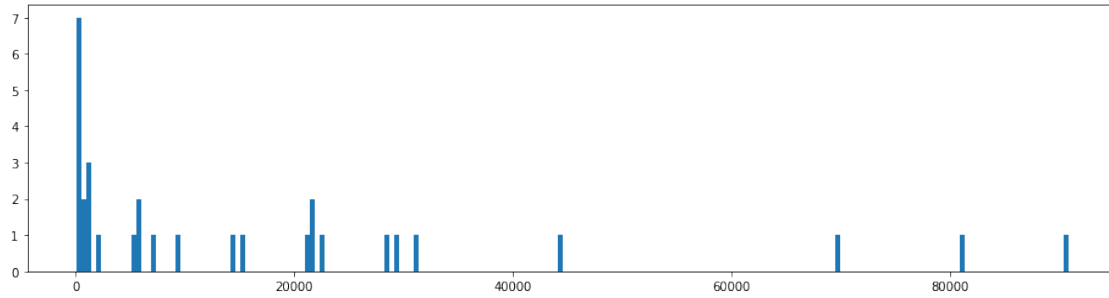
Stats for hour 9

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	6,558.87
std	0.51	8,977.30
min	9.00	0.00
25%	9.00	179.00
50%	10.00	1,729.00
75%	10.00	10,245.50
80%	10.00	14,727.00
max	10.00	35,778.00



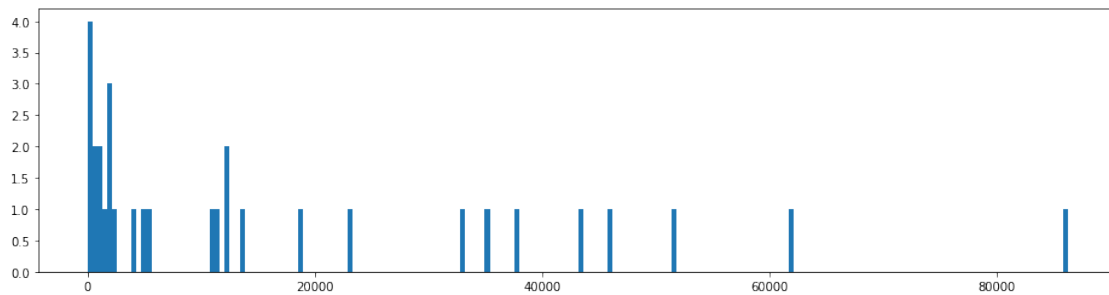
Stats for hour 10

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	17,242.19
std	0.51	24,257.42
min	9.00	75.00
25%	9.00	752.50
50%	10.00	5,953.00
75%	10.00	22,143.50
80%	10.00	28,241.00
max	10.00	90,874.00



Stats for hour 11

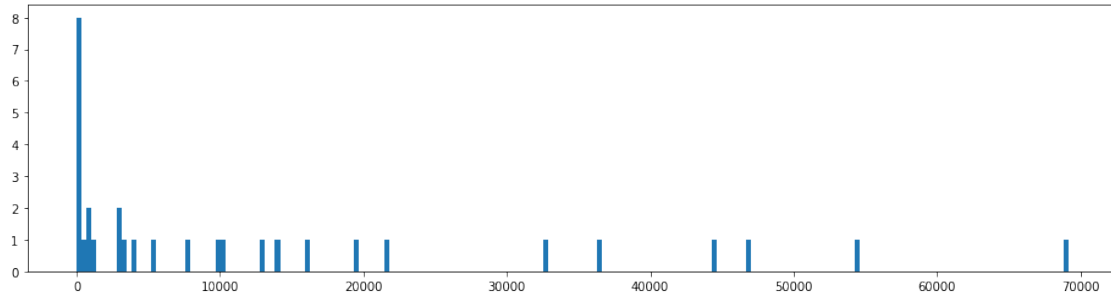
	Month	CreditsUsed
count	31.00	31.00
mean	9.52	16,966.45
std	0.51	21,952.83
min	9.00	10.00
25%	9.00	1,272.50
50%	10.00	5,542.00
75%	10.00	28,001.00
80%	10.00	35,001.00
max	10.00	86,304.00



Stats for hour 12

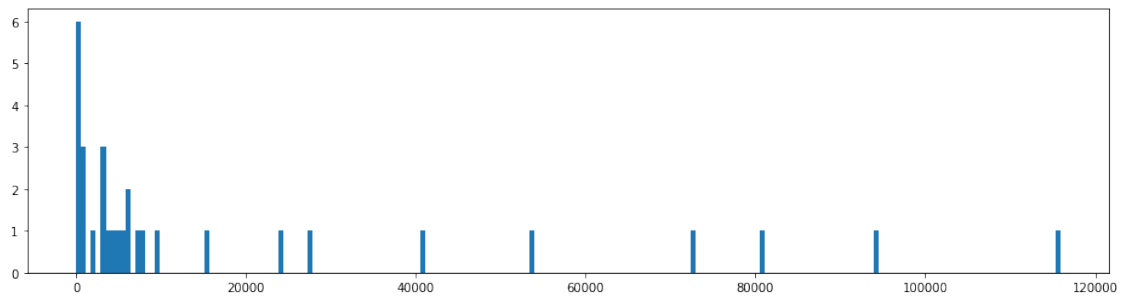
	Month	CreditsUsed
count	31.00	31.00
mean	9.52	13,489.94
std	0.51	18,673.26
min	9.00	0.00
25%	9.00	304.00
50%	10.00	3,904.00
75%	10.00	17,835.50
80%	10.00	21,555.00
max	10.00	69,169.00





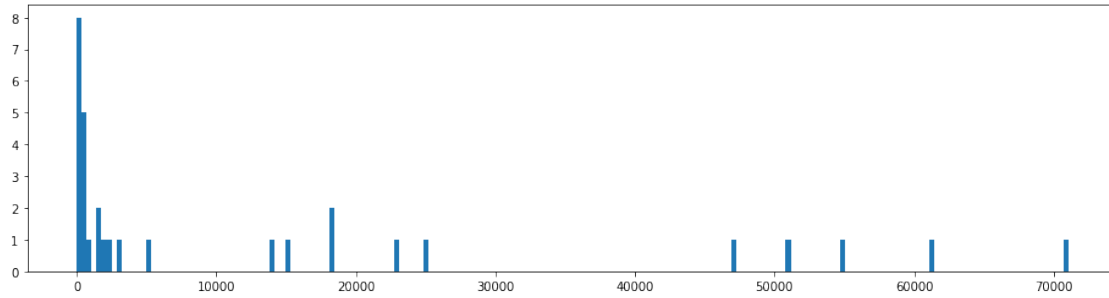
Stats for hour 13

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	19,223.29
std	0.51	31,254.60
min	9.00	9.00
25%	9.00	907.00
50%	10.00	5,159.00
75%	10.00	19,746.50
80%	10.00	27,787.00
max	10.00	115,895.00



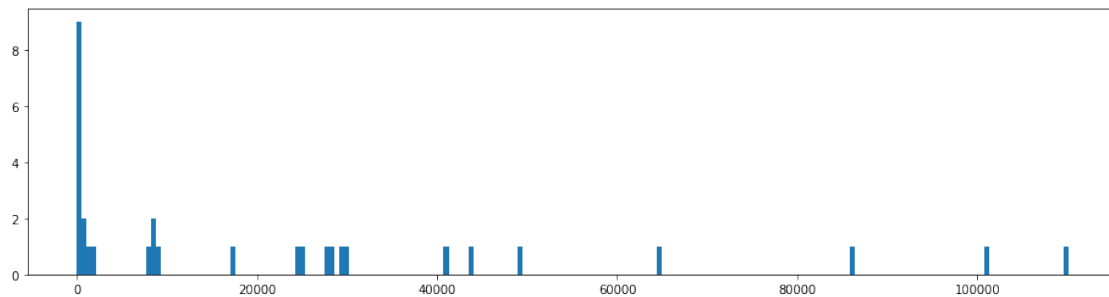
Stats for hour 14

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	13,510.52
std	0.51	21,017.71
min	9.00	0.00
25%	9.00	332.50
50%	10.00	1,602.00
75%	10.00	18,299.00
80%	10.00	22,962.00
max	10.00	71,050.00



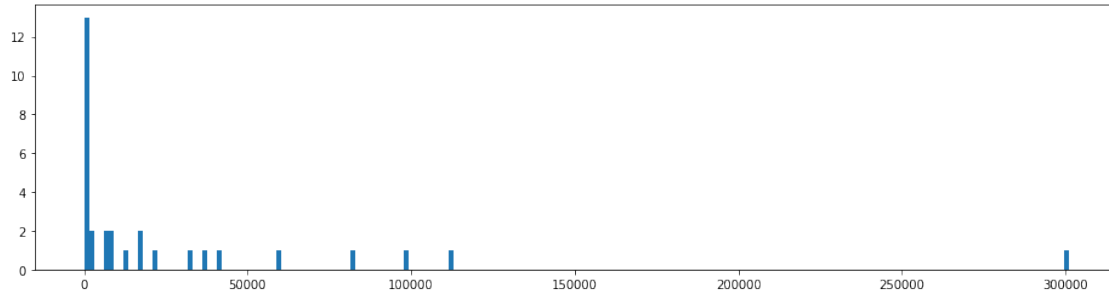
Stats for hour 15

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	23,159.16
std	0.51	30,816.16
min	9.00	0.00
25%	9.00	421.50
50%	10.00	8,339.00
75%	10.00	29,846.00
80%	10.00	41,174.00
max	10.00	110,093.00



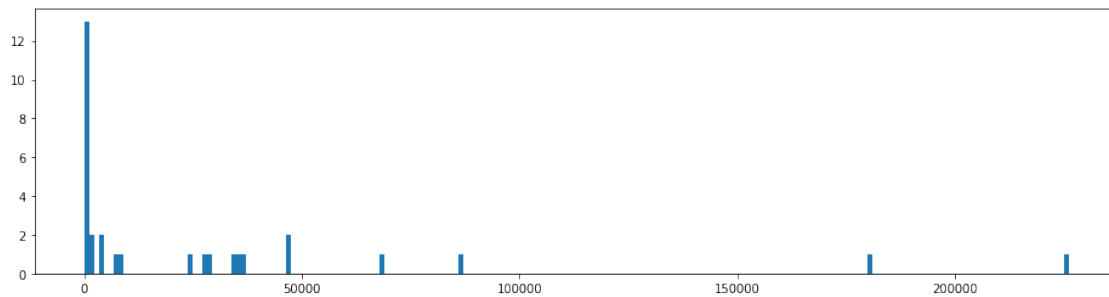
Stats for hour 16

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	28,202.45
std	0.51	58,971.36
min	9.00	0.00
25%	9.00	405.00
50%	10.00	6,800.00
75%	10.00	27,111.00
80%	10.00	36,647.00
max	10.00	301,082.00



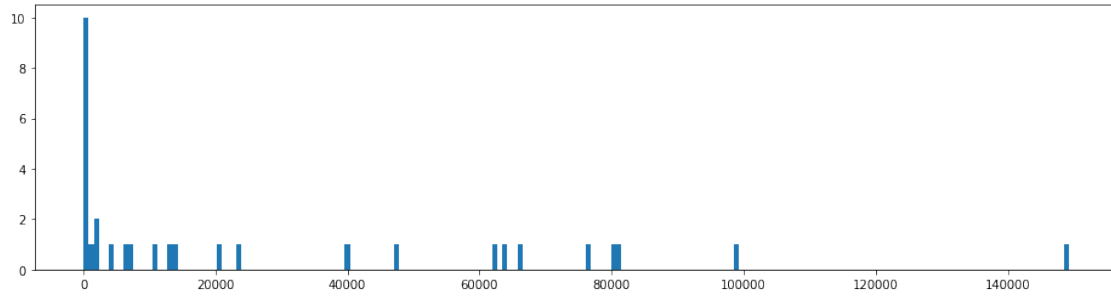
Stats for hour 17

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	28,233.81
std	0.51	52,175.37
min	9.00	0.00
25%	9.00	461.50
50%	10.00	3,827.00
75%	10.00	35,179.00
80%	10.00	36,861.00
max	10.00	226,119.00



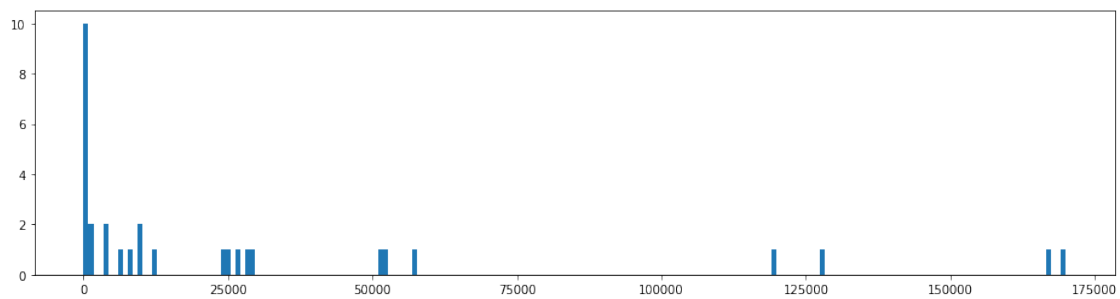
Stats for hour 18

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	28,153.42
std	0.51	38,379.10
min	9.00	55.00
25%	9.00	422.00
50%	10.00	7,107.00
75%	10.00	55,063.00
80%	10.00	63,858.00
max	10.00	149,292.00



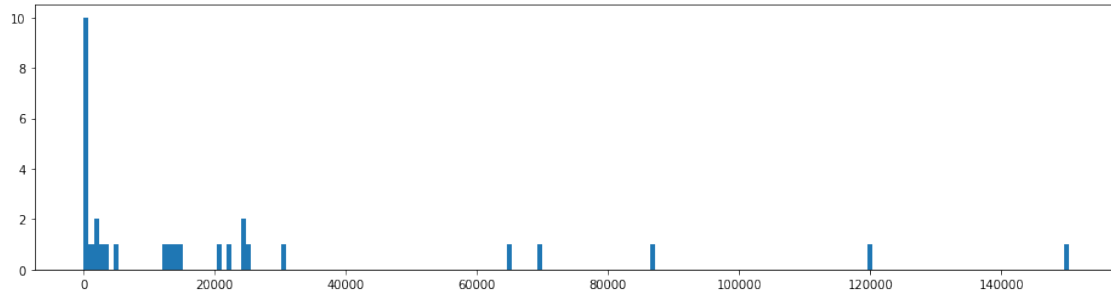
Stats for hour 19

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	30,332.77
std	0.51	48,928.26
min	9.00	0.00
25%	9.00	488.00
50%	10.00	8,408.00
75%	10.00	29,155.50
80%	10.00	51,595.00
max	10.00	169,948.00



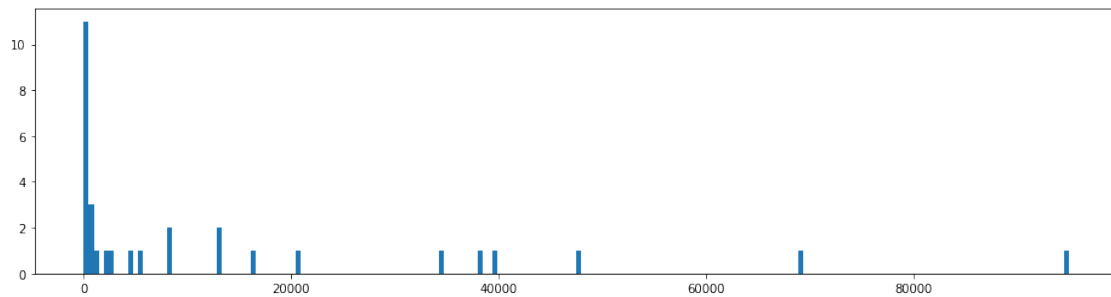
Stats for hour 20

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	22,931.55
std	0.51	37,328.13
min	9.00	16.00
25%	9.00	410.50
50%	10.00	5,005.00
75%	10.00	24,370.00
80%	10.00	25,380.00
max	10.00	150,289.00



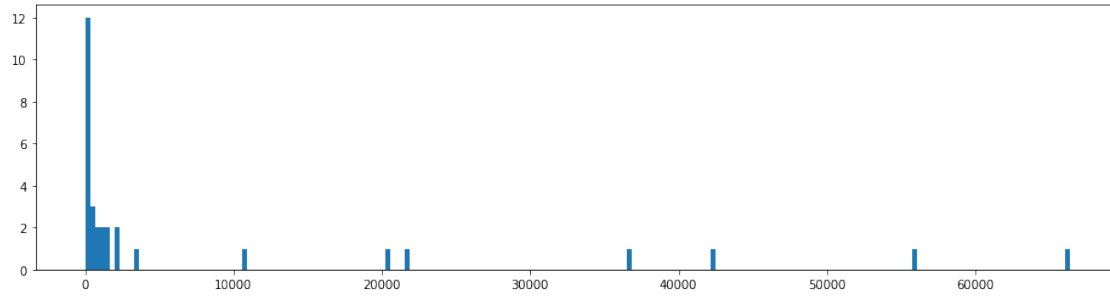
Stats for hour 21

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	13,700.39
std	0.51	22,904.94
min	9.00	0.00
25%	9.00	229.50
50%	10.00	2,214.00
75%	10.00	14,719.50
80%	10.00	20,685.00
max	10.00	95,049.00



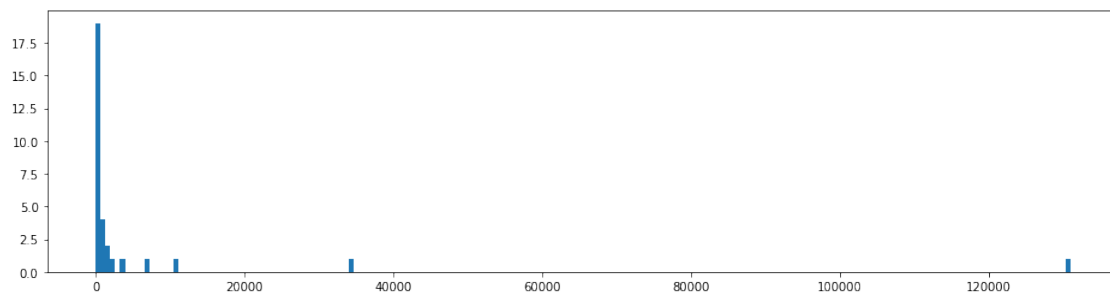
Stats for hour 22

	Month	CreditsUsed
count	31.00	31.00
mean	9.52	8,770.55
std	0.51	17,624.57
min	9.00	0.00
25%	9.00	128.00
50%	10.00	705.00
75%	10.00	2,954.50
80%	10.00	10,881.00
max	10.00	66,381.00



Stats for hour 23

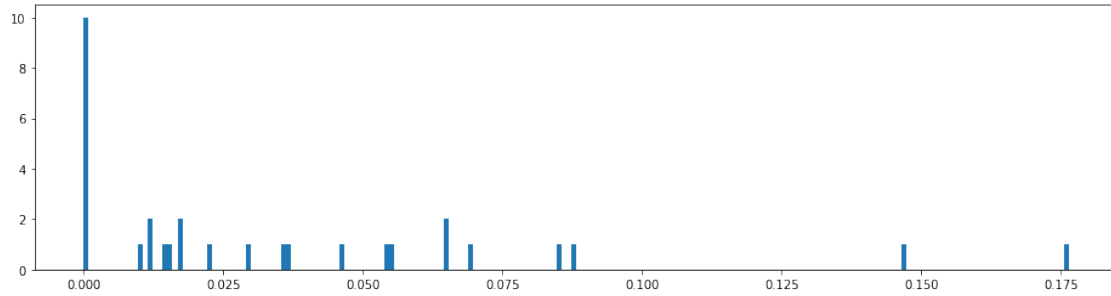
	Month	CreditsUsed
count	31.00	31.00
mean	9.52	6,368.87
std	0.51	23,966.79
min	9.00	0.00
25%	9.00	0.00
50%	10.00	260.00
75%	10.00	1,230.50
80%	10.00	1,657.00
max	10.00	130,914.00



Info for FailuresHindi FirstHalf

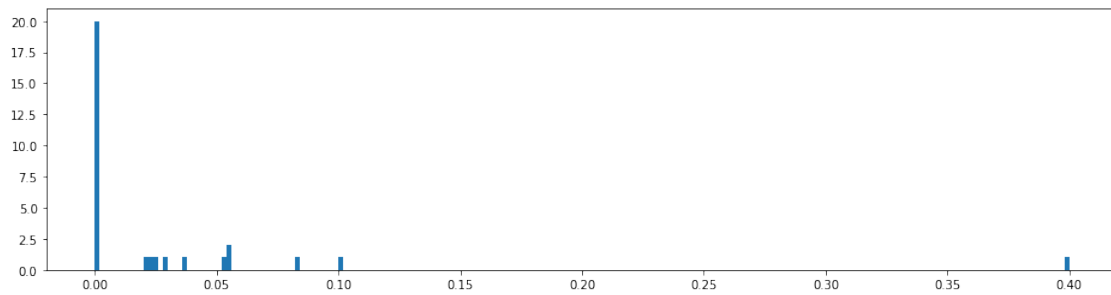
Stats for hour 0

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.55	63.55	1.94	0.03
std	0.57	37.30	2.24	0.04
min	9.00	19.00	0.00	0.00
25%	9.00	36.00	0.00	0.00
50%	10.00	58.00	1.00	0.02
75%	10.00	77.50	3.00	0.06
80%	10.00	81.00	4.00	0.06
max	11.00	194.00	9.00	0.18



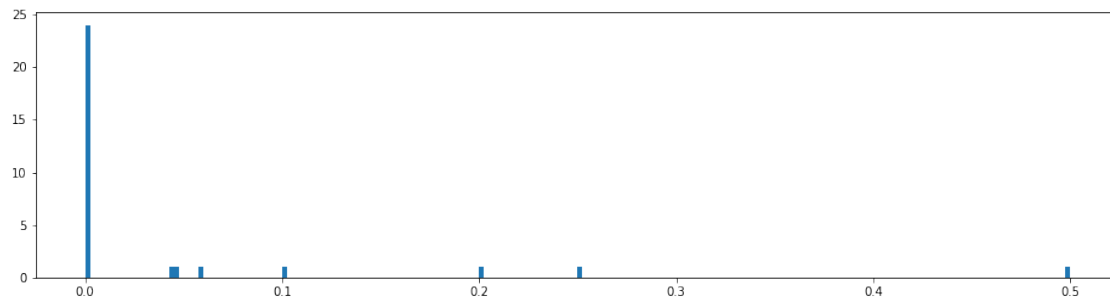
Stats for hour 1

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.55	35.29	0.65	0.03
std	0.57	27.08	1.25	0.07
min	9.00	10.00	0.00	0.00
25%	9.00	20.00	0.00	0.00
50%	10.00	27.00	0.00	0.00
75%	10.00	38.00	1.00	0.03
80%	10.00	45.00	1.00	0.04
max	11.00	138.00	6.00	0.40



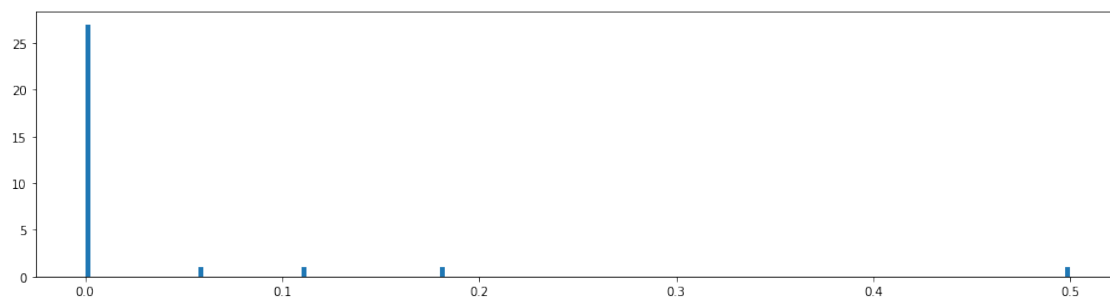
Stats for hour 2

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.55	18.55	0.23	0.04
std	0.57	21.39	0.43	0.10
min	9.00	2.00	0.00	0.00
25%	9.00	6.50	0.00	0.00
50%	10.00	13.00	0.00	0.00
75%	10.00	20.00	0.00	0.00
80%	10.00	22.00	1.00	0.04
max	11.00	100.00	1.00	0.50



Stats for hour 3

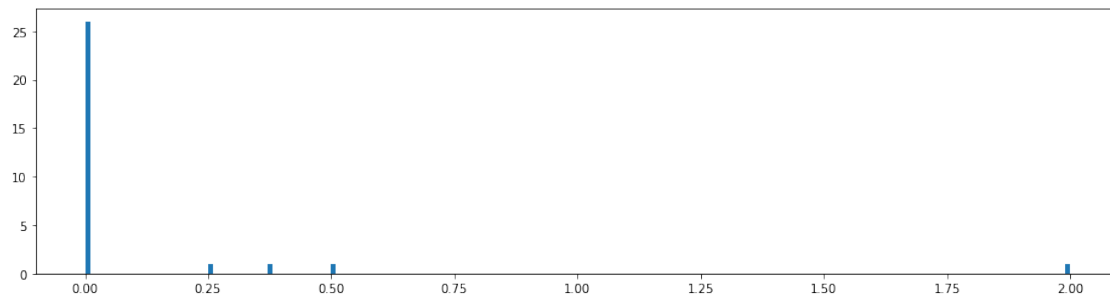
	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.55	9.06	0.16	0.03
std	0.57	7.36	0.45	0.10
min	9.00	1.00	0.00	0.00
25%	9.00	3.50	0.00	0.00
50%	10.00	8.00	0.00	0.00
75%	10.00	11.00	0.00	0.00
80%	10.00	12.00	0.00	0.00
max	11.00	33.00	2.00	0.50



Stats for hour 4

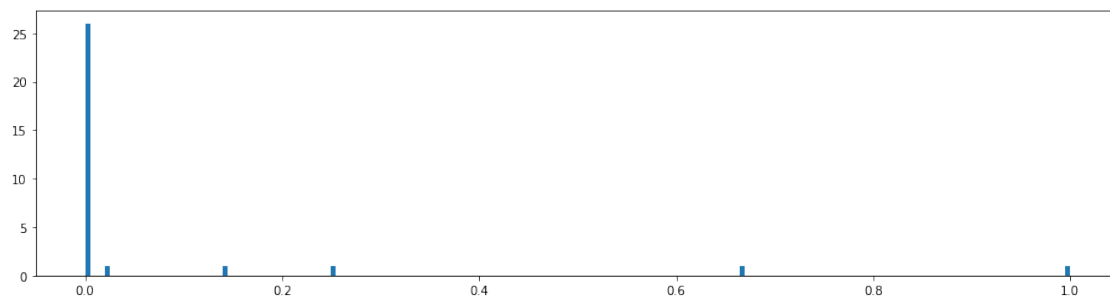
	Month	Payments	Failure	FailRate
count	30.00	30.00	30.00	30.00
mean	9.53	4.93	0.53	0.10
std	0.57	3.53	1.91	0.38
min	9.00	1.00	0.00	0.00
25%	9.00	2.00	0.00	0.00
50%	9.50	4.50	0.00	0.00
75%	10.00	6.00	0.00	0.00
80%	10.00	8.00	0.00	0.00
max	11.00	13.00	10.00	2.00





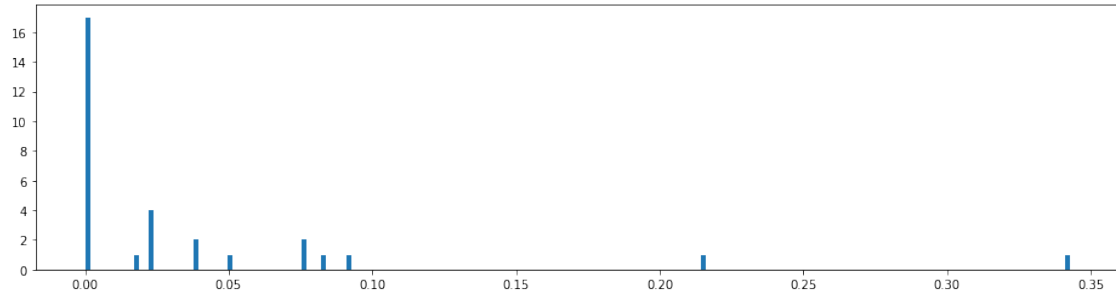
Stats for hour 5

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.55	13.84	0.35	0.07
std	0.57	11.97	1.02	0.22
min	9.00	2.00	0.00	0.00
25%	9.00	6.00	0.00	0.00
50%	10.00	8.00	0.00	0.00
75%	10.00	20.00	0.00	0.00
80%	10.00	22.00	0.00	0.00
max	11.00	44.00	5.00	1.00



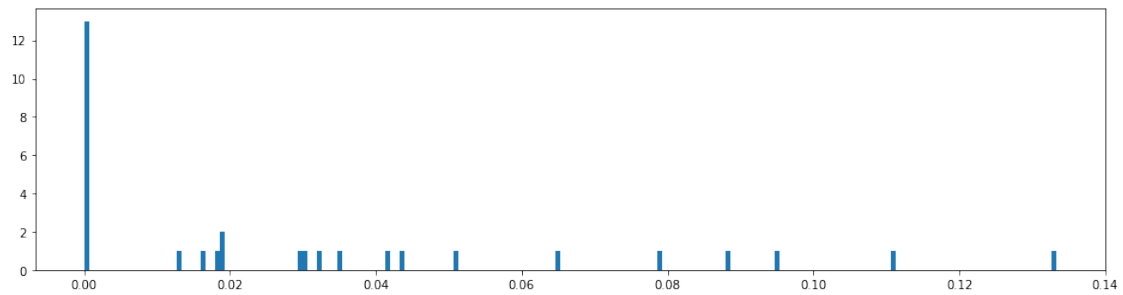
Stats for hour 6

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.55	35.26	1.03	0.04
std	0.57	22.45	2.21	0.07
min	9.00	10.00	0.00	0.00
25%	9.00	23.00	0.00	0.00
50%	10.00	28.00	0.00	0.00
75%	10.00	42.50	1.00	0.04
80%	10.00	44.00	2.00	0.05
max	11.00	114.00	12.00	0.34



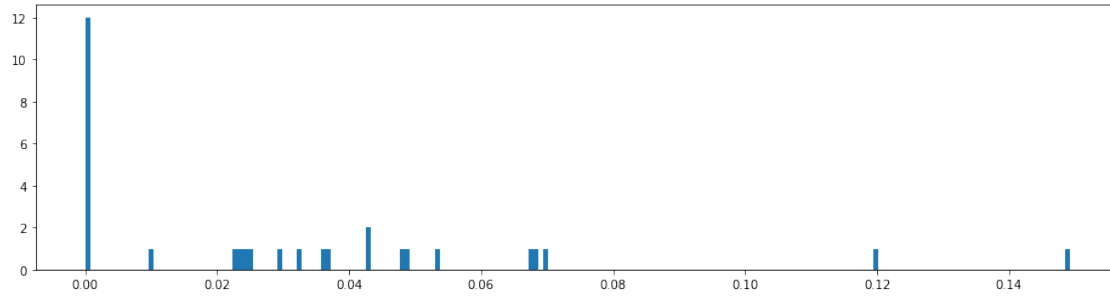
Stats for hour 7

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.55	66.03	1.68	0.03
std	0.57	35.53	2.01	0.04
min	9.00	33.00	0.00	0.00
25%	9.00	46.00	0.00	0.00
50%	10.00	56.00	1.00	0.02
75%	10.00	70.00	3.00	0.04
80%	10.00	76.00	3.00	0.05
max	11.00	215.00	6.00	0.13



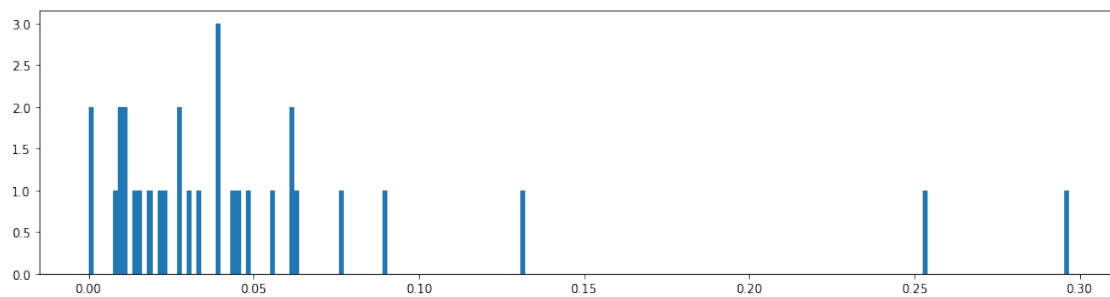
Stats for hour 8

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.55	89.71	2.74	0.03
std	0.57	50.14	3.50	0.04
min	9.00	34.00	0.00	0.00
25%	9.00	62.00	0.00	0.00
50%	10.00	84.00	2.00	0.02
75%	10.00	99.00	3.50	0.05
80%	10.00	102.00	5.00	0.05
max	11.00	296.00	12.00	0.15



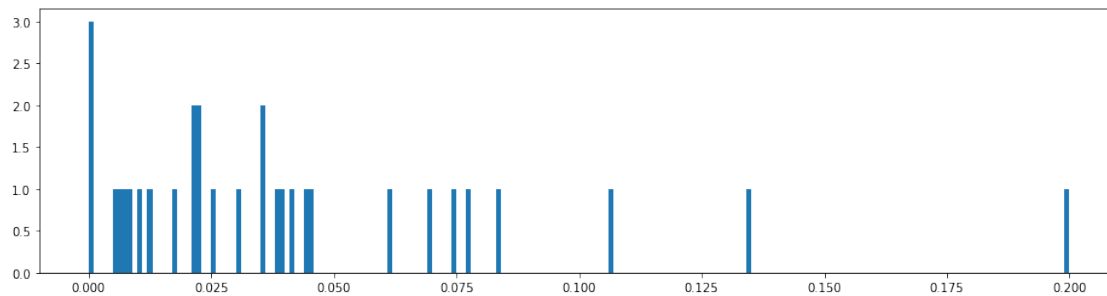
Stats for hour 9

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.55	123.87	6.58	0.05
std	0.57	42.01	9.18	0.07
min	9.00	56.00	0.00	0.00
25%	9.00	95.00	1.50	0.01
50%	10.00	125.00	4.00	0.03
75%	10.00	145.50	7.00	0.06
80%	10.00	154.00	9.00	0.06
max	11.00	254.00	49.00	0.30



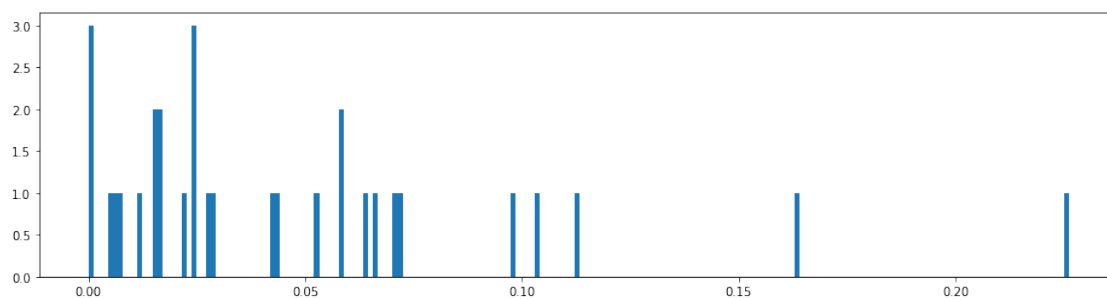
Stats for hour 10

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.55	154.81	6.48	0.04
std	0.57	46.67	6.42	0.04
min	9.00	68.00	0.00	0.00
25%	9.00	130.00	2.00	0.01
50%	10.00	154.00	4.00	0.03
75%	10.00	184.00	9.00	0.05
80%	10.00	189.00	9.00	0.07
max	11.00	259.00	26.00	0.20



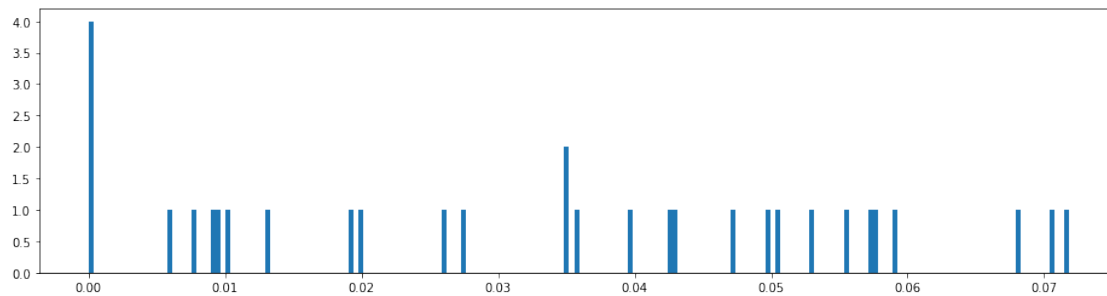
Stats for hour 11

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.55	176.65	8.84	0.05
std	0.57	69.92	12.02	0.05
min	9.00	84.00	0.00	0.00
25%	9.00	125.00	2.50	0.02
50%	10.00	162.00	4.00	0.03
75%	10.00	215.50	11.50	0.07
80%	10.00	233.00	13.00	0.07
max	11.00	380.00	62.00	0.23



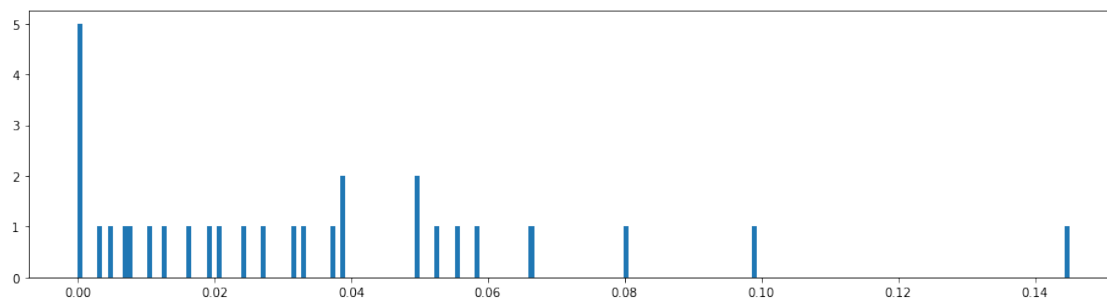
Stats for hour 12

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.55	176.35	5.97	0.03
std	0.57	79.59	5.09	0.02
min	9.00	70.00	0.00	0.00
25%	9.00	129.00	2.00	0.01
50%	10.00	170.00	5.00	0.04
75%	10.00	201.50	9.00	0.05
80%	10.00	212.00	9.00	0.06
max	11.00	502.00	18.00	0.07



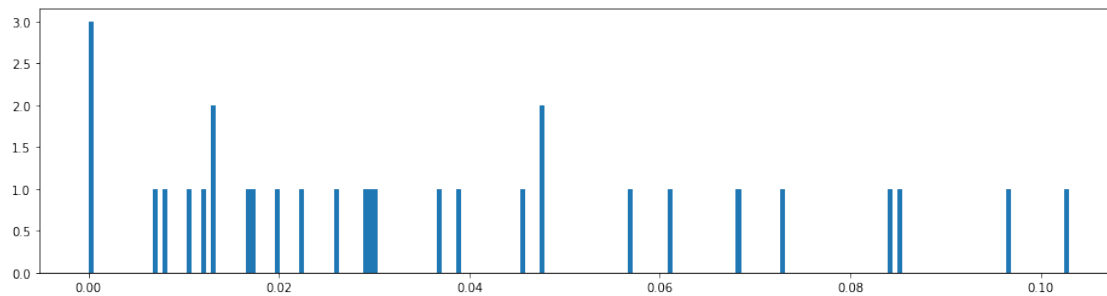
Stats for hour 13

	Month	Payments	Failure	FailRate
count	30.00	30.00	30.00	30.00
mean	9.50	174.00	5.60	0.03
std	0.51	65.54	5.82	0.03
min	9.00	60.00	0.00	0.00
25%	9.00	136.00	1.25	0.01
50%	9.50	162.00	4.00	0.03
75%	10.00	199.75	8.75	0.05
80%	10.00	212.00	9.00	0.05
max	10.00	342.00	21.00	0.15



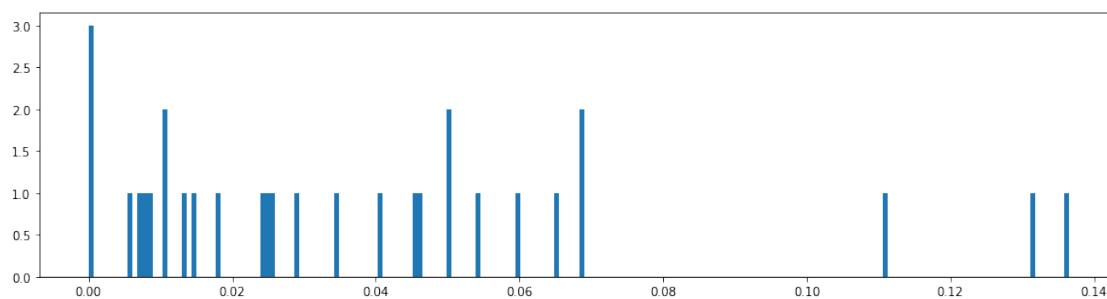
Stats for hour 14

	Month	Payments	Failure	FailRate
count	30.00	30.00	30.00	30.00
mean	9.50	172.70	6.17	0.04
std	0.51	58.79	4.94	0.03
min	9.00	62.00	0.00	0.00
25%	9.00	136.25	2.25	0.01
50%	9.50	170.50	5.00	0.03
75%	10.00	211.00	10.00	0.05
80%	10.00	215.20	10.40	0.06
max	10.00	328.00	18.00	0.10



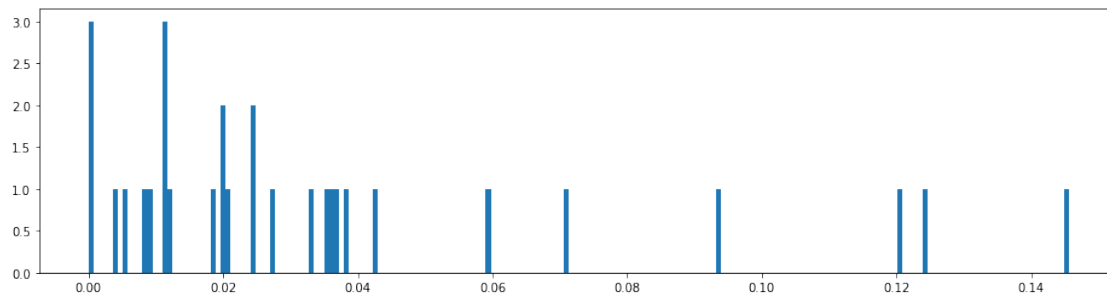
Stats for hour 15

	Month	Payments	Failure	FailRate
count	30.00	30.00	30.00	30.00
mean	9.50	175.40	6.47	0.04
std	0.51	58.10	6.15	0.04
min	9.00	76.00	0.00	0.00
25%	9.00	135.50	1.25	0.01
50%	9.50	178.00	7.00	0.03
75%	10.00	210.25	9.00	0.05
80%	10.00	220.20	10.00	0.06
max	10.00	287.00	28.00	0.14



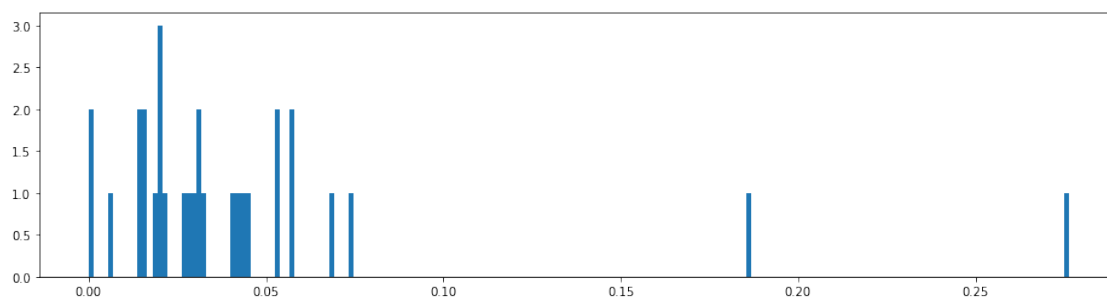
Stats for hour 16

	Month	Payments	Failure	FailRate
count	30.00	30.00	30.00	30.00
mean	9.50	195.70	6.47	0.04
std	0.51	67.26	7.06	0.04
min	9.00	74.00	0.00	0.00
25%	9.00	157.25	2.25	0.01
50%	9.50	197.50	4.00	0.02
75%	10.00	231.50	8.75	0.04
80%	10.00	240.40	9.20	0.05
max	10.00	357.00	29.00	0.15



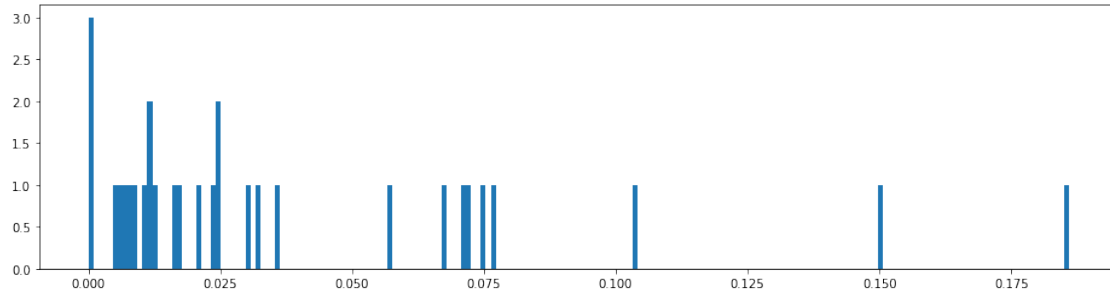
Stats for hour 17

	Month	Payments	Failure	FailRate
count	30.00	30.00	30.00	30.00
mean	9.50	204.87	8.93	0.04
std	0.51	70.69	10.37	0.06
min	9.00	98.00	0.00	0.00
25%	9.00	160.00	3.25	0.02
50%	9.50	192.00	6.50	0.03
75%	10.00	248.75	9.00	0.05
80%	10.00	262.40	9.60	0.05
max	10.00	397.00	47.00	0.28



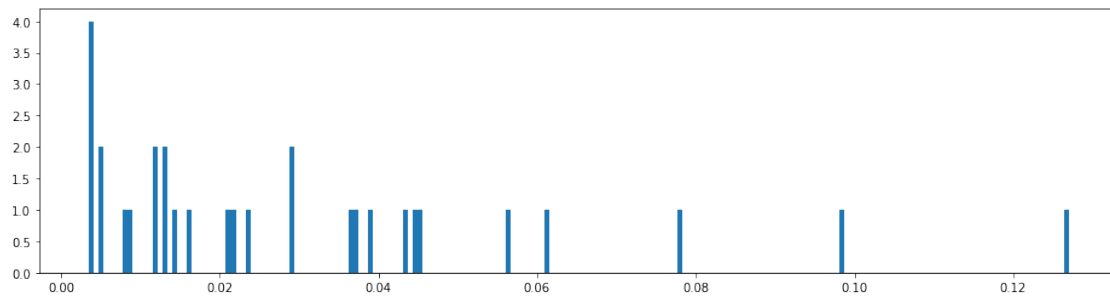
Stats for hour 18

	Month	Payments	Failure	FailRate
count	30.00	30.00	30.00	30.00
mean	9.50	210.20	7.50	0.04
std	0.51	81.85	9.19	0.05
min	9.00	41.00	0.00	0.00
25%	9.00	144.00	2.00	0.01
50%	9.50	206.50	5.00	0.02
75%	10.00	276.75	9.00	0.06
80%	10.00	293.60	10.20	0.07
max	10.00	352.00	40.00	0.19



Stats for hour 19

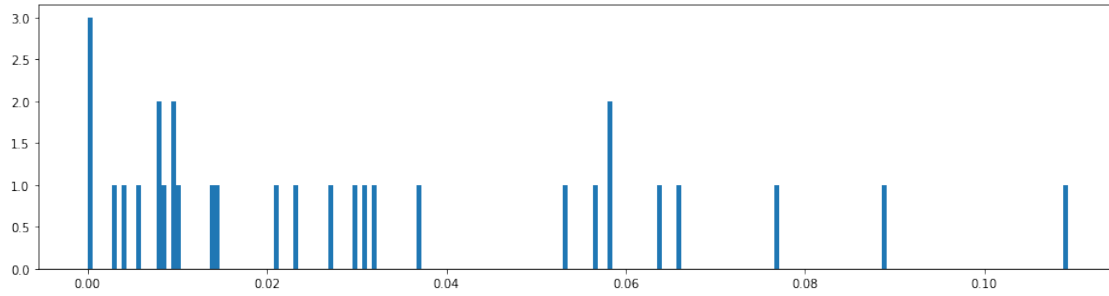
	Month	Payments	Failure	FailRate
count	30.00	30.00	30.00	30.00
mean	9.50	225.27	6.07	0.03
std	0.51	83.22	5.31	0.03
min	9.00	83.00	1.00	0.00
25%	9.00	167.25	2.00	0.01
50%	9.50	222.50	5.00	0.02
75%	10.00	260.75	10.00	0.04
80%	10.00	271.00	10.00	0.04
max	10.00	432.00	23.00	0.13



Stats for hour 20

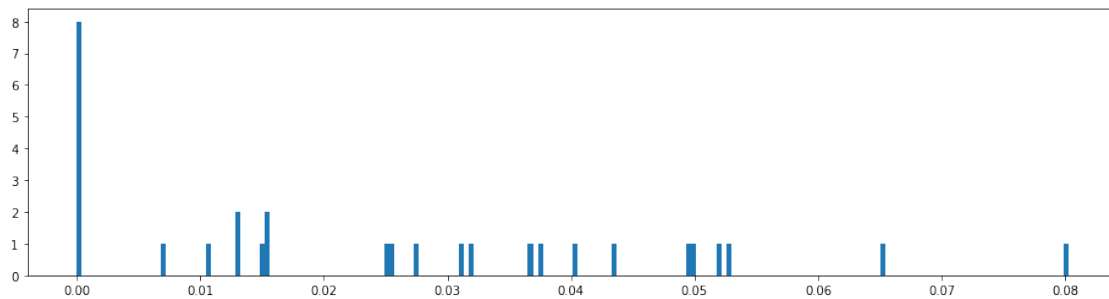
	Month	Payments	Failure	FailRate
count	30.00	30.00	30.00	30.00
mean	9.50	212.50	5.97	0.03
std	0.51	89.94	5.40	0.03
min	9.00	69.00	0.00	0.00
25%	9.00	150.50	2.00	0.01
50%	9.50	203.50	5.00	0.02
75%	10.00	257.00	9.00	0.06
80%	10.00	282.60	9.20	0.06
max	10.00	417.00	25.00	0.11





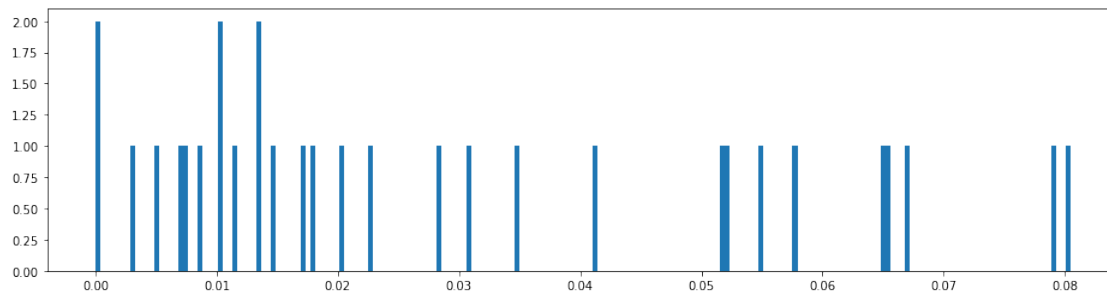
Stats for hour 21

	Month	Payments	Failure	FailRate
count	30.00	30.00	30.00	30.00
mean	9.50	208.60	4.80	0.02
std	0.51	90.71	4.24	0.02
min	9.00	78.00	0.00	0.00
25%	9.00	143.25	0.25	0.00
50%	9.50	199.50	4.00	0.02
75%	10.00	275.25	8.75	0.04
80%	10.00	283.40	9.00	0.04
max	10.00	388.00	13.00	0.08



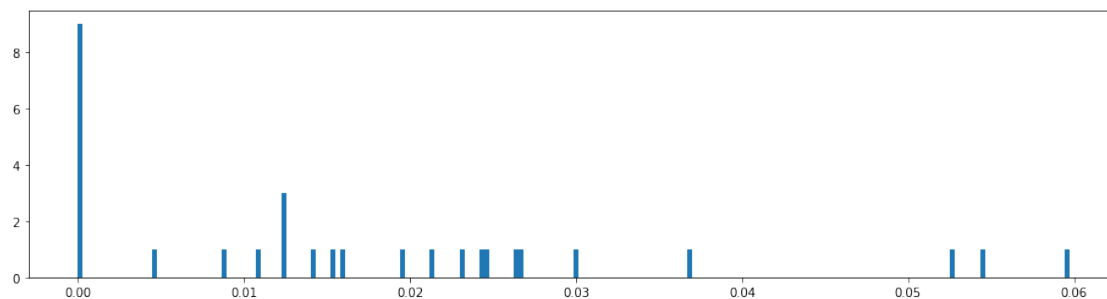
Stats for hour 22

	Month	Payments	Failure	FailRate
count	30.00	30.00	30.00	30.00
mean	9.50	185.30	5.43	0.03
std	0.51	88.15	4.90	0.03
min	9.00	58.00	0.00	0.00
25%	9.00	121.25	1.00	0.01
50%	9.50	183.50	3.50	0.02
75%	10.00	228.50	8.75	0.05
80%	10.00	232.60	10.00	0.06
max	10.00	394.00	15.00	0.08



Stats for hour 23

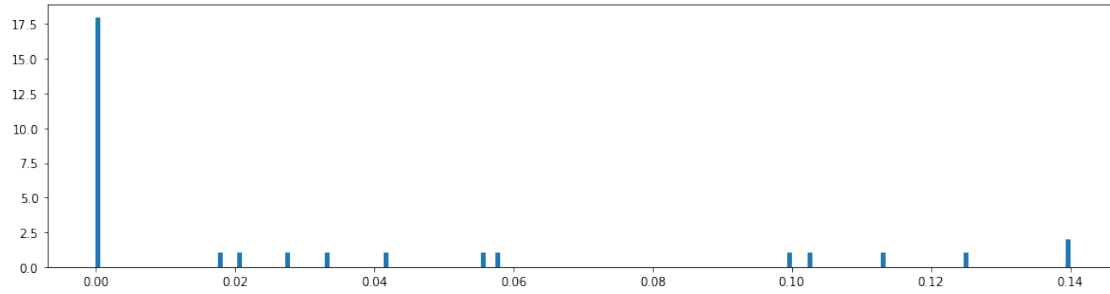
	Month	Payments	Failure	FailRate
count	30.00	30.00	30.00	30.00
mean	9.50	117.93	2.00	0.02
std	0.51	52.04	1.88	0.02
min	9.00	43.00	0.00	0.00
25%	9.00	77.25	0.00	0.00
50%	9.50	112.50	1.50	0.01
75%	10.00	161.50	4.00	0.02
80%	10.00	162.20	4.00	0.03
max	10.00	249.00	6.00	0.06



Info for FailuresHindi SecondHalf

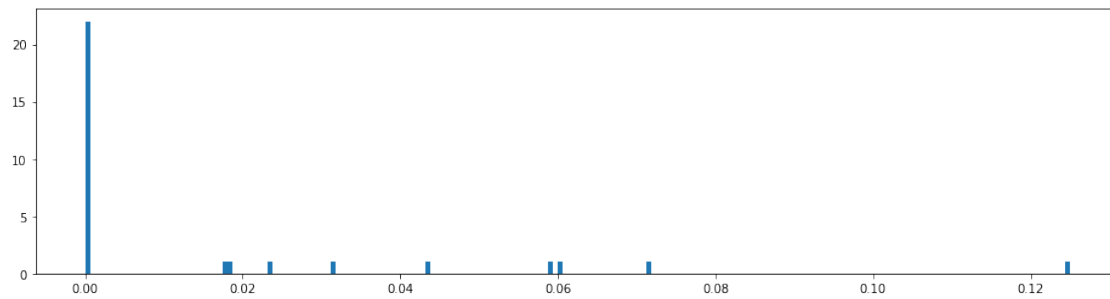
Stats for hour 0

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	58.29	1.74	0.03
std	0.51	27.00	2.65	0.05
min	9.00	20.00	0.00	0.00
25%	9.00	47.50	0.00	0.00
50%	10.00	53.00	0.00	0.00
75%	10.00	65.00	3.00	0.05
80%	10.00	66.00	4.00	0.06
max	10.00	168.00	8.00	0.14



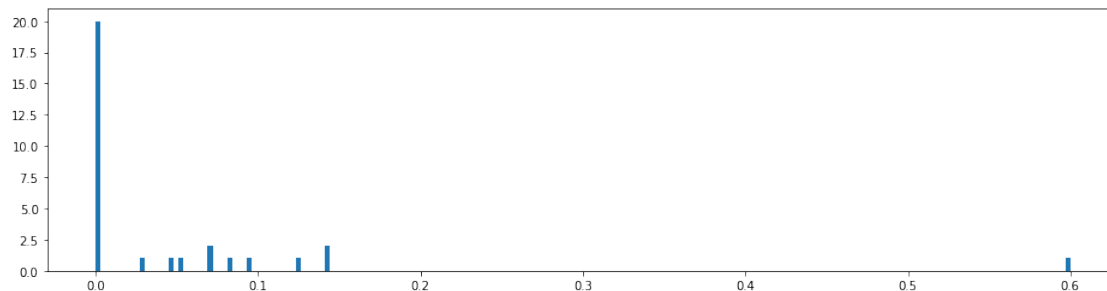
Stats for hour 1

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	31.06	0.42	0.01
std	0.51	13.53	0.76	0.03
min	9.00	11.00	0.00	0.00
25%	9.00	20.00	0.00	0.00
50%	10.00	30.00	0.00	0.00
75%	10.00	38.00	1.00	0.02
80%	10.00	43.00	1.00	0.02
max	10.00	57.00	3.00	0.12



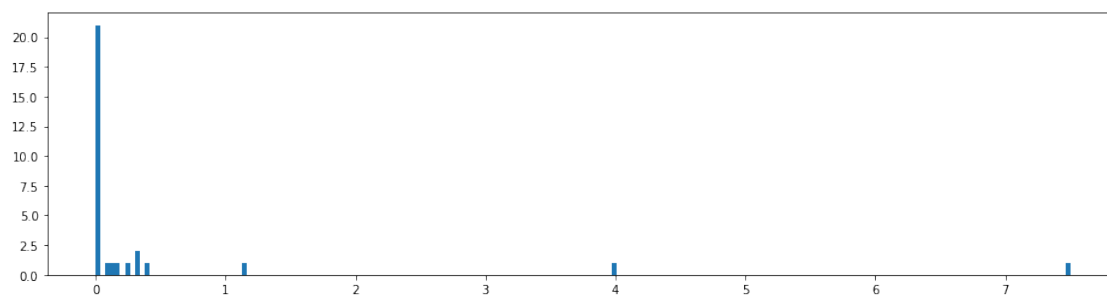
Stats for hour 2

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	16.26	0.77	0.05
std	0.51	9.52	2.17	0.11
min	9.00	3.00	0.00	0.00
25%	9.00	8.00	0.00	0.00
50%	10.00	14.00	0.00	0.00
75%	10.00	21.00	1.00	0.06
80%	10.00	23.00	1.00	0.07
max	10.00	41.00	12.00	0.60



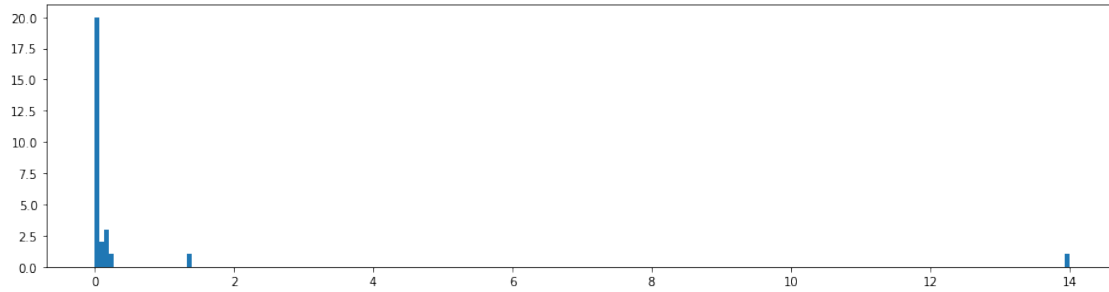
Stats for hour 3

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	7.65	1.81	0.46
std	0.51	6.86	5.56	1.50
min	9.00	1.00	0.00	0.00
25%	9.00	4.00	0.00	0.00
50%	10.00	6.00	0.00	0.00
75%	10.00	8.00	1.00	0.15
80%	10.00	8.00	1.00	0.25
max	10.00	37.00	30.00	7.50



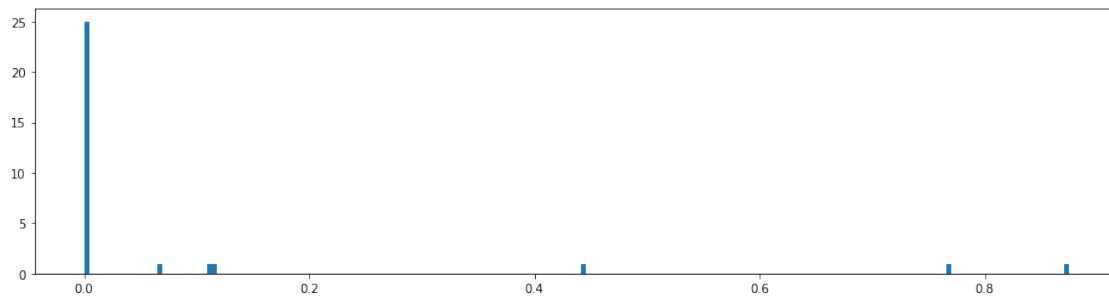
Stats for hour 4

	Month	Payments	Failure	FailRate
count	28.00	28.00	28.00	28.00
mean	9.54	7.79	0.93	0.58
std	0.51	6.20	2.72	2.64
min	9.00	1.00	0.00	0.00
25%	9.00	3.00	0.00	0.00
50%	10.00	6.00	0.00	0.00
75%	10.00	13.00	1.00	0.12
80%	10.00	13.60	1.00	0.14
max	10.00	24.00	14.00	14.00



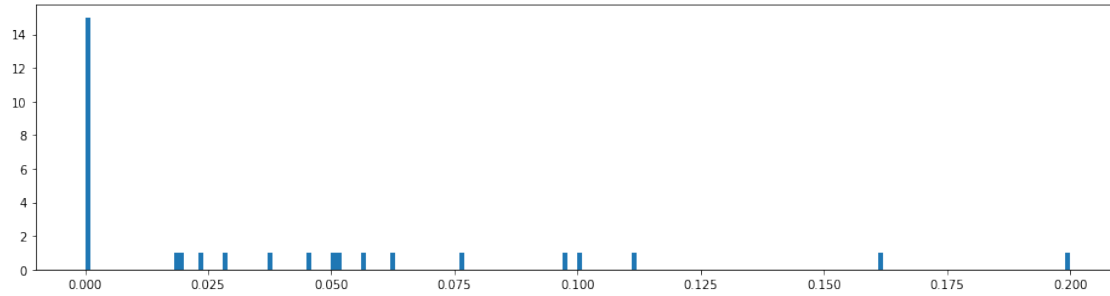
Stats for hour 5

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	13.61	1.16	0.08
std	0.51	10.80	3.80	0.22
min	9.00	2.00	0.00	0.00
25%	9.00	6.50	0.00	0.00
50%	10.00	9.00	0.00	0.00
75%	10.00	19.50	0.00	0.00
80%	10.00	21.00	0.00	0.00
max	10.00	43.00	20.00	0.88



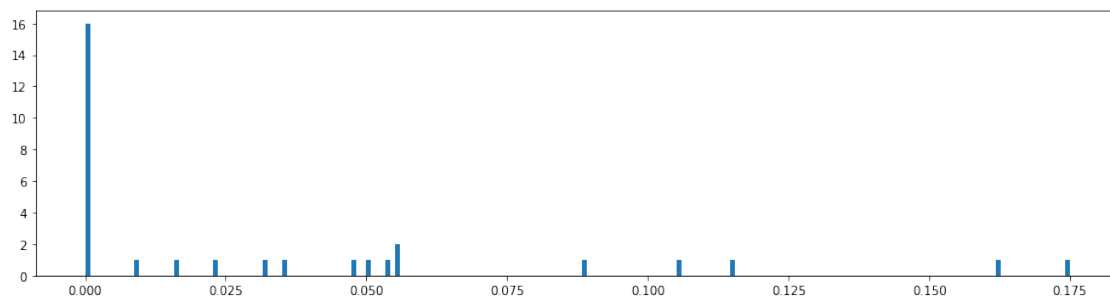
Stats for hour 6

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	32.10	1.16	0.04
std	0.51	14.90	1.70	0.05
min	9.00	12.00	0.00	0.00
25%	9.00	21.50	0.00	0.00
50%	10.00	27.00	1.00	0.02
75%	10.00	39.50	1.50	0.05
80%	10.00	42.00	2.00	0.06
max	10.00	72.00	7.00	0.20



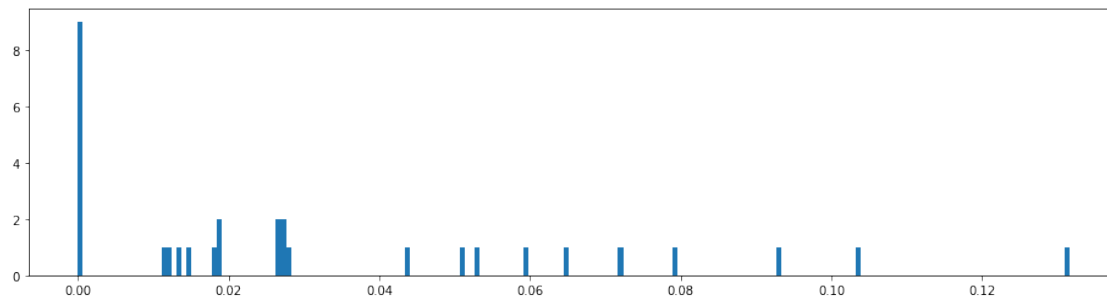
Stats for hour 7

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	56.45	2.06	0.03
std	0.51	20.95	3.29	0.05
min	9.00	20.00	0.00	0.00
25%	9.00	42.00	0.00	0.00
50%	10.00	53.00	0.00	0.00
75%	10.00	61.50	3.00	0.05
80%	10.00	74.00	3.00	0.06
max	10.00	110.00	12.00	0.17



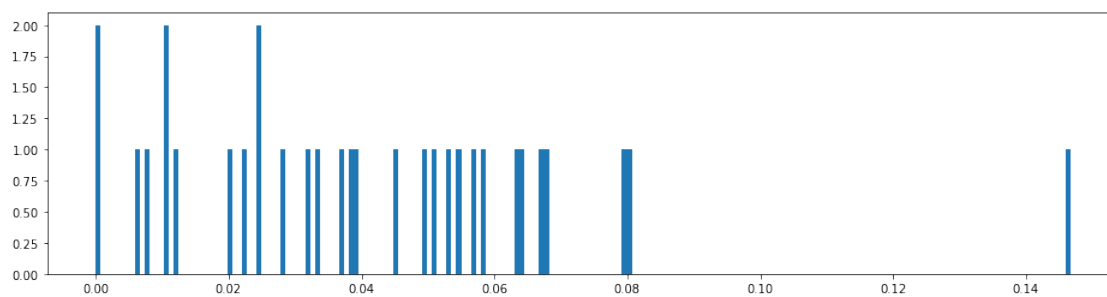
Stats for hour 8

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	82.23	2.84	0.03
std	0.51	30.59	3.37	0.03
min	9.00	39.00	0.00	0.00
25%	9.00	59.00	0.00	0.00
50%	10.00	74.00	2.00	0.02
75%	10.00	99.00	5.00	0.05
80%	10.00	113.00	6.00	0.06
max	10.00	161.00	15.00	0.13



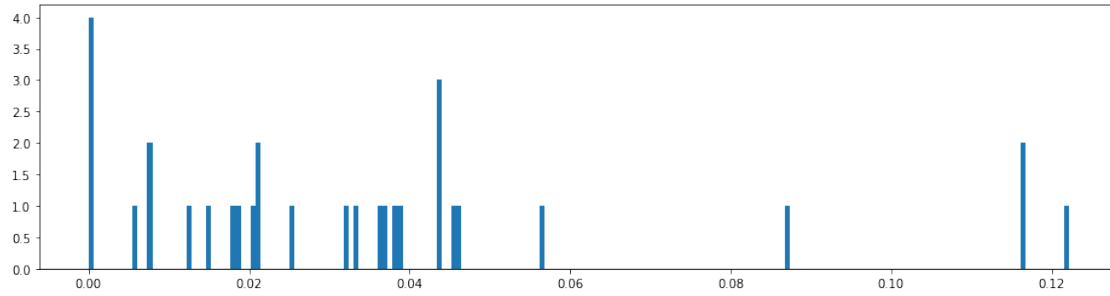
Stats for hour 9

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	111.68	4.39	0.04
std	0.51	38.00	3.08	0.03
min	9.00	47.00	0.00	0.00
25%	9.00	85.00	2.00	0.02
50%	10.00	97.00	4.00	0.04
75%	10.00	138.00	6.00	0.06
80%	10.00	152.00	6.00	0.06
max	10.00	199.00	13.00	0.15



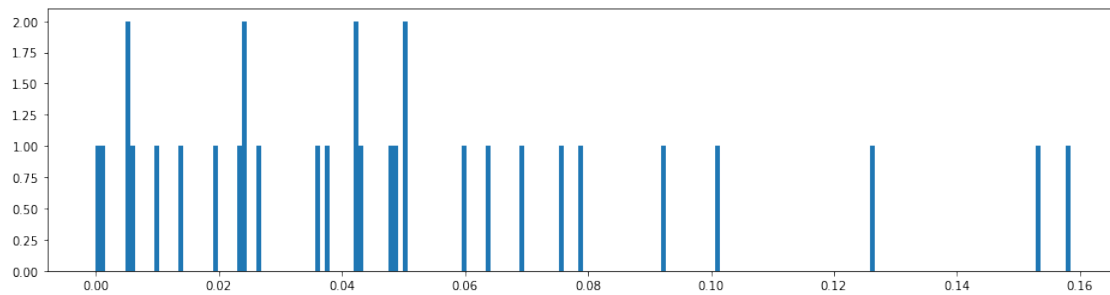
Stats for hour 10

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	138.23	5.10	0.04
std	0.51	43.05	5.75	0.03
min	9.00	46.00	0.00	0.00
25%	9.00	106.50	1.50	0.01
50%	10.00	142.00	3.00	0.03
75%	10.00	174.00	6.00	0.04
80%	10.00	180.00	7.00	0.05
max	10.00	210.00	22.00	0.12



Stats for hour 11

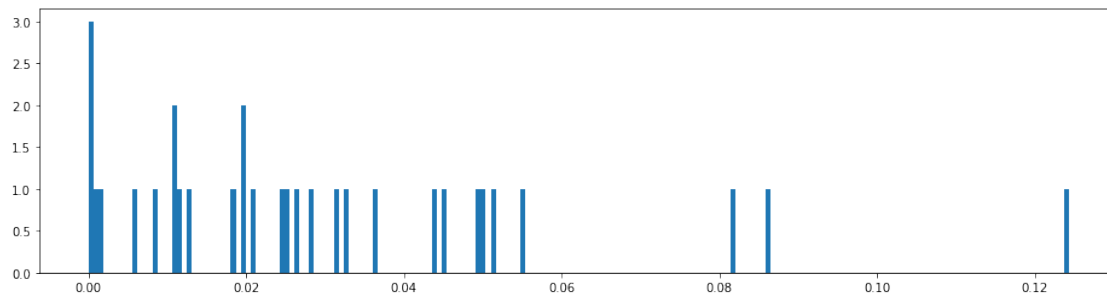
	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	236.16	7.39	0.05
std	0.51	472.85	6.09	0.04
min	9.00	55.00	0.00	0.00
25%	9.00	125.50	4.00	0.02
50%	10.00	160.00	6.00	0.04
75%	10.00	182.00	10.00	0.07
80%	10.00	189.00	11.00	0.08
max	10.00	2,772.00	27.00	0.16



Stats for hour 12

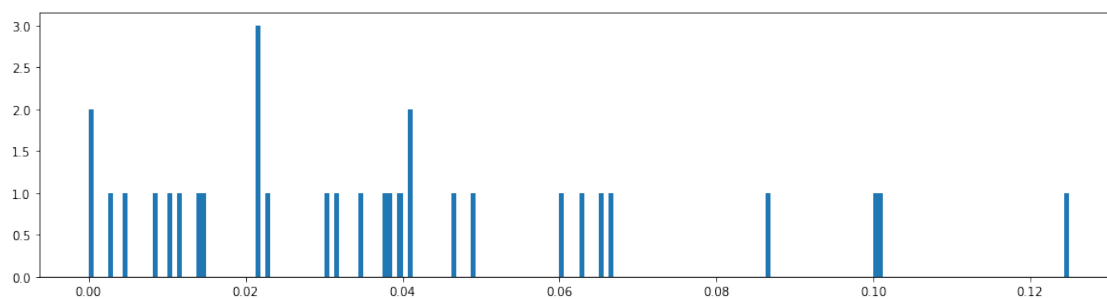
	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	373.23	5.55	0.03
std	0.51	645.26	5.92	0.03
min	9.00	92.00	0.00	0.00
25%	9.00	138.00	2.00	0.01
50%	10.00	170.00	4.00	0.02
75%	10.00	194.50	7.00	0.04
80%	10.00	227.00	8.00	0.05
max	10.00	2,353.00	25.00	0.12





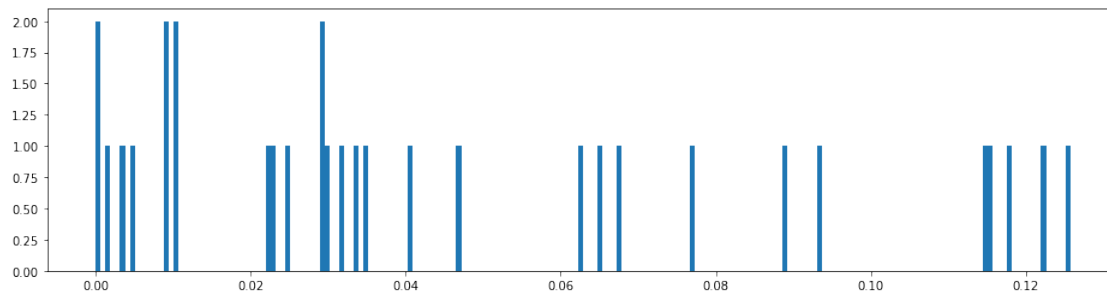
Stats for hour 13

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	190.90	6.45	0.04
std	0.51	179.29	5.85	0.03
min	9.00	86.00	0.00	0.00
25%	9.00	137.00	3.00	0.01
50%	10.00	150.00	5.00	0.03
75%	10.00	194.50	8.50	0.05
80%	10.00	207.00	9.00	0.06
max	10.00	1,130.00	26.00	0.12



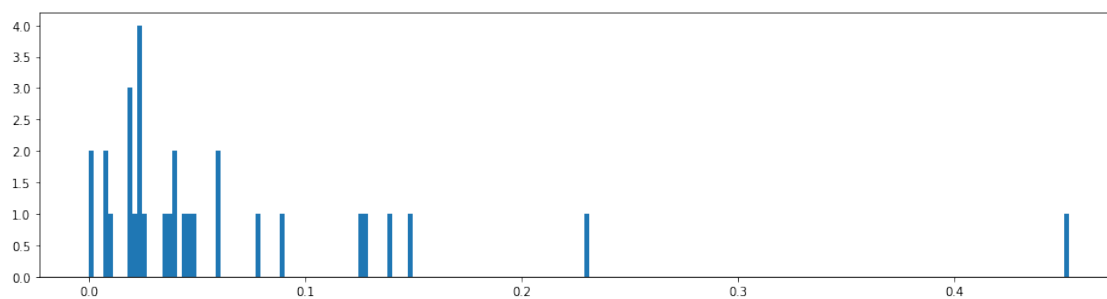
Stats for hour 14

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	218.58	6.74	0.05
std	0.51	283.17	6.74	0.04
min	9.00	61.00	0.00	0.00
25%	9.00	100.50	2.00	0.01
50%	10.00	139.00	4.00	0.03
75%	10.00	194.50	9.50	0.07
80%	10.00	201.00	11.00	0.09
max	10.00	1,279.00	26.00	0.13



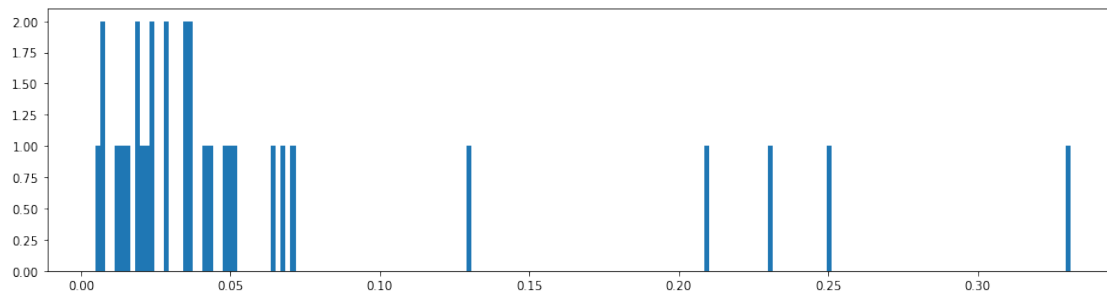
Stats for hour 15

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	239.32	9.26	0.07
std	0.51	536.13	11.94	0.09
min	9.00	76.00	0.00	0.00
25%	9.00	113.50	2.50	0.02
50%	10.00	131.00	5.00	0.04
75%	10.00	178.50	11.50	0.07
80%	10.00	201.00	12.00	0.09
max	10.00	3,116.00	53.00	0.45



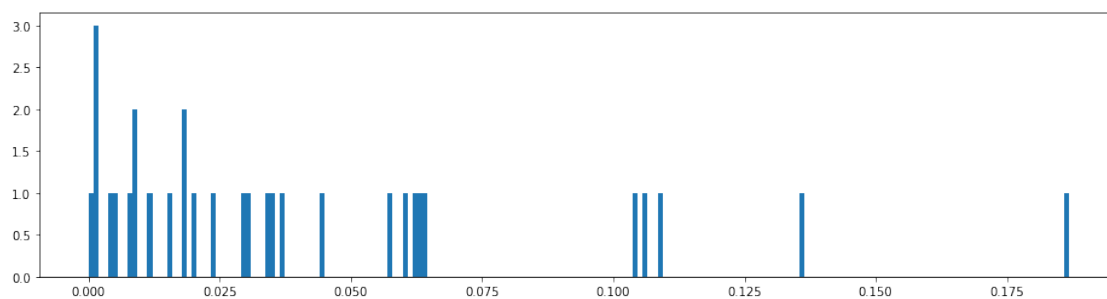
Stats for hour 16

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	192.94	11.35	0.06
std	0.51	147.45	18.97	0.08
min	9.00	77.00	1.00	0.00
25%	9.00	120.00	3.00	0.02
50%	10.00	144.00	4.00	0.04
75%	10.00	209.00	9.00	0.06
80%	10.00	223.00	10.00	0.07
max	10.00	823.00	96.00	0.33



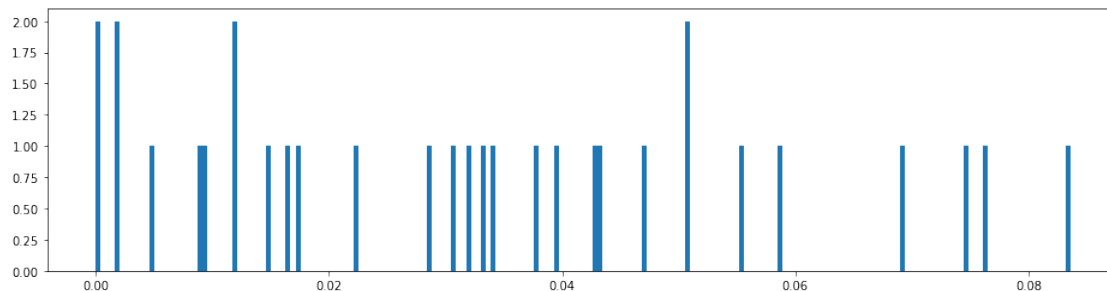
#### Stats for hour 17

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	591.97	8.68	0.04
std	0.51	1,013.63	9.88	0.05
min	9.00	78.00	0.00	0.00
25%	9.00	130.00	4.00	0.01
50%	10.00	171.00	5.00	0.03
75%	10.00	319.00	10.00	0.06
80%	10.00	432.00	11.00	0.06
max	10.00	3,205.00	51.00	0.19



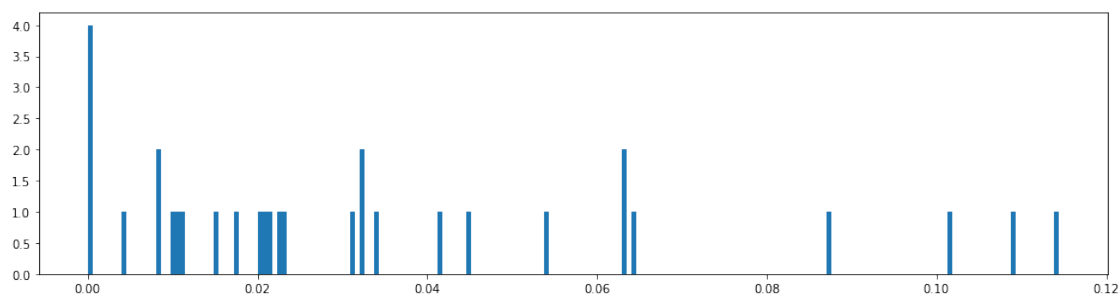
#### Stats for hour 18

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	348.61	6.94	0.03
std	0.51	580.96	6.91	0.02
min	9.00	60.00	0.00	0.00
25%	9.00	141.00	2.00	0.01
50%	10.00	177.00	5.00	0.03
75%	10.00	249.00	8.00	0.05
80%	10.00	289.00	8.00	0.05
max	10.00	2,808.00	29.00	0.08



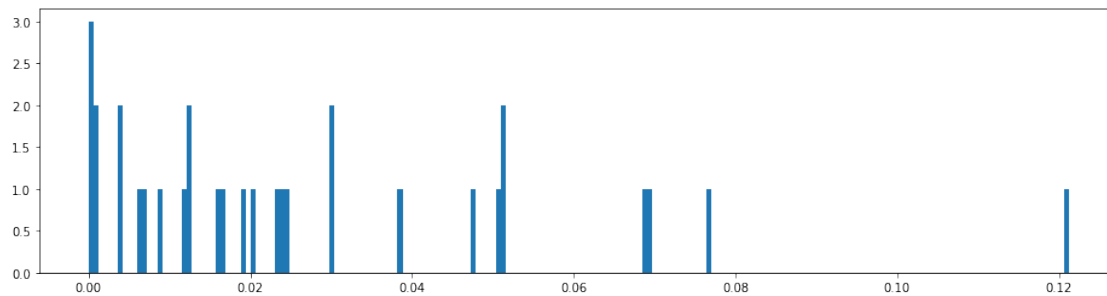
Stats for hour 19

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	314.35	6.55	0.03
std	0.51	754.92	7.52	0.03
min	9.00	93.00	0.00	0.00
25%	9.00	121.50	2.00	0.01
50%	10.00	156.00	4.00	0.02
75%	10.00	227.50	7.50	0.05
80%	10.00	259.00	9.00	0.06
max	10.00	4,360.00	34.00	0.11



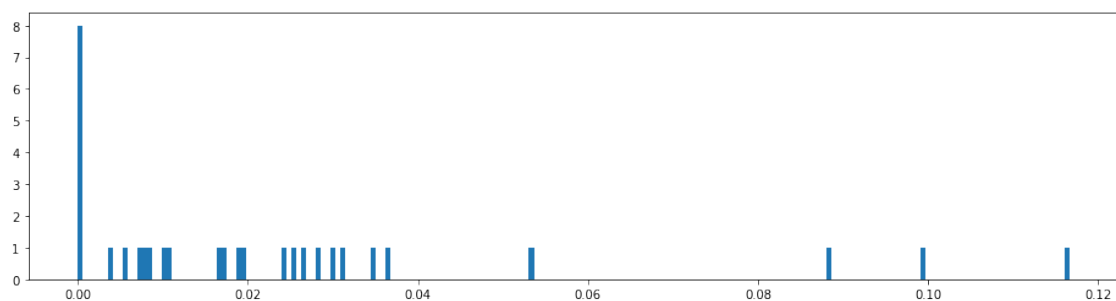
Stats for hour 20

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	466.52	5.19	0.03
std	0.51	1,312.39	6.76	0.03
min	9.00	59.00	0.00	0.00
25%	9.00	104.50	1.00	0.01
50%	10.00	156.00	3.00	0.02
75%	10.00	254.00	6.00	0.04
80%	10.00	265.00	7.00	0.05
max	10.00	7,188.00	33.00	0.12



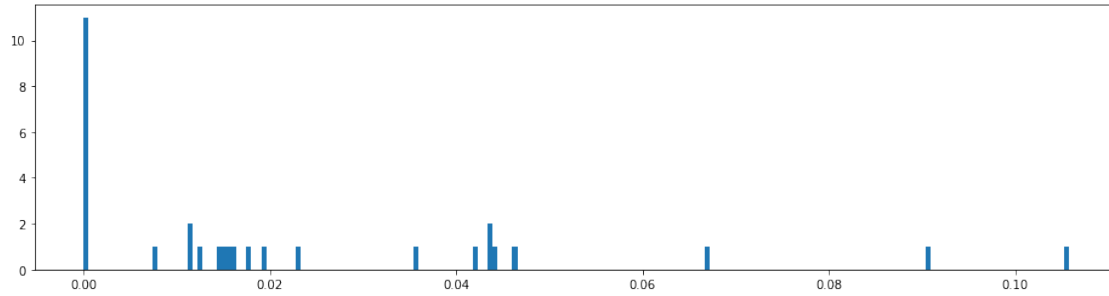
Stats for hour 21

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	420.68	4.58	0.02
std	0.51	1,394.64	7.88	0.03
min	9.00	52.00	0.00	0.00
25%	9.00	111.00	0.50	0.00
50%	10.00	155.00	2.00	0.02
75%	10.00	240.00	4.00	0.03
80%	10.00	251.00	5.00	0.03
max	10.00	7,920.00	33.00	0.12



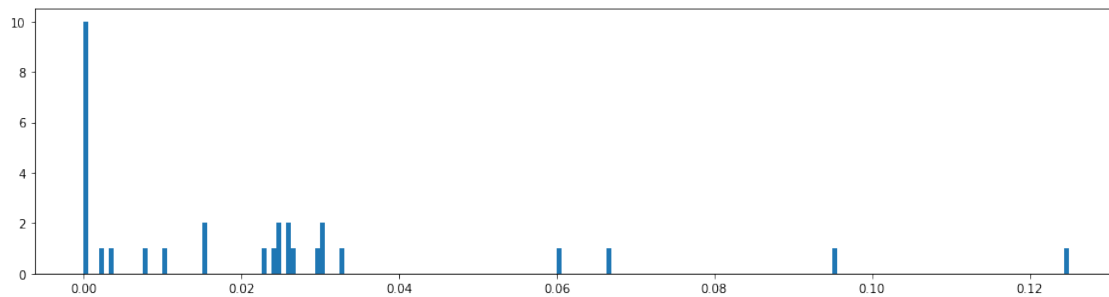
Stats for hour 22

	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	448.58	4.84	0.02
std	0.51	1,511.46	7.73	0.03
min	9.00	40.00	0.00	0.00
25%	9.00	114.50	0.00	0.00
50%	10.00	164.00	2.00	0.01
75%	10.00	239.50	5.00	0.04
80%	10.00	248.00	6.00	0.04
max	10.00	8,575.00	33.00	0.11



Stats for hour 23

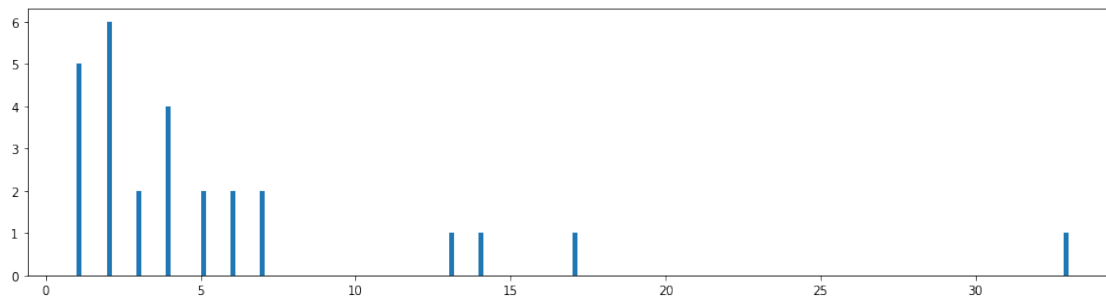
	Month	Payments	Failure	FailRate
count	31.00	31.00	31.00	31.00
mean	9.52	235.55	3.03	0.02
std	0.51	461.78	5.06	0.03
min	9.00	38.00	0.00	0.00
25%	9.00	82.00	0.00	0.00
50%	10.00	115.00	1.00	0.02
75%	10.00	147.50	3.50	0.03
80%	10.00	166.00	4.00	0.03
max	10.00	2,017.00	24.00	0.12



Info for ThinkWalnut FirstHalf

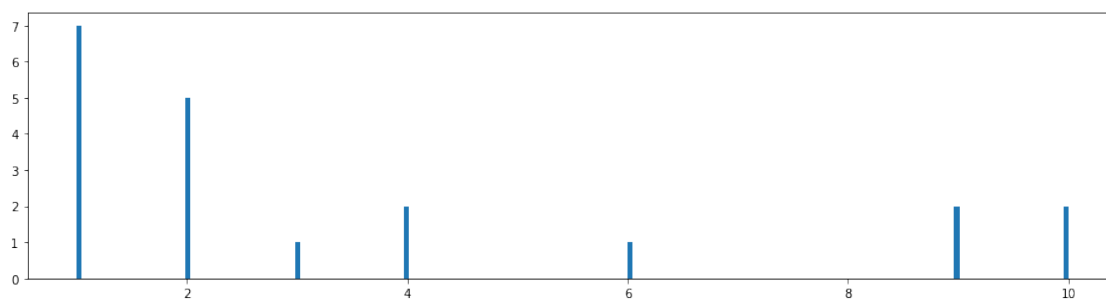
Stats for hour 0

	Month	SessionCount
count	27.00	27.00
mean	9.52	5.63
std	0.51	6.85
min	9.00	1.00
25%	9.00	2.00
50%	10.00	4.00
75%	10.00	6.00
80%	10.00	6.80
max	10.00	33.00



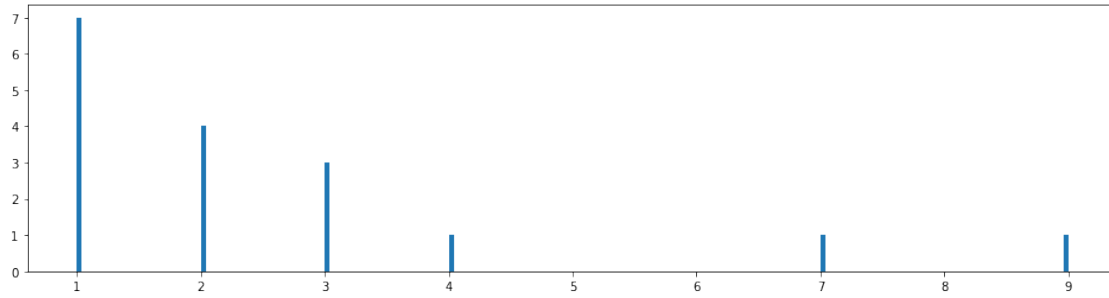
Stats for hour 1

	Month	SessionCount
count	20.00	20.00
mean	9.65	3.60
std	0.49	3.30
min	9.00	1.00
25%	9.00	1.00
50%	10.00	2.00
75%	10.00	4.50
80%	10.00	6.60
max	10.00	10.00



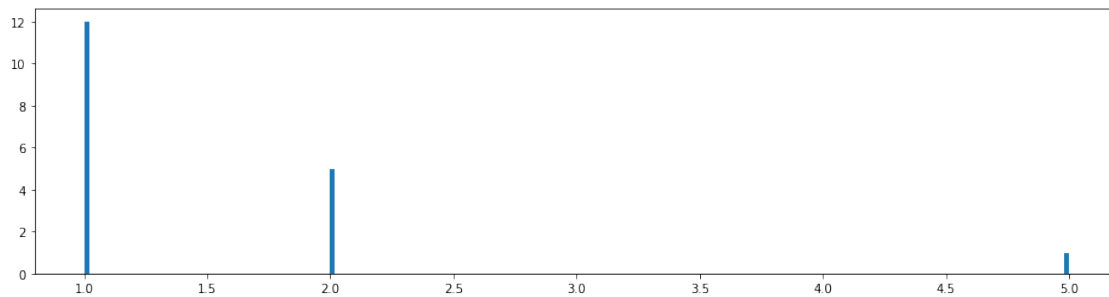
Stats for hour 2

	Month	SessionCount
count	17.00	17.00
mean	9.53	2.59
std	0.51	2.27
min	9.00	1.00
25%	9.00	1.00
50%	10.00	2.00
75%	10.00	3.00
80%	10.00	3.00
max	10.00	9.00



Stats for hour 5

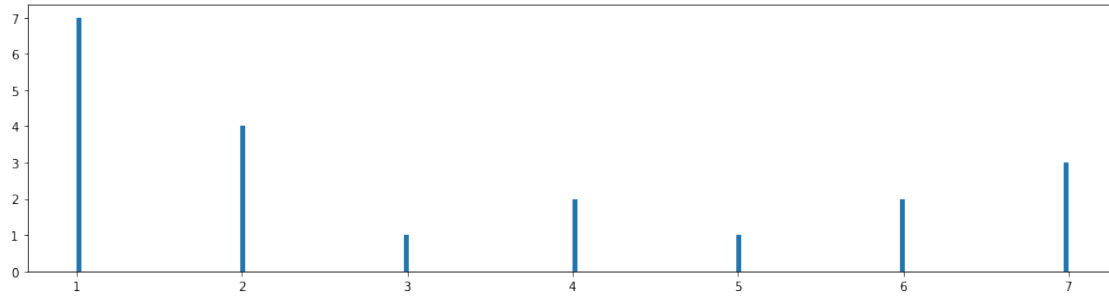
	Month	SessionCount
count	18.00	18.00
mean	9.61	1.50
std	0.50	0.99
min	9.00	1.00
25%	9.00	1.00
50%	10.00	1.00
75%	10.00	2.00
80%	10.00	2.00
max	10.00	5.00



Stats for hour 6

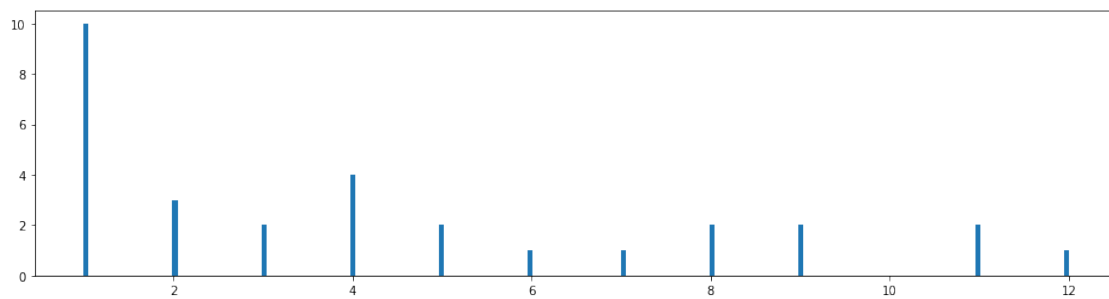
	Month	SessionCount
count	20.00	20.00
mean	9.55	3.20
std	0.51	2.33
min	9.00	1.00
25%	9.00	1.00
50%	10.00	2.00
75%	10.00	5.25
80%	10.00	6.00
max	10.00	7.00





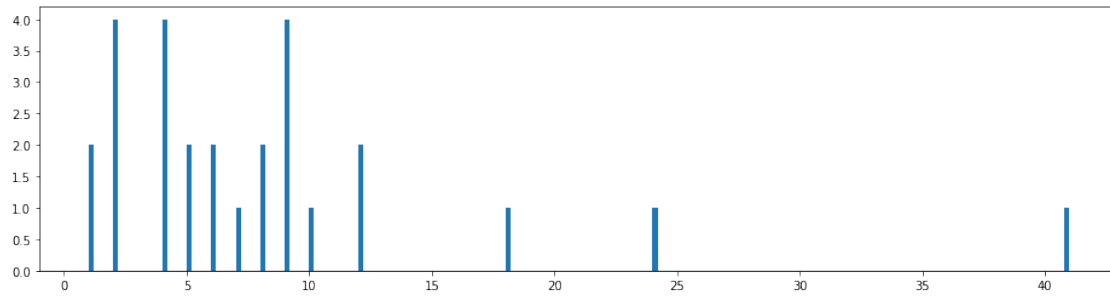
Stats for hour 7

	Month	SessionCount
count	30.00	30.00
mean	9.57	4.30
std	0.57	3.52
min	9.00	1.00
25%	9.00	1.00
50%	10.00	3.50
75%	10.00	6.75
80%	10.00	8.00
max	11.00	12.00



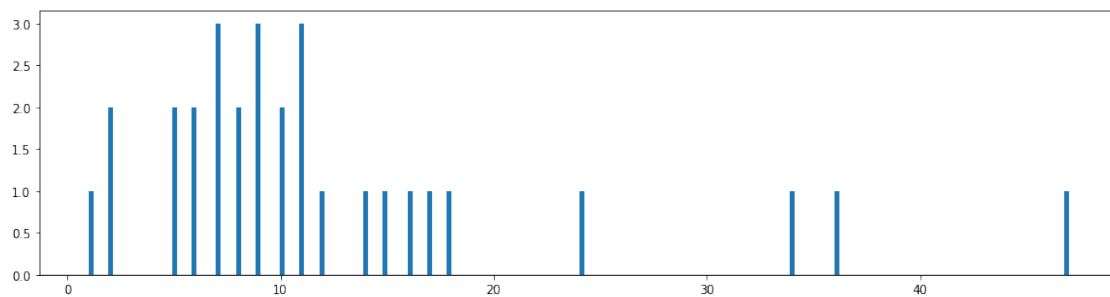
Stats for hour 8

	Month	SessionCount
count	27.00	27.00
mean	9.52	8.30
std	0.51	8.36
min	9.00	1.00
25%	9.00	4.00
50%	10.00	6.00
75%	10.00	9.00
80%	10.00	9.80
max	10.00	41.00



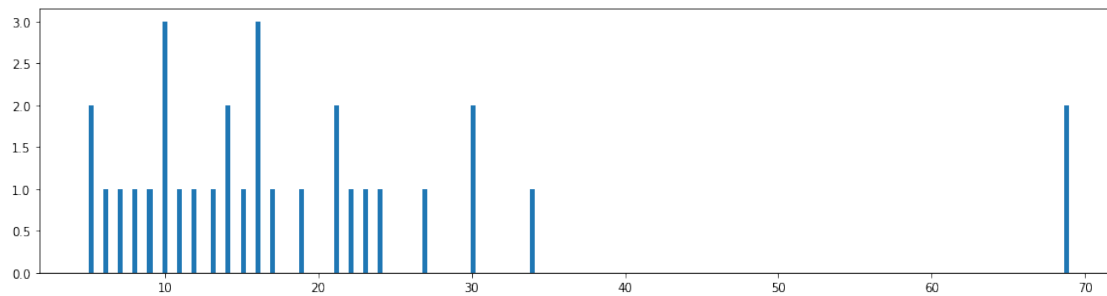
Stats for hour 9

	Month	SessionCount
count	30.00	30.00
mean	9.50	12.57
std	0.51	10.41
min	9.00	1.00
25%	9.00	7.00
50%	9.50	9.50
75%	10.00	14.75
80%	10.00	16.20
max	10.00	47.00



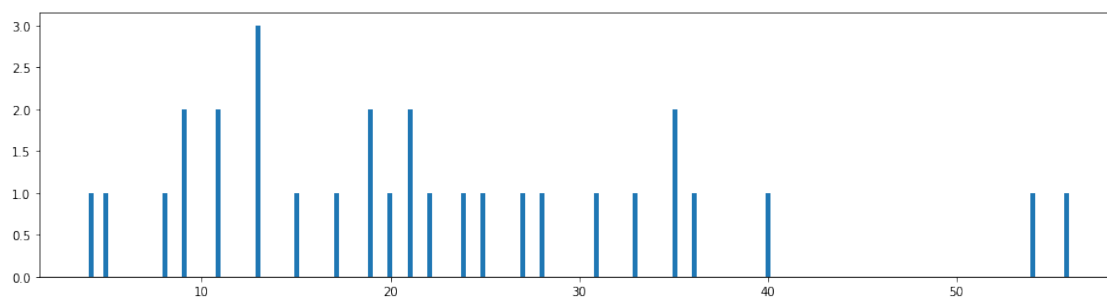
Stats for hour 10

	Month	SessionCount
count	31.00	31.00
mean	9.55	19.45
std	0.57	15.27
min	9.00	5.00
25%	9.00	10.00
50%	10.00	16.00
75%	10.00	22.50
80%	10.00	24.00
max	11.00	69.00



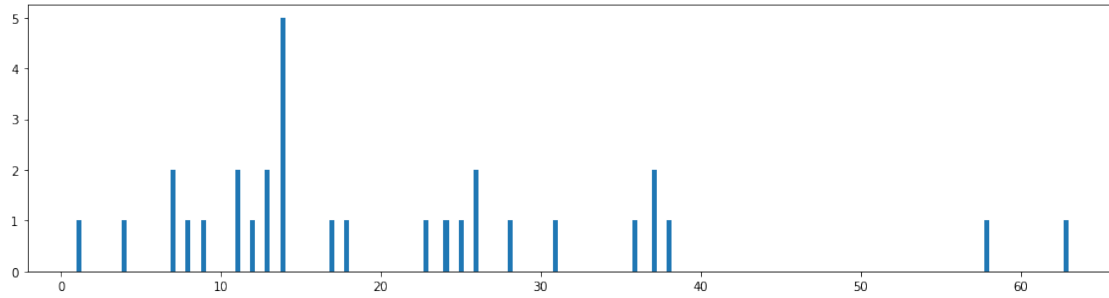
Stats for hour 11

	Month	SessionCount
count	30.00	30.00
mean	9.50	22.47
std	0.51	13.18
min	9.00	4.00
25%	9.00	13.00
50%	9.50	20.50
75%	10.00	30.25
80%	10.00	33.40
max	10.00	56.00



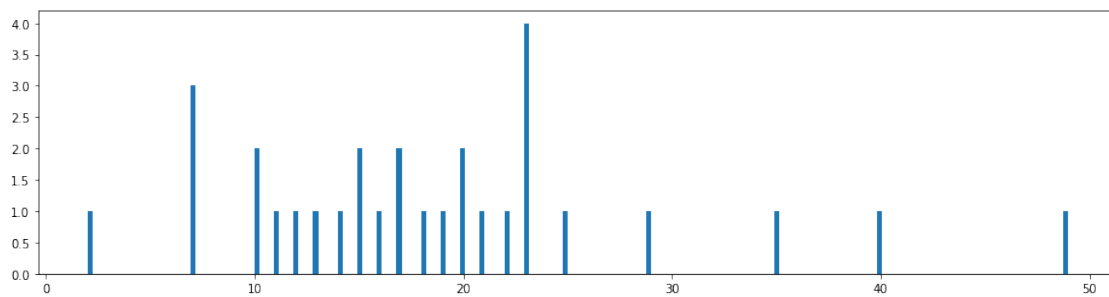
Stats for hour 12

	Month	SessionCount
count	31.00	31.00
mean	9.55	21.06
std	0.57	14.67
min	9.00	1.00
25%	9.00	11.50
50%	10.00	14.00
75%	10.00	27.00
80%	10.00	31.00
max	11.00	63.00



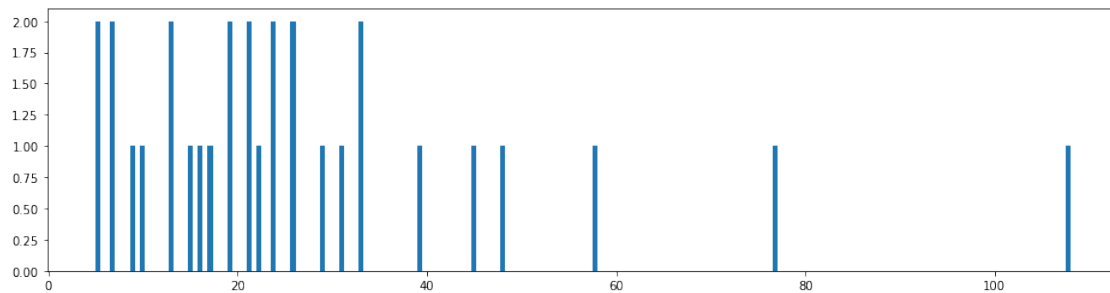
#### Stats for hour 13

	Month	SessionCount
count	30.00	30.00
mean	9.50	18.77
std	0.51	10.03
min	9.00	2.00
25%	9.00	12.25
50%	9.50	17.50
75%	10.00	23.00
80%	10.00	23.00
max	10.00	49.00



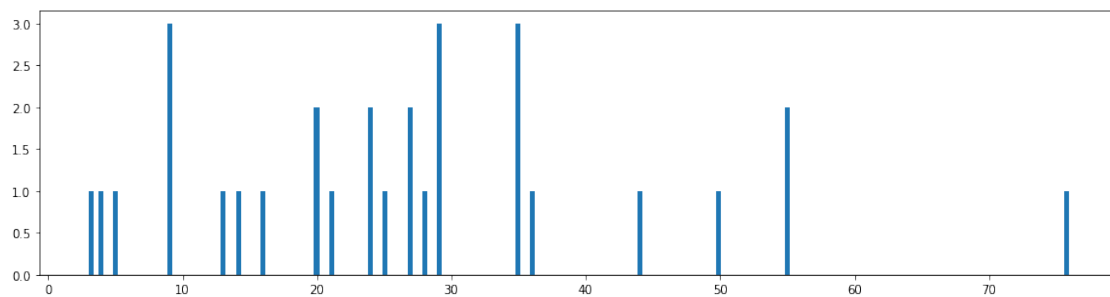
#### Stats for hour 14

	Month	SessionCount
count	30.00	30.00
mean	9.50	27.33
std	0.51	22.29
min	9.00	5.00
25%	9.00	13.50
50%	9.50	21.50
75%	10.00	32.50
80%	10.00	34.20
max	10.00	108.00



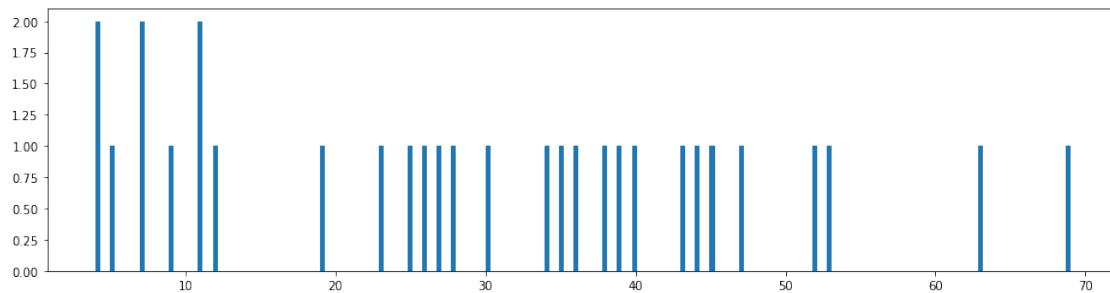
Stats for hour 15

	Month	SessionCount
count	30.00	30.00
mean	9.50	26.87
std	0.51	16.89
min	9.00	3.00
25%	9.00	14.50
50%	9.50	26.00
75%	10.00	35.00
80%	10.00	35.20
max	10.00	76.00



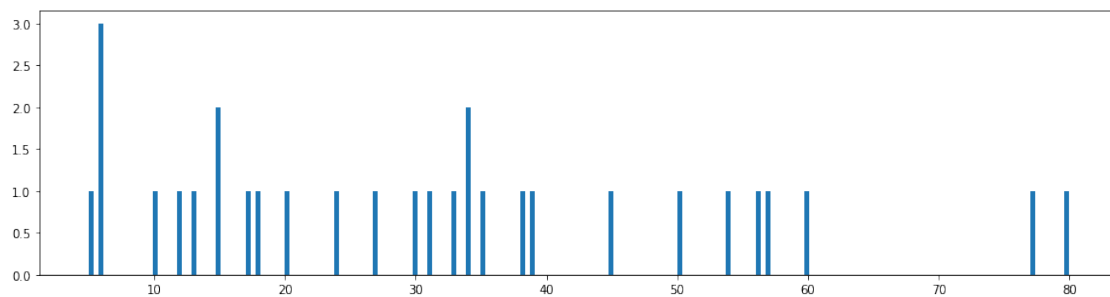
Stats for hour 16

	Month	SessionCount
count	30.00	30.00
mean	9.50	29.53
std	0.51	18.16
min	9.00	4.00
25%	9.00	11.25
50%	9.50	29.00
75%	10.00	42.25
80%	10.00	44.20
max	10.00	69.00



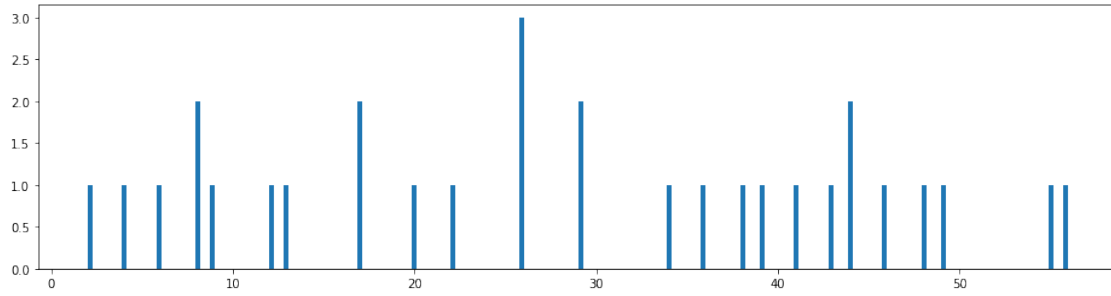
Stats for hour 17

	Month	SessionCount
count	30.00	30.00
mean	9.50	31.57
std	0.51	20.87
min	9.00	5.00
25%	9.00	15.00
50%	9.50	30.50
75%	10.00	43.50
80%	10.00	50.80
max	10.00	80.00



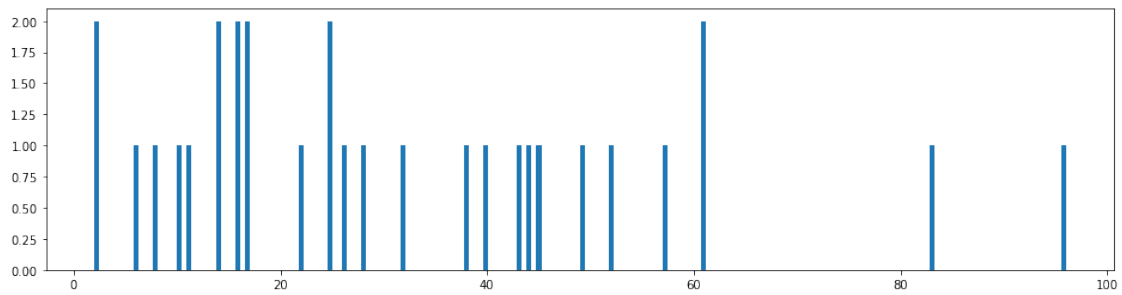
Stats for hour 18

	Month	SessionCount
count	30.00	30.00
mean	9.50	28.23
std	0.51	16.23
min	9.00	2.00
25%	9.00	14.00
50%	9.50	27.50
75%	10.00	42.50
80%	10.00	44.00
max	10.00	56.00



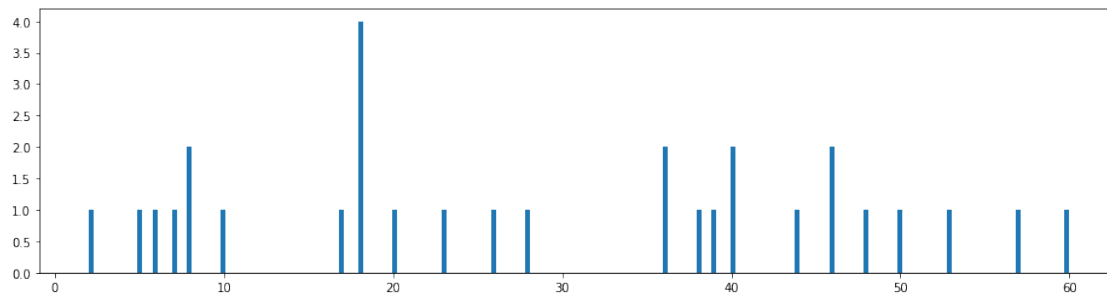
Stats for hour 19

	Month	SessionCount
count	30.00	30.00
mean	9.50	32.00
std	0.51	23.54
min	9.00	2.00
25%	9.00	14.50
50%	9.50	25.50
75%	10.00	44.75
80%	10.00	49.60
max	10.00	96.00



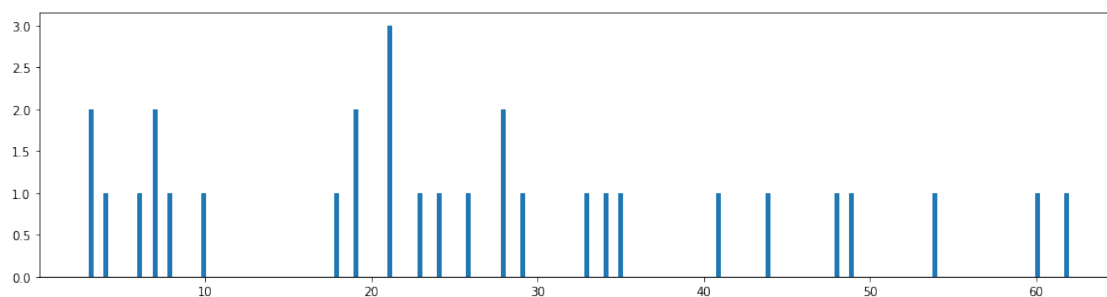
Stats for hour 20

	Month	SessionCount
count	30.00	30.00
mean	9.50	28.83
std	0.51	17.38
min	9.00	2.00
25%	9.00	17.25
50%	9.50	27.00
75%	10.00	43.00
80%	10.00	46.00
max	10.00	60.00



Stats for hour 21

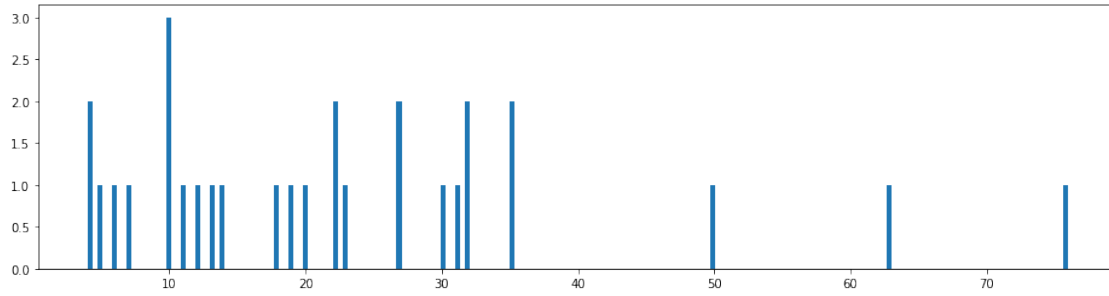
	Month	SessionCount
count	30.00	30.00
mean	9.50	26.17
std	0.51	17.12
min	9.00	3.00
25%	9.00	12.00
50%	9.50	23.50
75%	10.00	34.75
80%	10.00	41.60
max	10.00	62.00



Stats for hour 22

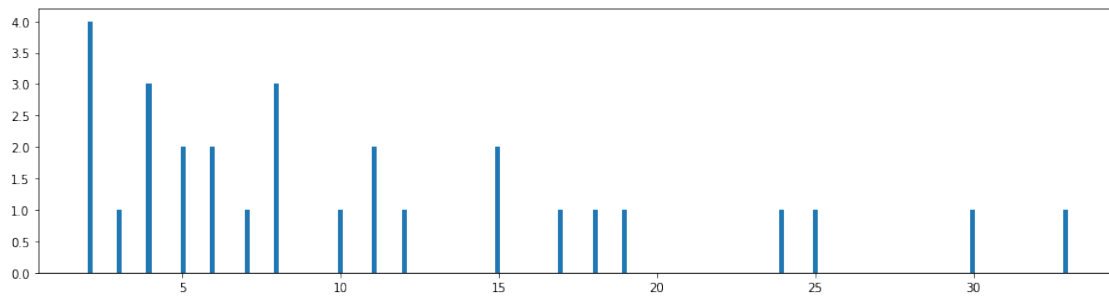
	Month	SessionCount
count	29.00	29.00
mean	9.52	23.03
std	0.51	17.25
min	9.00	4.00
25%	9.00	10.00
50%	10.00	20.00
75%	10.00	31.00
80%	10.00	32.00
max	10.00	76.00





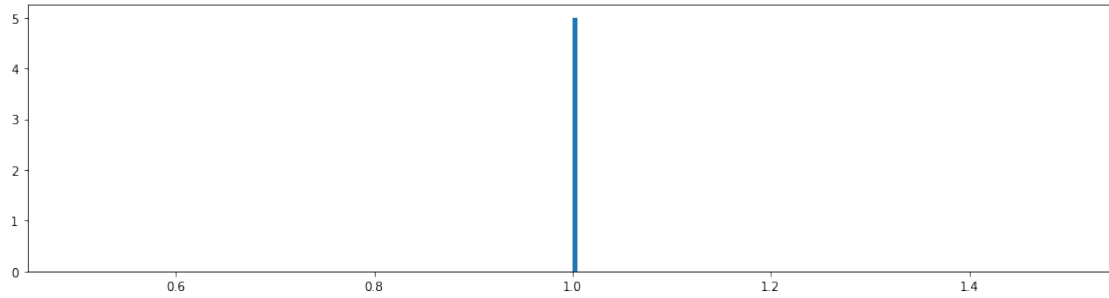
Stats for hour 23

	Month	SessionCount
count	29.00	29.00
mean	9.52	10.90
std	0.51	8.65
min	9.00	2.00
25%	9.00	4.00
50%	10.00	8.00
75%	10.00	15.00
80%	10.00	17.40
max	10.00	33.00



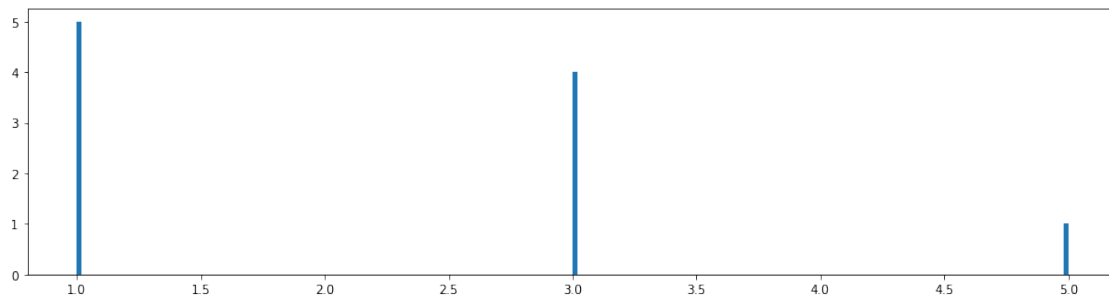
Stats for hour 4

	Month	SessionCount
count	5.00	5.00
mean	9.40	1.00
std	0.55	0.00
min	9.00	1.00
25%	9.00	1.00
50%	9.00	1.00
75%	10.00	1.00
80%	10.00	1.00
max	10.00	1.00



Stats for hour 3

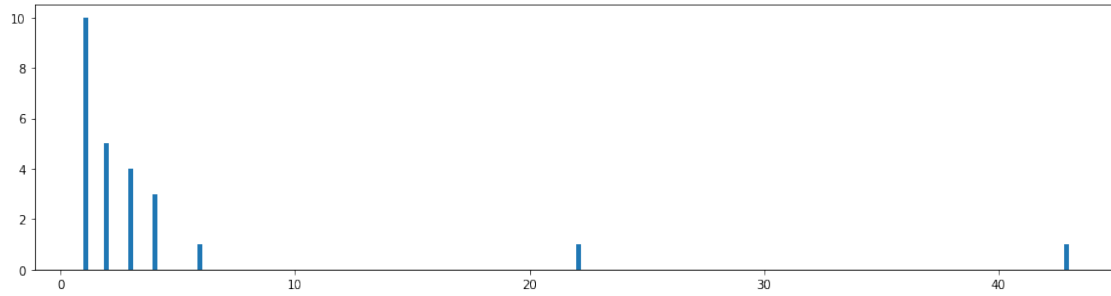
	Month	SessionCount
count	10.00	10.00
mean	9.70	2.20
std	0.48	1.40
min	9.00	1.00
25%	9.25	1.00
50%	10.00	2.00
75%	10.00	3.00
80%	10.00	3.00
max	10.00	5.00



Info for ThinkWalnut SecondHalf

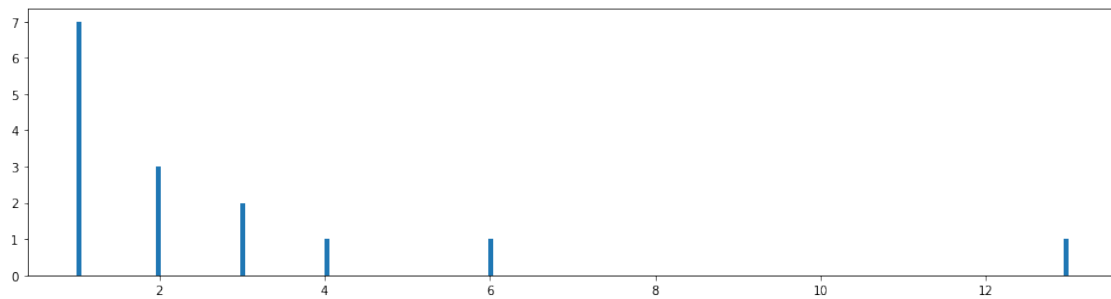
Stats for hour 0

	Month	SessionCount
count	25.00	25.00
mean	9.48	4.60
std	0.51	9.02
min	9.00	1.00
25%	9.00	1.00
50%	9.00	2.00
75%	10.00	3.00
80%	10.00	4.00
max	10.00	43.00



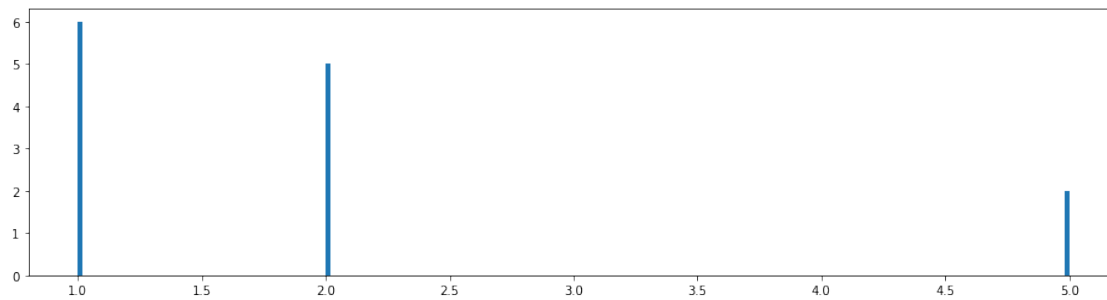
Stats for hour 1

	Month	SessionCount
count	15.00	15.00
mean	9.47	2.80
std	0.52	3.17
min	9.00	1.00
25%	9.00	1.00
50%	9.00	2.00
75%	10.00	3.00
80%	10.00	3.20
max	10.00	13.00



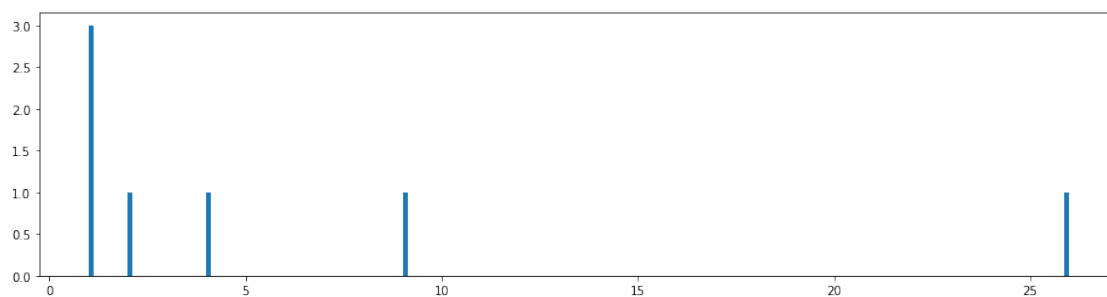
Stats for hour 2

	Month	SessionCount
count	13.00	13.00
mean	9.62	2.00
std	0.51	1.41
min	9.00	1.00
25%	9.00	1.00
50%	10.00	2.00
75%	10.00	2.00
80%	10.00	2.00
max	10.00	5.00



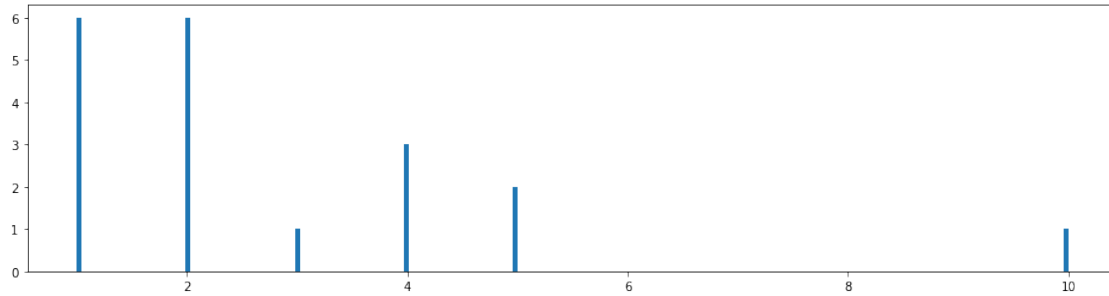
Stats for hour 5

	Month	SessionCount
count	7.00	7.00
mean	9.43	6.29
std	0.53	9.16
min	9.00	1.00
25%	9.00	1.00
50%	9.00	2.00
75%	10.00	6.50
80%	10.00	8.00
max	10.00	26.00



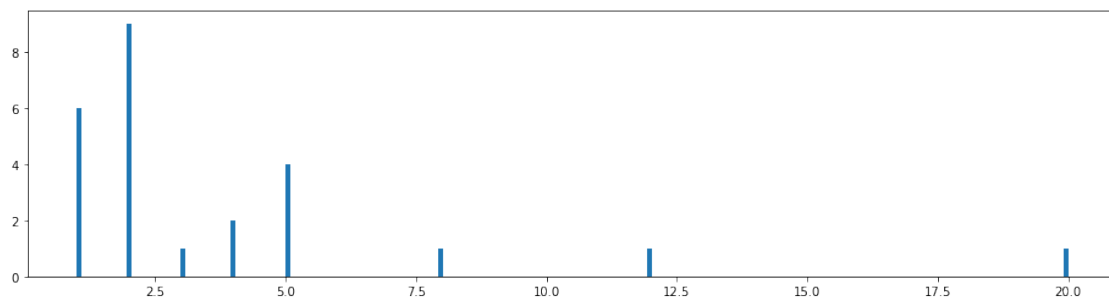
Stats for hour 6

	Month	SessionCount
count	19.00	19.00
mean	9.47	2.79
std	0.51	2.23
min	9.00	1.00
25%	9.00	1.00
50%	9.00	2.00
75%	10.00	4.00
80%	10.00	4.00
max	10.00	10.00



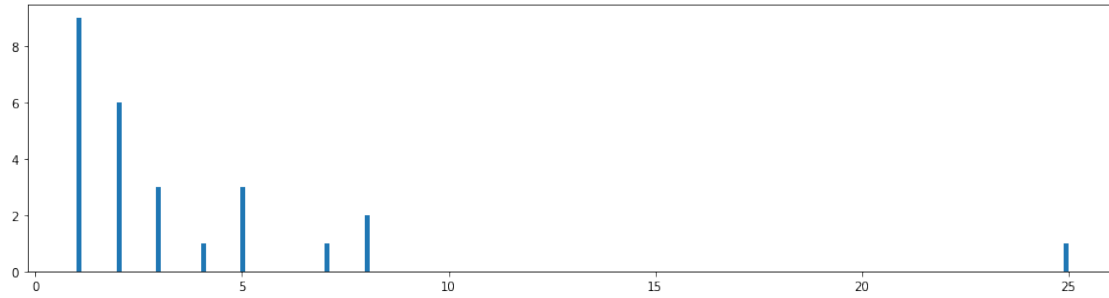
Stats for hour 7

	Month	SessionCount
count	25.00	25.00
mean	9.44	3.80
std	0.51	4.23
min	9.00	1.00
25%	9.00	2.00
50%	9.00	2.00
75%	10.00	5.00
80%	10.00	5.00
max	10.00	20.00



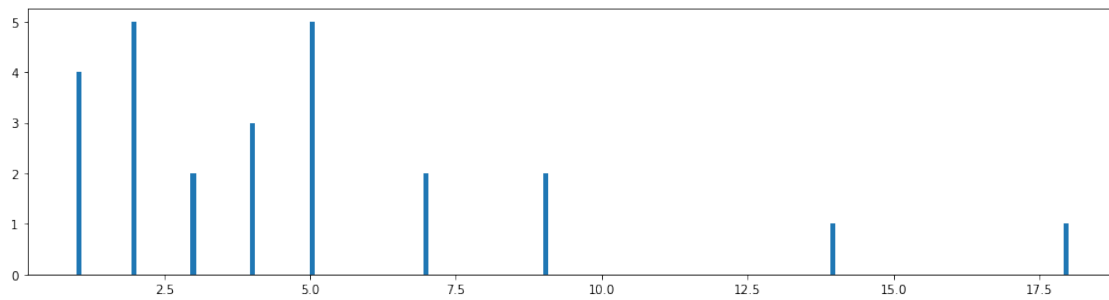
Stats for hour 8

	Month	SessionCount
count	26.00	26.00
mean	9.50	3.73
std	0.51	4.86
min	9.00	1.00
25%	9.00	1.00
50%	9.50	2.00
75%	10.00	4.75
80%	10.00	5.00
max	10.00	25.00



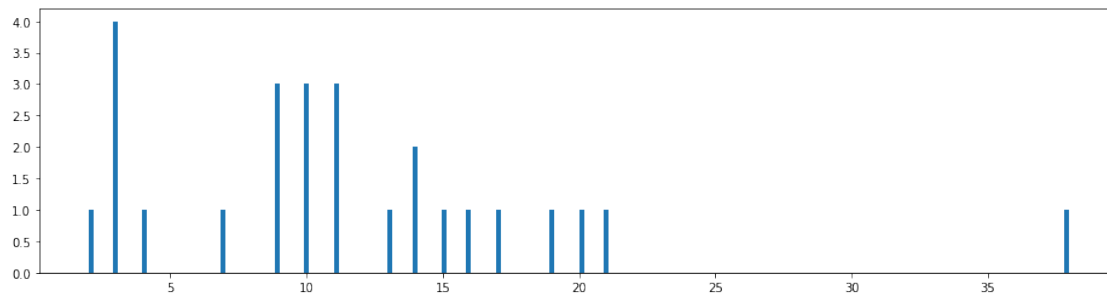
Stats for hour 9

	Month	SessionCount
count	25.00	25.00
mean	9.40	4.84
std	0.50	4.13
min	9.00	1.00
25%	9.00	2.00
50%	9.00	4.00
75%	10.00	5.00
80%	10.00	7.00
max	10.00	18.00



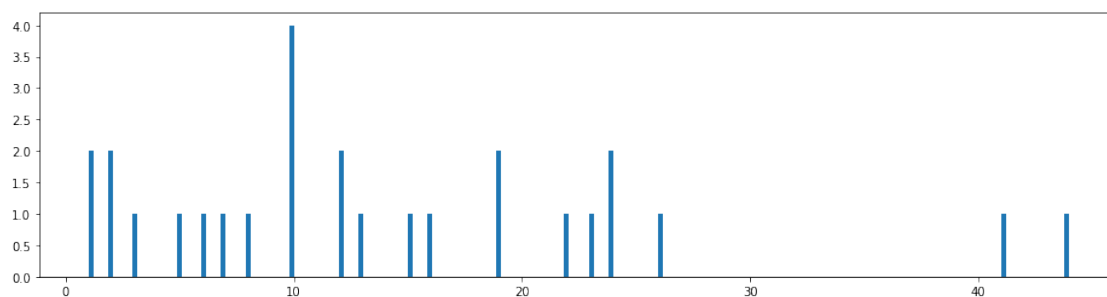
Stats for hour 10

	Month	SessionCount
count	26.00	26.00
mean	9.46	11.62
std	0.51	7.69
min	9.00	2.00
25%	9.00	7.50
50%	9.00	10.50
75%	10.00	14.75
80%	10.00	16.00
max	10.00	38.00



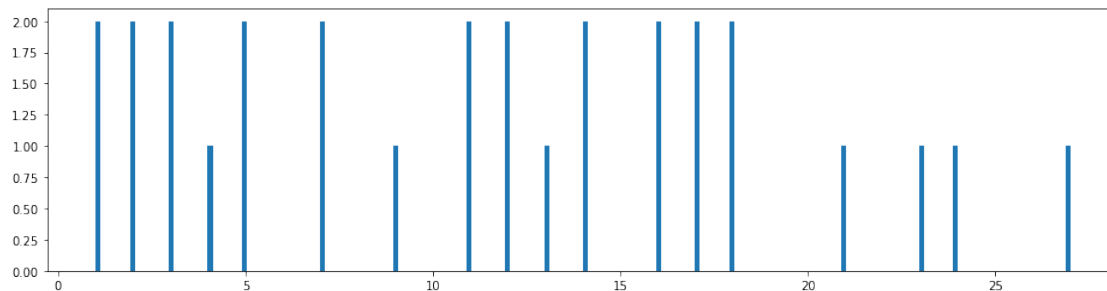
Stats for hour 11

	Month	SessionCount
count	27.00	27.00
mean	9.48	14.26
std	0.51	11.13
min	9.00	1.00
25%	9.00	6.50
50%	9.00	12.00
75%	10.00	20.50
80%	10.00	22.80
max	10.00	44.00



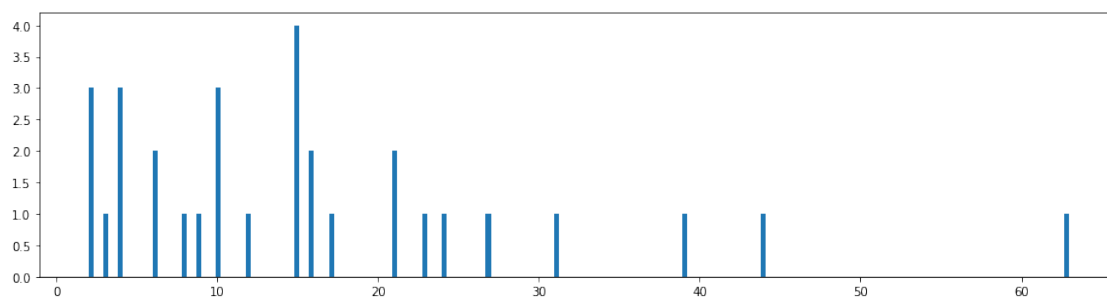
Stats for hour 12

	Month	SessionCount
count	29.00	29.00
mean	9.48	11.48
std	0.51	7.45
min	9.00	1.00
25%	9.00	5.00
50%	9.00	12.00
75%	10.00	17.00
80%	10.00	17.40
max	10.00	27.00



Stats for hour 13

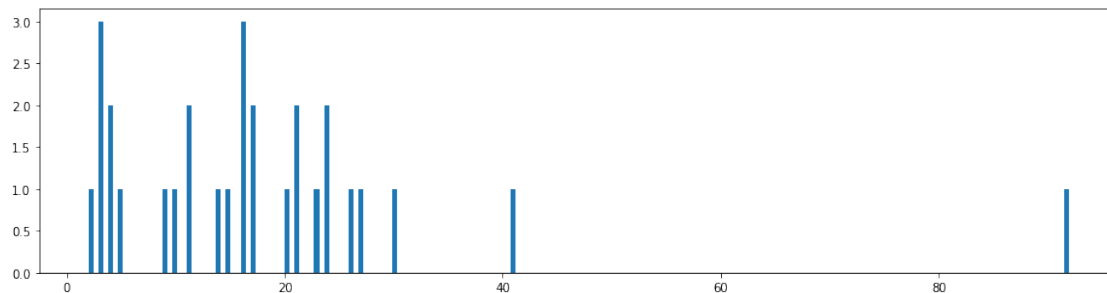
	Month	SessionCount
count	31.00	31.00
mean	9.52	15.94
std	0.51	13.74
min	9.00	2.00
25%	9.00	6.00
50%	10.00	15.00
75%	10.00	21.00
80%	10.00	23.00
max	10.00	63.00



Stats for hour 14

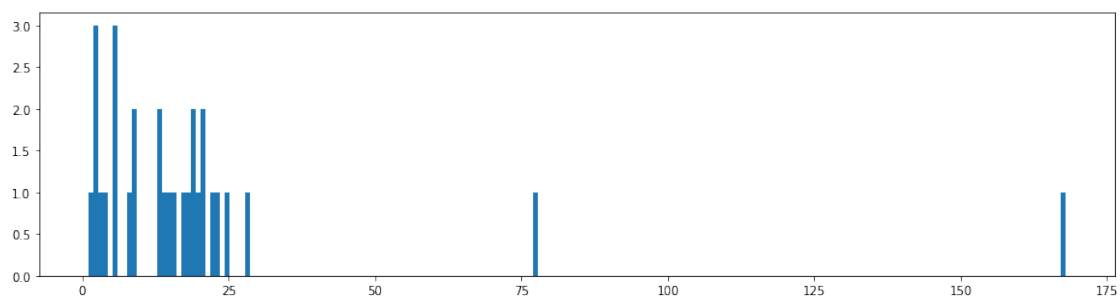
	Month	SessionCount
count	29.00	29.00
mean	9.48	18.10
std	0.51	17.10
min	9.00	2.00
25%	9.00	9.00
50%	9.00	16.00
75%	10.00	23.00
80%	10.00	24.00
max	10.00	92.00





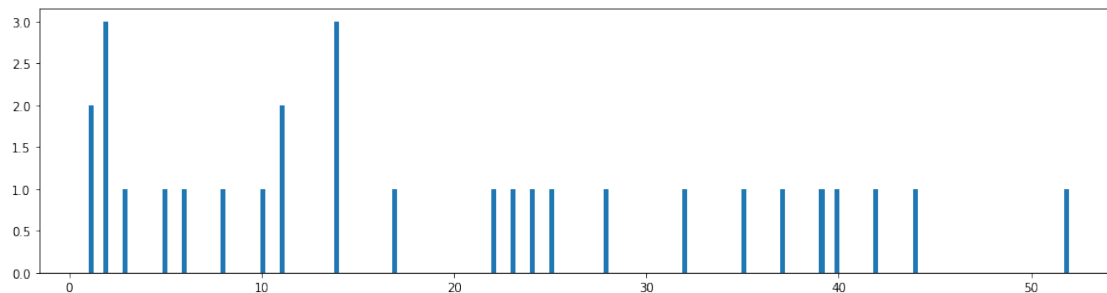
Stats for hour 15

	Month	SessionCount
count	30.00	30.00
mean	9.50	20.23
std	0.51	31.24
min	9.00	1.00
25%	9.00	6.00
50%	9.50	14.50
75%	10.00	20.75
80%	10.00	21.20
max	10.00	168.00



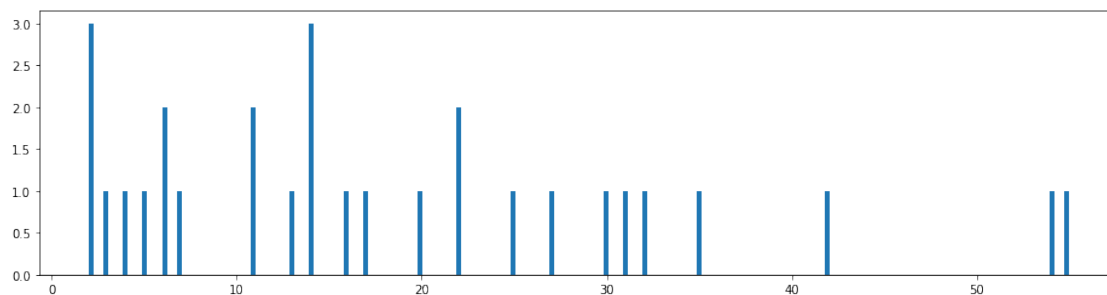
Stats for hour 16

	Month	SessionCount
count	29.00	29.00
mean	9.48	19.45
std	0.51	15.28
min	9.00	1.00
25%	9.00	6.00
50%	9.00	14.00
75%	10.00	32.00
80%	10.00	35.80
max	10.00	52.00



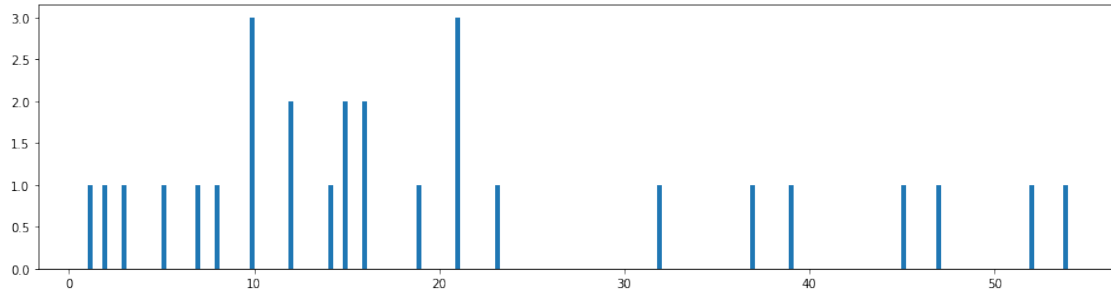
Stats for hour 17

	Month	SessionCount
count	29.00	29.00
mean	9.48	18.69
std	0.51	14.80
min	9.00	2.00
25%	9.00	6.00
50%	9.00	14.00
75%	10.00	27.00
80%	10.00	30.40
max	10.00	55.00



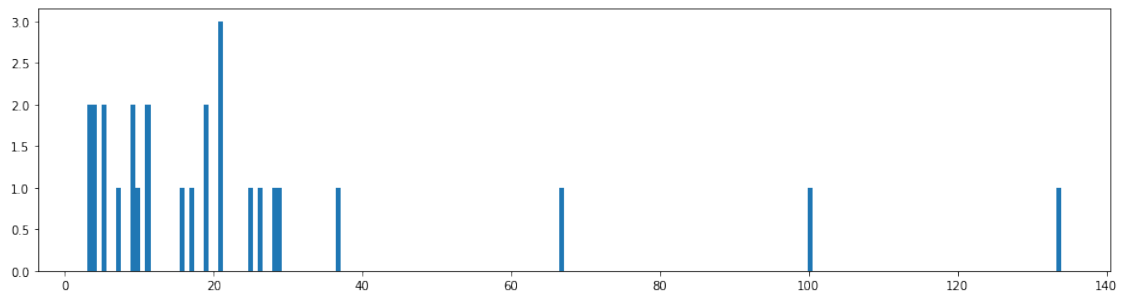
Stats for hour 18

	Month	SessionCount
count	28.00	28.00
mean	9.46	20.25
std	0.51	15.39
min	9.00	1.00
25%	9.00	10.00
50%	9.00	15.50
75%	10.00	25.25
80%	10.00	35.00
max	10.00	54.00



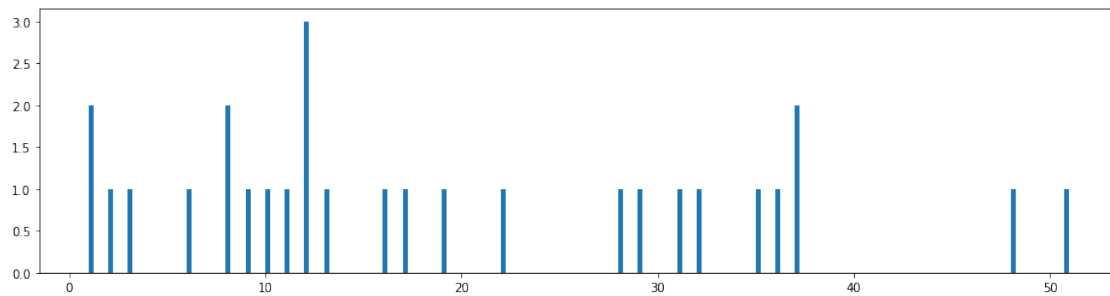
Stats for hour 19

	Month	SessionCount
count	27.00	27.00
mean	9.44	24.48
std	0.51	30.26
min	9.00	3.00
25%	9.00	8.00
50%	9.00	17.00
75%	10.00	25.50
80%	10.00	27.60
max	10.00	134.00



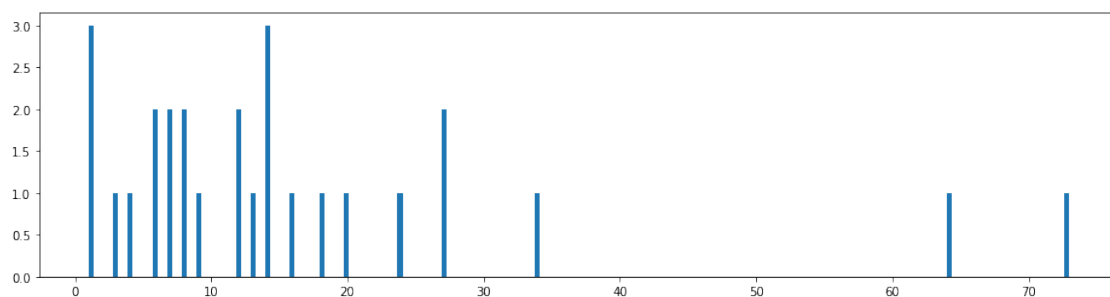
Stats for hour 20

	Month	SessionCount
count	28.00	28.00
mean	9.50	19.50
std	0.51	14.40
min	9.00	1.00
25%	9.00	8.75
50%	9.50	14.50
75%	10.00	31.25
80%	10.00	33.80
max	10.00	51.00



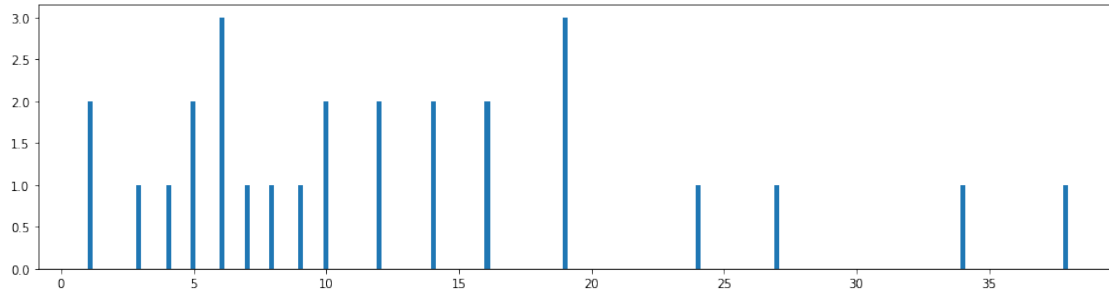
### Stats for hour 21

	Month	SessionCount
count	27.00	27.00
mean	9.52	16.41
std	0.51	17.30
min	9.00	1.00
25%	9.00	6.50
50%	10.00	12.00
75%	10.00	19.00
80%	10.00	23.20
max	10.00	73.00



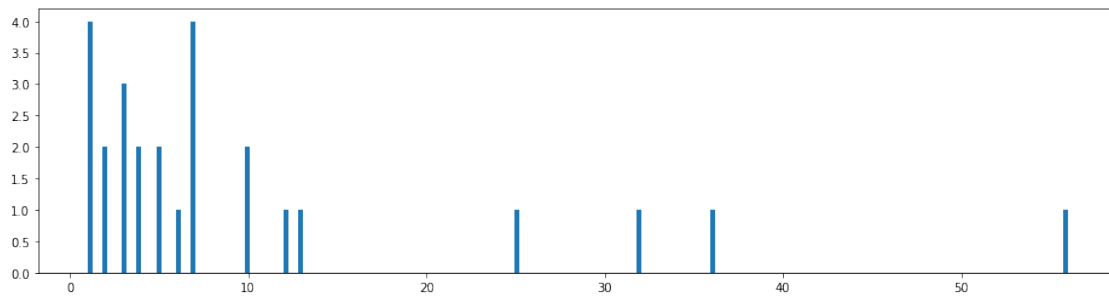
### Stats for hour 22

	Month	SessionCount
count	27.00	27.00
mean	9.44	12.78
std	0.51	9.51
min	9.00	1.00
25%	9.00	6.00
50%	9.00	10.00
75%	10.00	17.50
80%	10.00	19.00
max	10.00	38.00



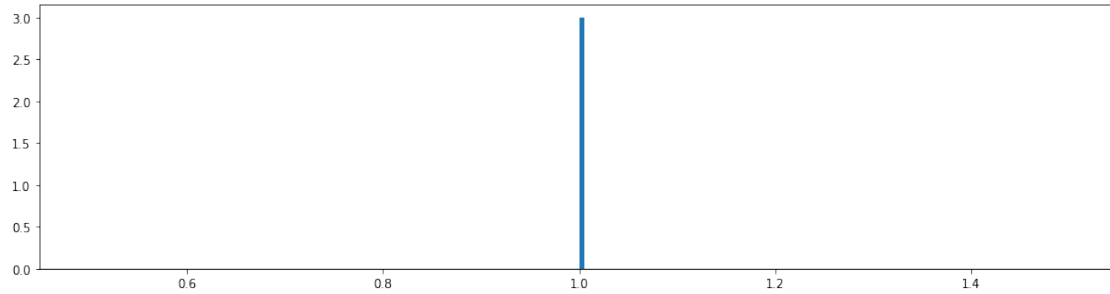
Stats for hour 23

	Month	SessionCount
count	26.00	26.00
mean	9.46	10.12
std	0.51	13.09
min	9.00	1.00
25%	9.00	3.00
50%	9.00	5.50
75%	10.00	10.00
80%	10.00	12.00
max	10.00	56.00



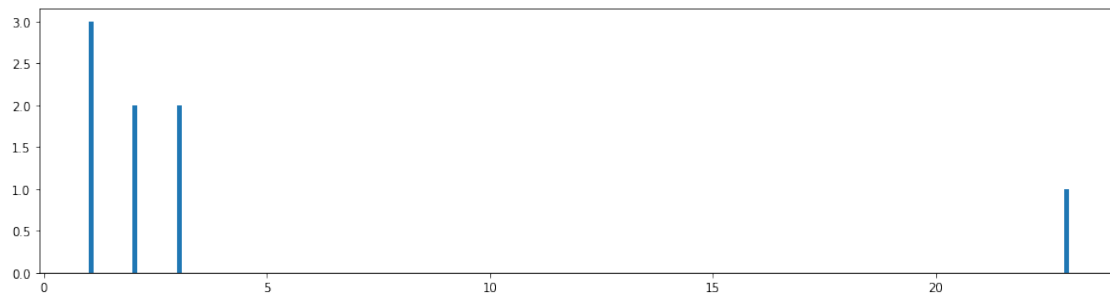
Stats for hour 4

	Month	SessionCount
count	3.00	3.00
mean	9.00	1.00
std	0.00	0.00
min	9.00	1.00
25%	9.00	1.00
50%	9.00	1.00
75%	9.00	1.00
80%	9.00	1.00
max	9.00	1.00



Stats for hour 3

	Month	SessionCount
count	8.00	8.00
mean	9.50	4.50
std	0.53	7.52
min	9.00	1.00
25%	9.00	1.00
50%	9.50	2.00
75%	10.00	3.00
80%	10.00	3.00
max	10.00	23.00



## 1.1 Graphical averaging of values at each hour across 24 hour period

```
[28]: main_sample = pd.DataFrame()
for i, row in alert_set.iterrows():
    alert = row['Name']
    periods = data_prep(row)
    metric = row['Metric']
    agg_column = row['AggColumn']
    aggregation = row['Aggregation']
    for period, value in periods.items():
        sample = value.groupby(['Hour'])[agg_column].mean().
        ↪reset_index(name=agg_column).set_index(['Hour'])
```

```

#         print(sample)
#         print(sample.median())
sample.plot(figsize=(16,10), grid=True, title=' '.join([alert, period,
↪agg_column]))
sample.rename(columns={sample.columns.tolist()[0]:sample.columns.
↪tolist()[0]+period}, inplace=True)
    if main_sample.empty:
        main_sample = sample
    else:
        main_sample = main_sample.merge(sample, left_on='Hour',
↪right_on='Hour', how='left')
main_sample.describe()
# main_sample

```

```

[28]:
      CreditsUsedFirstHalf  CreditsUsedSecondHalf  FailRateFirstHalf  \
count                24.00                24.00                24.00
mean                18,962.47                12,065.24                0.04
std                 15,871.36                10,599.36                0.02
min                   5.03                   1.45                0.02
25%                 1,300.31                 2,628.14                0.03
50%                 20,574.05                11,130.24                0.04
75%                 30,971.04                20,150.35                0.04
max                 45,623.90                30,332.77                0.10

      FailRateSecondHalf  SessionCountFirstHalf  SessionCountSecondHalf
count                24.00                24.00                24.00
mean                 0.08                16.30                11.24
std                  0.14                11.32                 7.33
min                  0.01                 1.00                 1.00
25%                  0.03                 4.12                 4.33
50%                  0.04                19.11                11.55
75%                  0.05                26.98                18.25
max                  0.58                32.00                24.48

```

