Caitlin_Monaghan_Yammer

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1 Yammer: Investigating a Drop in User Engagement

1.1 Question:

1.1.1 What is behind the recent drop in weekly user engagement?

1.1.2 Engagement:

Making some type of server call by interacting with the product.

1.1.3 User Engagement:

Measured as the number of users who logged at least one engagement event during the week starting on that date.

Note: Engagement figure is based on login events specifically, though this always precedes any other engagement activities

Hypotheses:

- Does it differ by country?
  - Time range corresponds to common European holiday

```
In [1]: # Import packages
        import os
        import pandas as pd
        from datetime import datetime
        import seaborn as sns
```

```
In [2]: # Read in data
        os.chdir('/Users/ckm/insight/Data Challenges/Week2')
        df_emails = pd.read_csv('yammer_emails.csv')
        df_events = pd.read_csv('yammer_events.csv')
        df_users = pd.read_csv('yammer_users.csv')
        df_rollup = pd.read_csv('dimension_rollup_periods.csv')
```

In [3]:
```
# Functions to convert string timestamps to datetime, date, and time formats

def make_datetime(string):
    return datetime.strptime(string, '%Y-%m-%d %H:%M:%S')
def make_date(string):
    return datetime.strptime(string[:10], '%Y-%m-%d')
def make_time(string):
    return datetime.strptime(string[11:], '%H:%M:%S')

df_emails['datetime'] = df_emails['occurred_at'].apply(make_datetime)
df_emails['date'] = df_emails['occurred_at'].apply(make_date)
df_emails['time'] = df_emails['occurred_at'].apply(make_time)

df_users['datetime_c'] = df_users['created_at'].apply(make_datetime)
df_users['date_c'] = df_users['created_at'].apply(make_date)
df_users['time_c'] = df_users['created_at'].apply(make_time)

df_events['datetime'] = df_events['occurred_at'].apply(make_datetime)
df_events['date'] = df_events['occurred_at'].apply(make_date)
df_events['time'] = df_events['occurred_at'].apply(make_time)
```

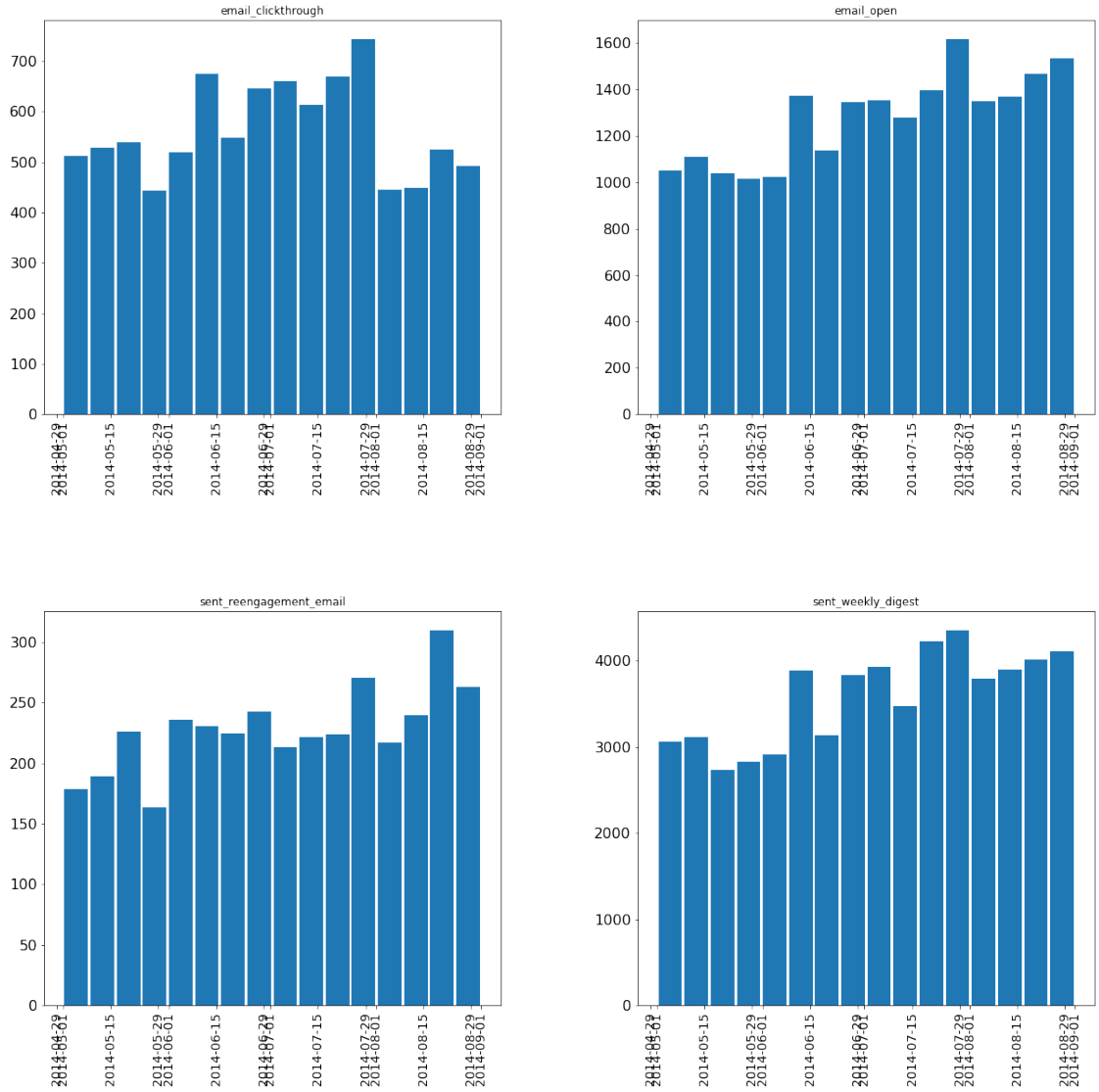
In [4]:
```
# Merge dataframes into one, add some other info.

df_emails = df_emails.rename({'action': 'event_type'}, axis='columns')
df_emails = df_emails.set_index('user_id', drop=False)
df_users = df_users.set_index('user_id', drop=False)
df_events = df_events.set_index('user_id', drop=False)
df_full = pd.concat([df_emails, df_events], sort=False)

def add_comp(row):
    return df_users['company_id'].loc[row]

df_full['company_id'] = df_full['user_id'].apply(add_comp)
```

2 Yammer emails

2.1 Exploratory Data Analysis

2.2 Email clickthroughs are down, though they are still being opened:

In [5]:
```
ax = df_emails.hist(column='date', by='event_type', figsize=(20,20), bins=16,
                    range=('2014-05-01', '2014-09-01'), rwidth=0.9,
                    xlabelsize=14, ylabelsize=16)
```

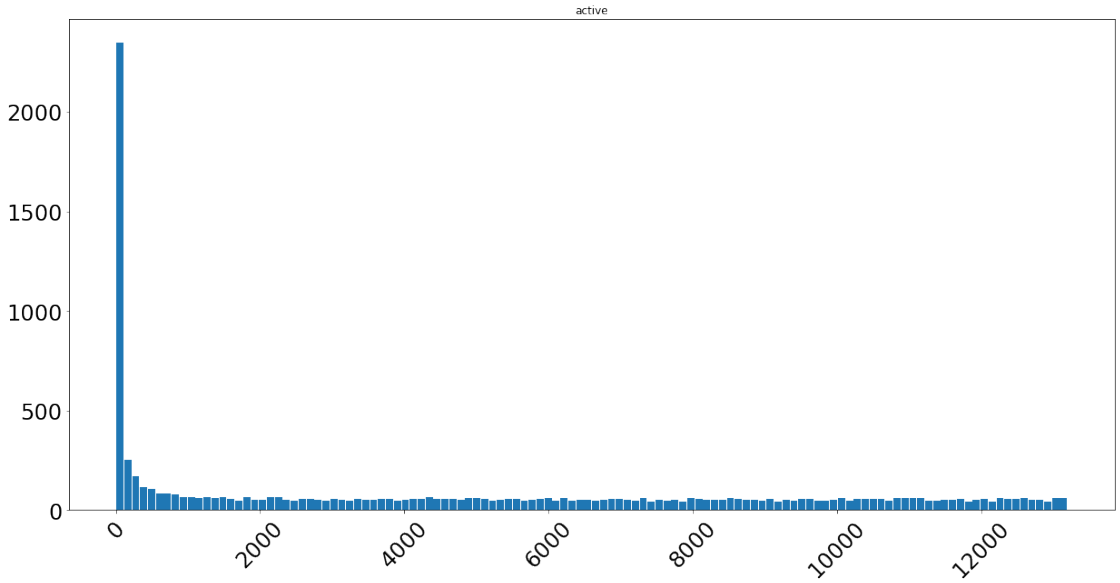


3 Yammer users

3.1 Exploratory Data Analysis

3.2 Number of active users in companies

```
In [6]: ax=df_users[df_users['state']=='active'].hist(column='company_id', by='state',
                                                    bins=120, figsize=(20,10), xrot=45,
                                                    rwidth=0.9,xlabelsize=24, ylabelsize=24)
```



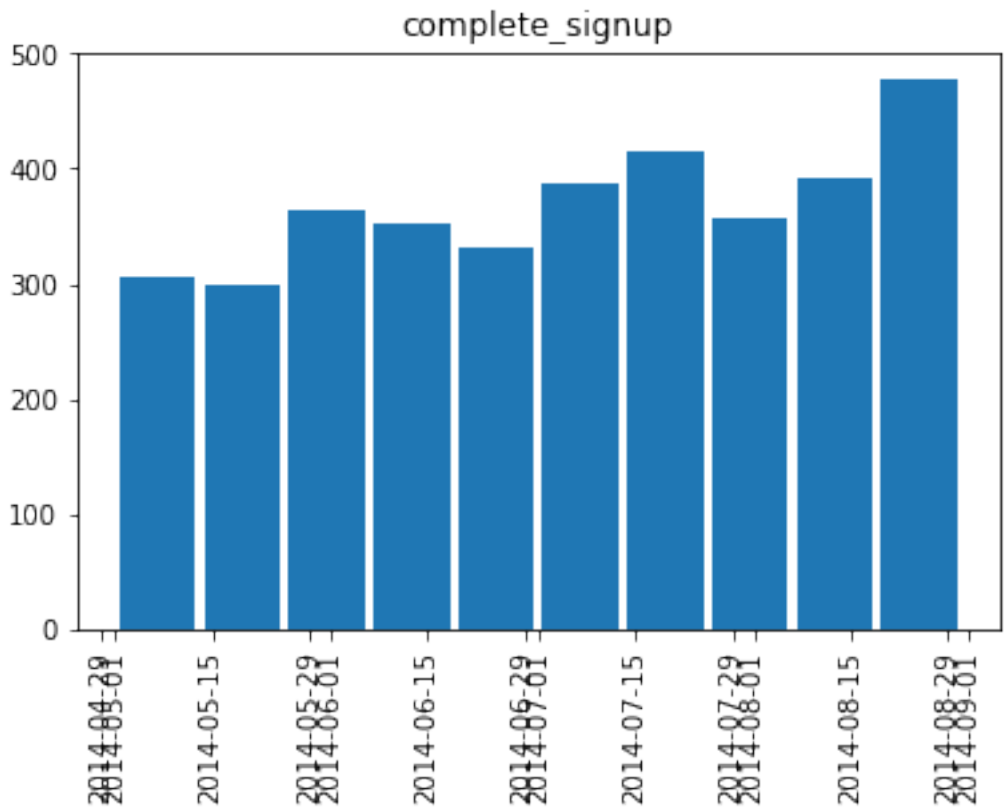
3.3 Not many more unique users than companies:

```
In [7]: companies = df_users['company_id'].unique()
        print('Unique companies: ' + str(len(companies)))
        print('Total users: ' + str(len(df_users)))
```

```
Unique companies: 13198
Total users: 19066
```

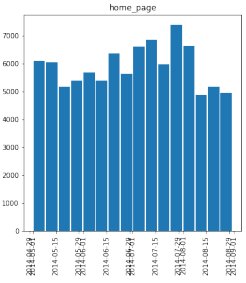
3.4 Signups are actually increasing

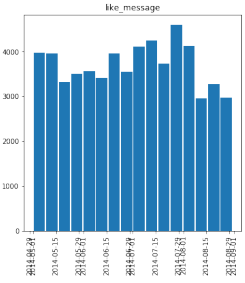
```
In [8]: ax=df_events[df_events['event_name']=='complete_signup'].hist(column='date',
                                                                      by='event_name',
                                                                      rwidth=0.9)
```

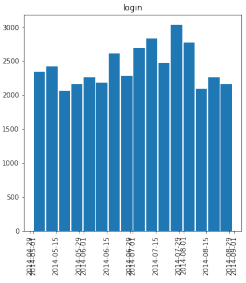


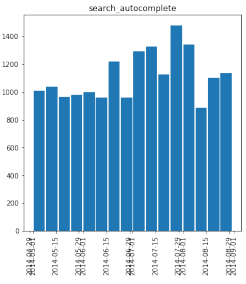
3.5 Decreasing trend consistent across event types:

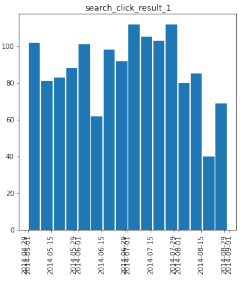
```
In [9]: ax=df_events[df_events['event_type']=='engagement'].hist(column='date', by='event_name',
                                                                 figsize=(20,50), layout=(6,3),
                                                                 bins=16, rwidth=0.9)
```

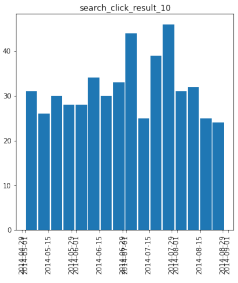

home_page

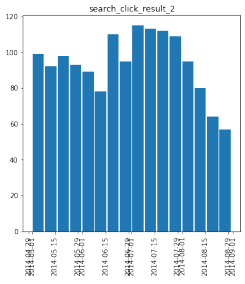

like_message

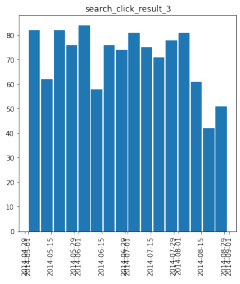

login

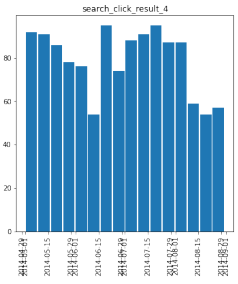

search_autocomplete

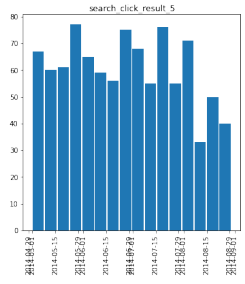

search_click_result_1

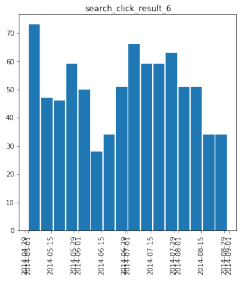

search_click_result_10

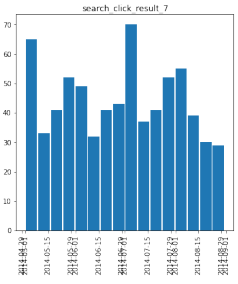

search_click_result_2

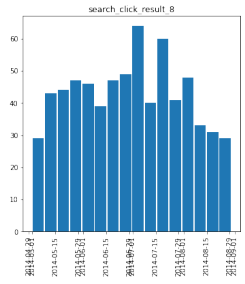

search_click_result_3

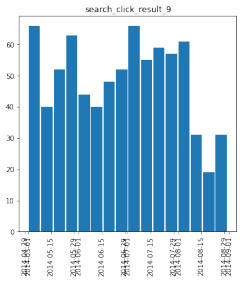

search_click_result_4

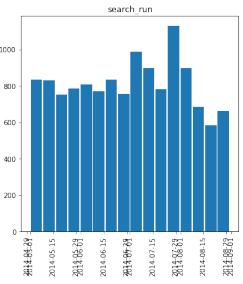

search_click_result_5

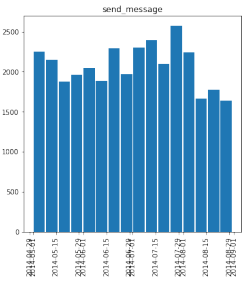

search_click_result_6

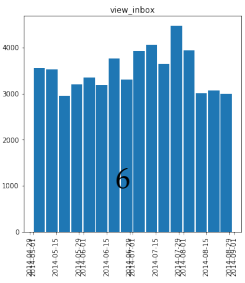

search_click_result_7


search_click_result_8


search_click_result_9

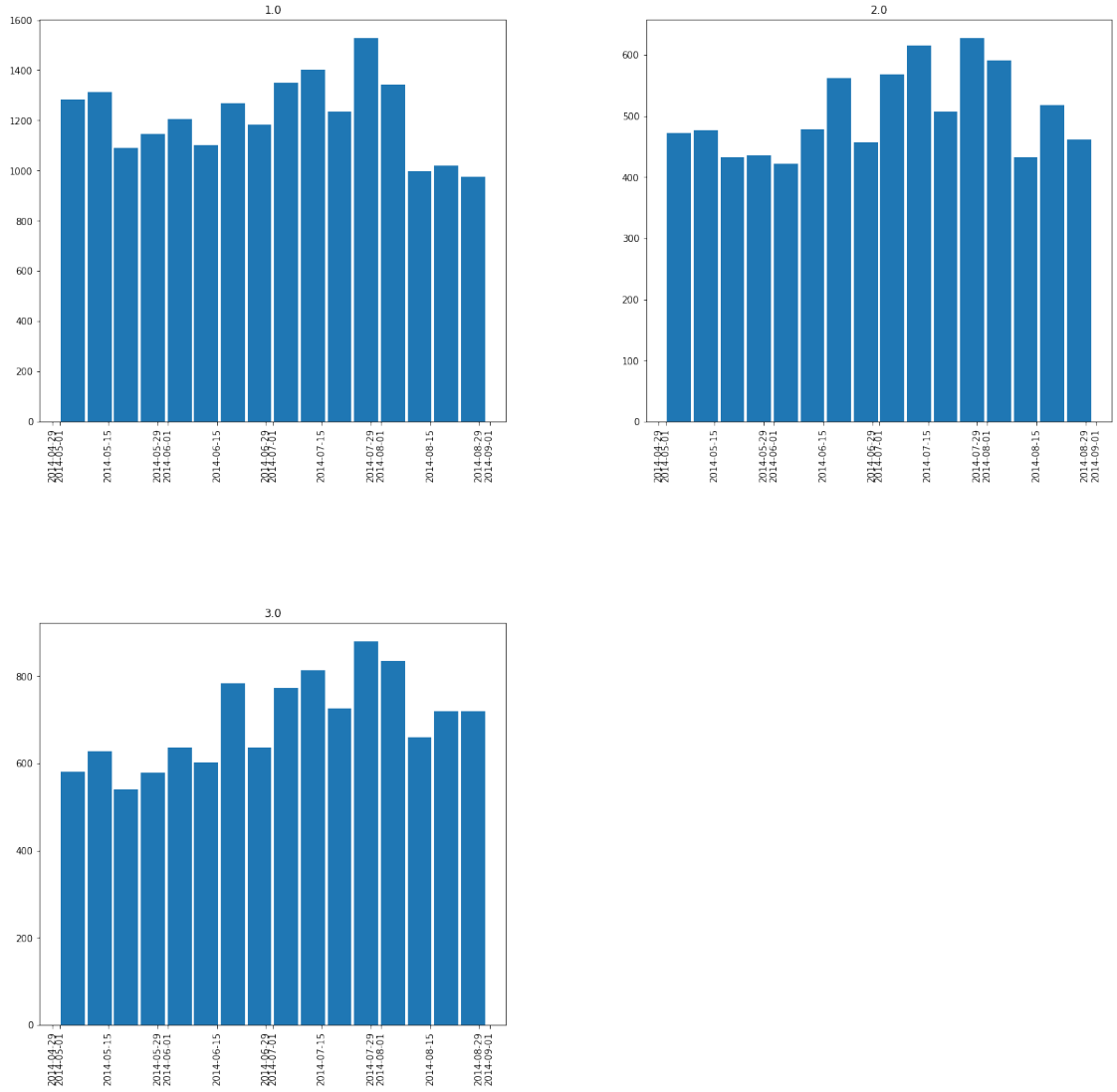

search_run


send_message


view_inbox

3.6 Decrease most pronounced in user type 1, though present across all:

```
In [10]: ax=df_events[df_events['event_name']=='login'].hist(column='date', by='user_type',
                                                             figsize=(20,20), bins=16,
                                                             rwidth=0.9)
```



3.7 Decrease in logins appears more pronounced in many European countries:

```
In [11]: ax=df_events[df_events['event_name']=='login'].hist(column='date', by='location',
                                                             figsize=(30,60), layout=(12,4),
                                                             rwidth=0.9, bins=16)
```


Argentina
Australia
Austria
Belgium
Brazil
Canada
Chile
Colombia
Denmark
Egypt
Finland
France
Germany
Greece
Hong Kong
India
Indonesia
Iran
Iraq
Ireland
Israel
Italy
Japan
Korea
Malaysia
Mexico
Netherlands
Nigeria
Norway
Pakistan
Philippines
Poland
Portugal
Russia
Saudi Arabia
Singapore
South Africa
Spain
Sweden
Switzerland
Taiwan
Thailand
Turkey
United Arab Emirates
United Kingdom
United States
Venezuela

3.8 Not due to complete failure on a device:

```
In [12]: ax=df_events[df_events['event_name']=='login'].hist(column='date', by='device',
                                                             figsize=(30,40), layout=(7,4),
                                                             rwidth=0.9, bins=16)
```

4 Ultimately, decrease in user engagement is likely due to the European holiday in August when fewer people are working.

5 Given the increase in user signups, engagement will likely rebound and return to previous growth.