Yammer ---- Yanchu Wang

Read the events file, which seems to be the most important one

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
evt=pd.read_csv('yammer_events.csv')
```

In [3]:
```
evt['time']=(pd.to_datetime(evt.occurred_at)-pd.to_datetime("2013-01-0
1 20:59:28")).dt.days
```

In [4]:
```
evt.head()
```

Out[4]:

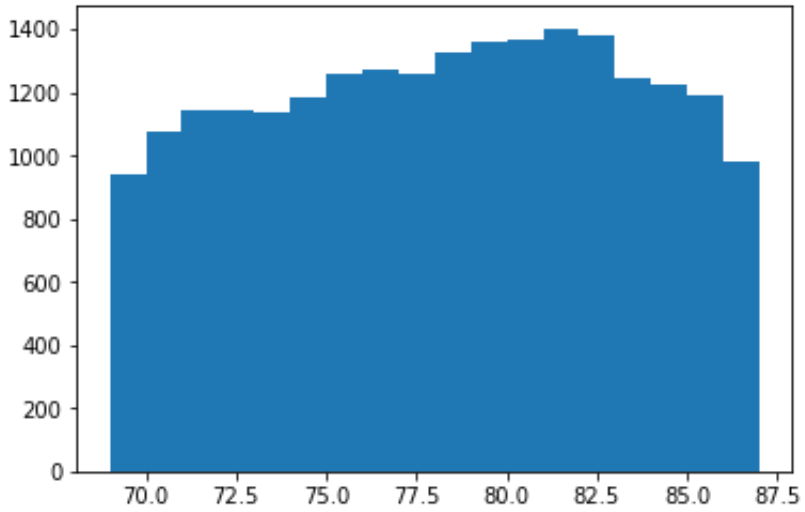
	user_id	occurred_at	event_type	event_name	location	device	user_type	time
0	10522.0	2014-05-02 11:02:39	engagement	login	Japan	dell inspiron notebook	3.0	485
1	10522.0	2014-05-02 11:02:53	engagement	home_page	Japan	dell inspiron notebook	3.0	485
2	10522.0	2014-05-02 11:03:28	engagement	like_message	Japan	dell inspiron notebook	3.0	485
3	10522.0	2014-05-02 11:04:09	engagement	view_inbox	Japan	dell inspiron notebook	3.0	485
4	10522.0	2014-05-02 11:03:16	engagement	search_run	Japan	dell inspiron notebook	3.0	485

reproduce the plot shown by the head

In [5]:
```
evt['week']=(evt.time)//7
```

In [6]:
```
plt.hist(evt[evt.event_type=='engagement'][['user_id','location','week
']].drop_duplicates().week,bins=range(evt.week.min(),evt.week.max()+2)
)
```

Out[6]:
```
(array([ 943., 1075., 1144., 1142., 1139., 1184., 1259., 1272., 1257
.,
        1325., 1358., 1367., 1403., 1384., 1243., 1223., 1191.,  980
.]),
 array([69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83,
84, 85,
        86, 87]),
 <a list of 18 Patch objects>)
```

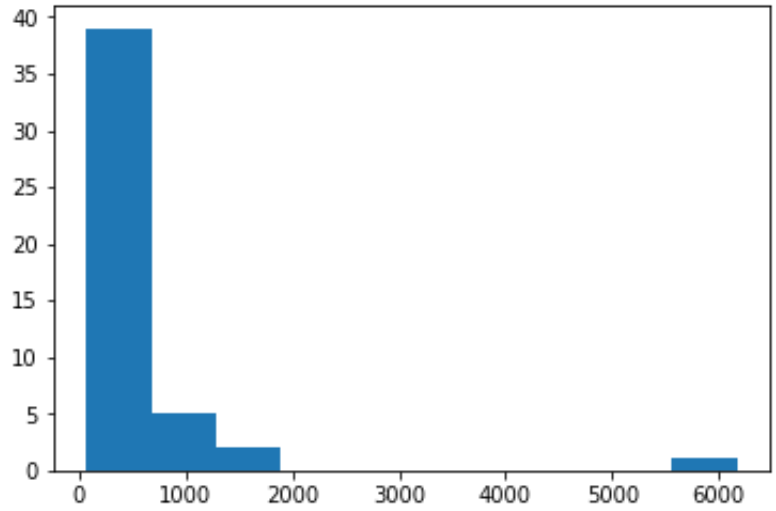


Hypothesis 1: Regional effect? Regional policy or server down?

In [7]:
```
evt2=evt[(evt.event_type=='engagement')][['user_id','week','location']
].drop_duplicates()
```

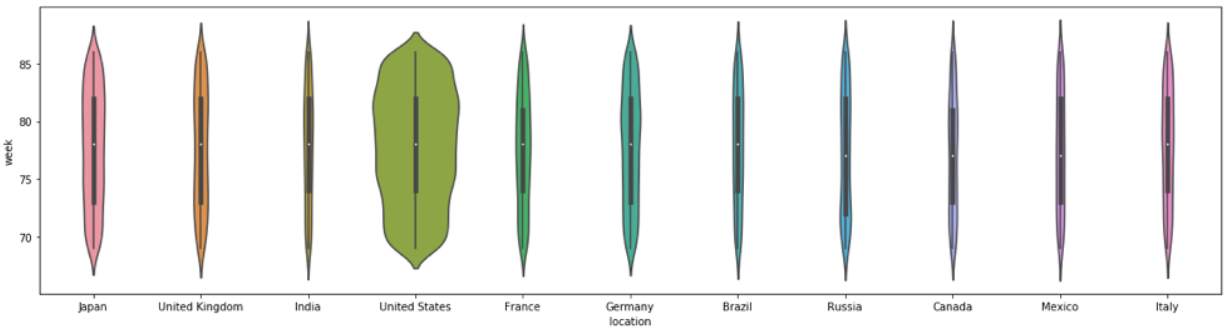
In [8]:
```
plt.hist(evt2.location.value_counts())
```

Out[8]:
```
(array([39.,  5.,  2.,  0.,  0.,  0.,  0.,  0.,  0.,  1.]),
 array([  65. ,  675.2, 1285.4, 1895.6, 2505.8, 3116. , 3726.2, 4336
.4,
        4946.6, 5556.8, 6167. ]),
 <a list of 10 Patch objects>)
```



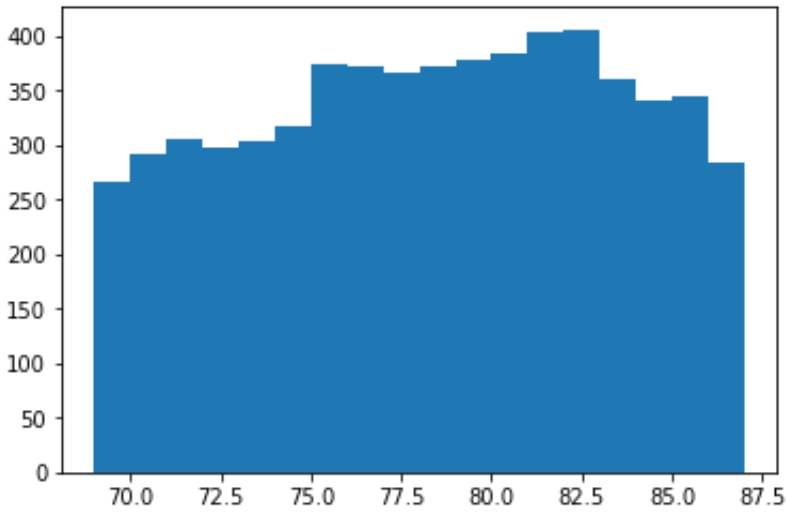
In [9]:
```
evt2=evt2[evt2.groupby('location')['week'].transform('count')>500]
plt.figure(figsize=(20,5))
sns.violinplot(x = 'location', y = 'week',data = evt2,scale="count")
```

Out[9]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1a18e95198>
```



In [10]:
```
plt.hist(evt2[evt2.location=='United States'].week,bins=range(evt.week
.min(),evt.week.max()+2))
```

Out[10]:
```
(array([266., 291., 306., 297., 303., 318., 374., 373., 366., 373.,
378.,
        383., 403., 406., 361., 340., 345., 284.]),
 array([69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83,
84, 85,
        86, 87]),
 <a list of 18 Patch objects>)
```

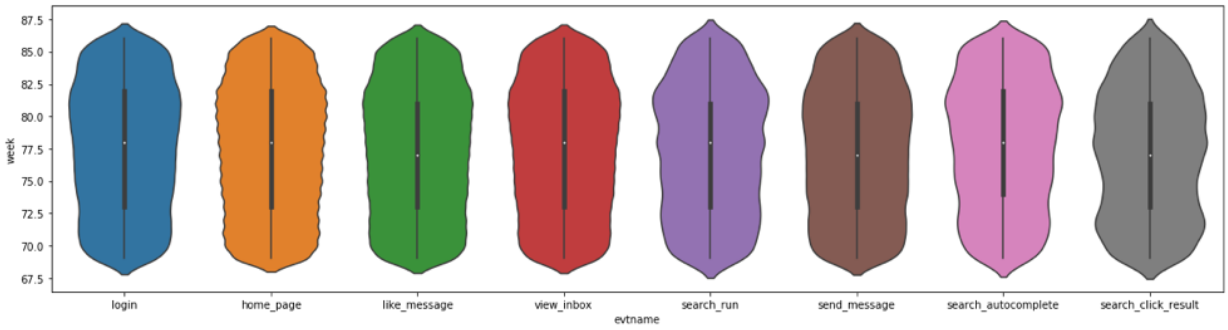


nothing much about the location, most of the users are in the US

Hypothesis 2: Something related to the event name? Some service malfunctioning?

In [11]:
```
evt['evtname']=evt.event_name.apply(lambda x: ('search_click_result' i
f 'search_click_result_' in x else x))
plt.figure(figsize=(20,5))
sns.violinplot(x = 'evtname', y = 'week',data = evt[evt.event_type=='e
ngagement'])
```

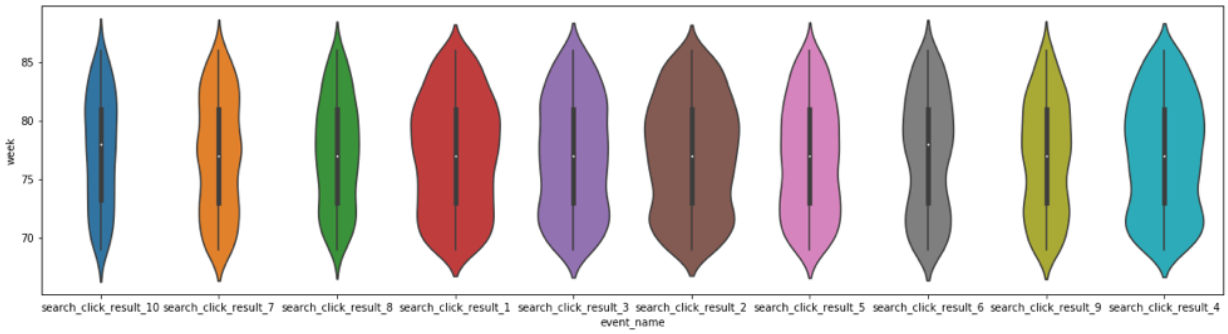
Out[11]: <matplotlib.axes._subplots.AxesSubplot at 0x1a184bf550>



The same trend across all the activities, unclear what's going on. Search_click_result activities seems to fall earlier and harder, comparing to others including search_run

In [12]:
```
plt.figure(figsize=(20,5))
sns.violinplot(x = 'event_name', y = 'week',data = evt[(evt.event_type
=='engagement') & (evt.evtname=='search_click_result')],scale="count")
```

Out[12]: <matplotlib.axes._subplots.AxesSubplot at 0x1a18e950b8>



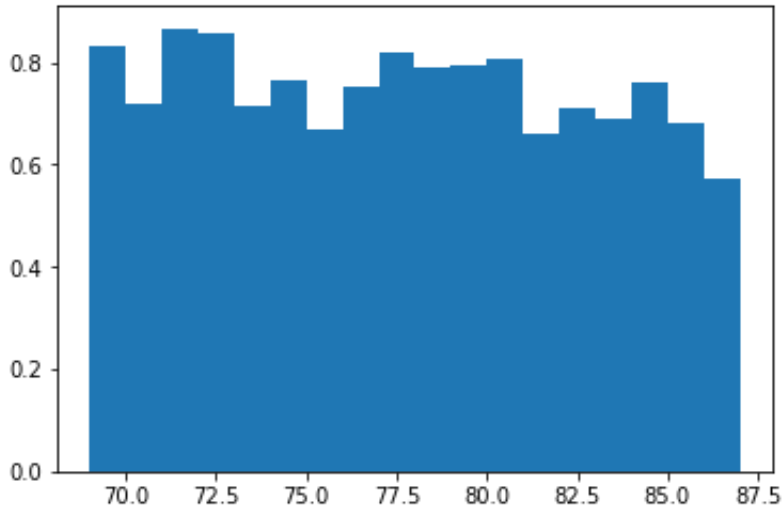
Distribution among search_click_result_X seems to make sense.

Let's have a loot at the click rate of the search runs (#search_click_result/#search_run)

In [13]:
```
cr,bins=np.histogram(evt[evt.evtname=='search_click_result'].week,bins
=range(evt.week.min(),evt.week.max()+2))
sr,bins=np.histogram(evt[evt.evtname=='search_run'].week,bins=range(ev
t.week.min(),evt.week.max()+2))
```

In [14]:
```
plt.bar(bins[:-1], cr/sr, align="edge", width=np.diff(bins))
```

Out[14]:
```
<BarContainer object of 18 artists>
```



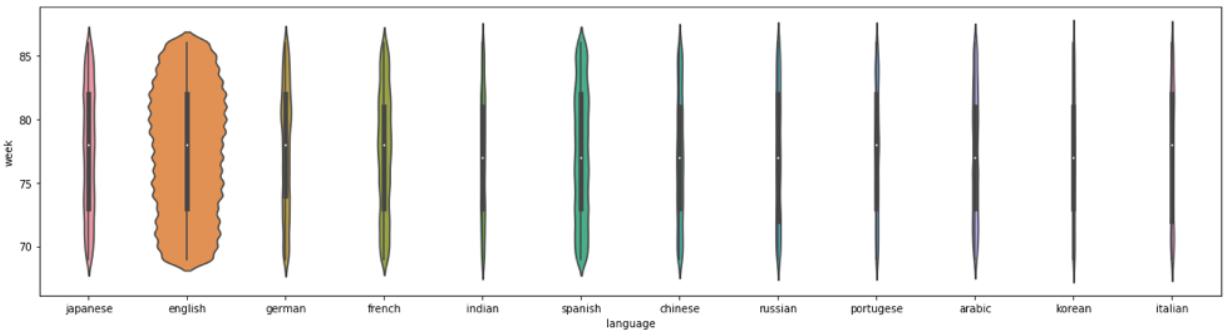
seems to fall, search results aren't as good?

Hypothesis 3: Langurage support?

In [15]:
```
evt3=evt[evt.event_type=='engagement'].merge(pd.read_csv("yammer_users
.csv")[["user_id","company_id","language"]],on='user_id')
```

In [16]:
```
plt.figure(figsize=(20,5))
sns.violinplot(x = 'language', y = 'week',data = evt3,scale="count")
```

Out[16]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1a17e2f3c8>
```

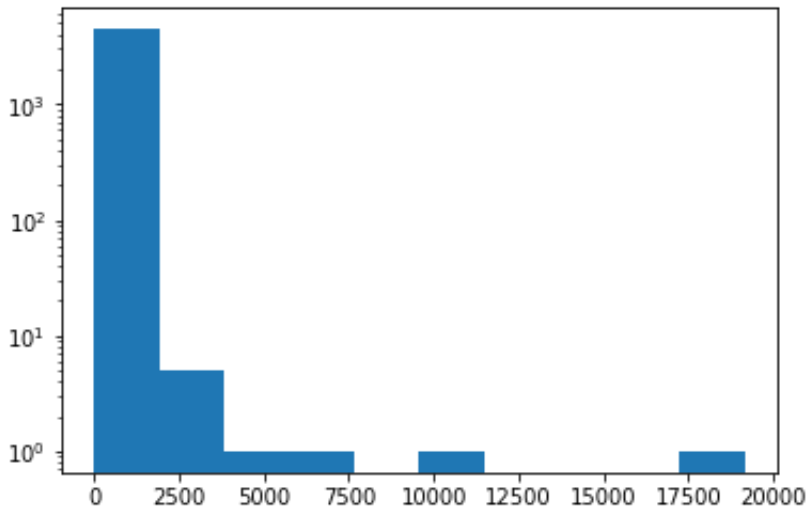


Nothing suspicious. Let's have a look at the companies instead.

Hypothesis 4: Top client company left?

In [17]:
```
plt.hist(evt3.company_id.value_counts(),log=True)
```

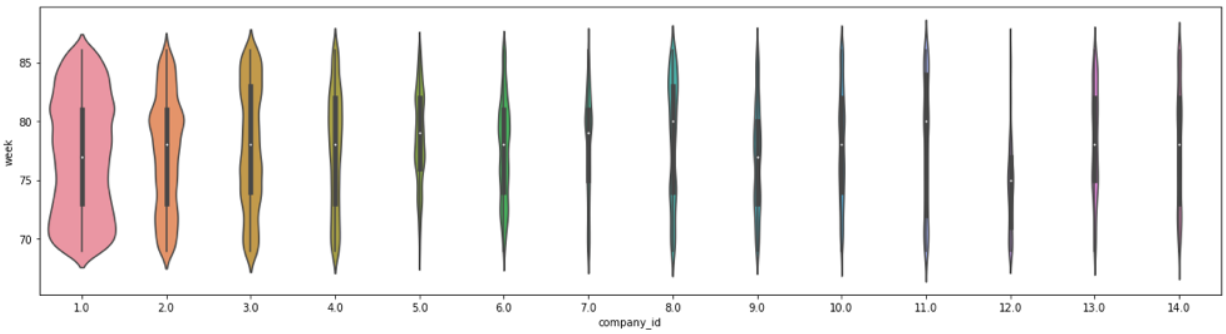
Out[17]:
```
(array([4.444e+03, 5.000e+00, 1.000e+00, 1.000e+00, 0.000e+00, 1.000
e+00,
        0.000e+00, 0.000e+00, 0.000e+00, 1.000e+00]),
 array([2.00000e+00, 1.91730e+03, 3.83260e+03, 5.74790e+03, 7.66320e
+03,
        9.57850e+03, 1.14938e+04, 1.34091e+04, 1.53244e+04, 1.72397e
+04,
        1.91550e+04]),
 <a list of 10 Patch objects>)
```



In [18]:
```
evt3=evt3[evt3.groupby('company_id')['week'].transform('count')>1000]
```

In [19]:
```
plt.figure(figsize=(20,5))
sns.violinplot(x = 'company_id', y = 'week',data = evt3,scale="count")
```

Out[19]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1a179d3748>
```

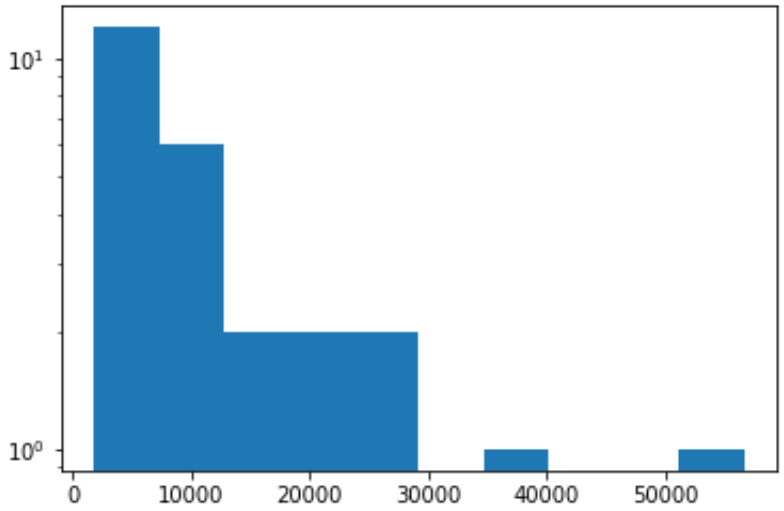


nothing obvious, usage drops in company 2 and 4, 5, 6, 7 etc at the same time.

Hypothesis 5: Device support?

In [20]:
```
plt.hist(evt[evt.event_type=='engagement'].device.value_counts(),log=True)
```

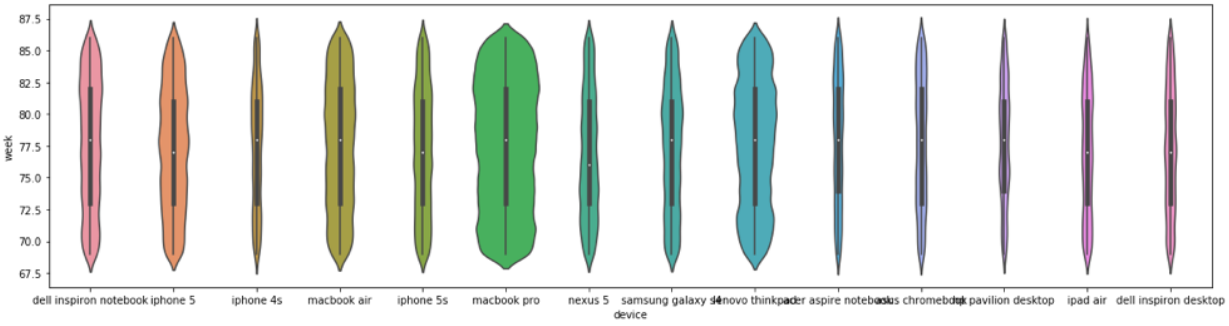
Out[20]:
```
(array([12.,  6.,  2.,  2.,  2.,  0.,  1.,  0.,  0.,  1.]),
 array([ 1786. ,  7274.4, 12762.8, 18251.2, 23739.6, 29228. , 34716.4,
        40204.8, 45693.2, 51181.6, 56670. ]),
 <a list of 10 Patch objects>)
```



In [21]:
```
evt4=evt[(evt.event_type=='engagement') & (evt.groupby('device')['week'].transform('count')>7000)]
```

In [22]:
```
plt.figure(figsize=(20,5))
sns.violinplot(x = 'device', y = 'week',data = evt4,scale="count")
```

Out[22]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1a17b86e80>
```



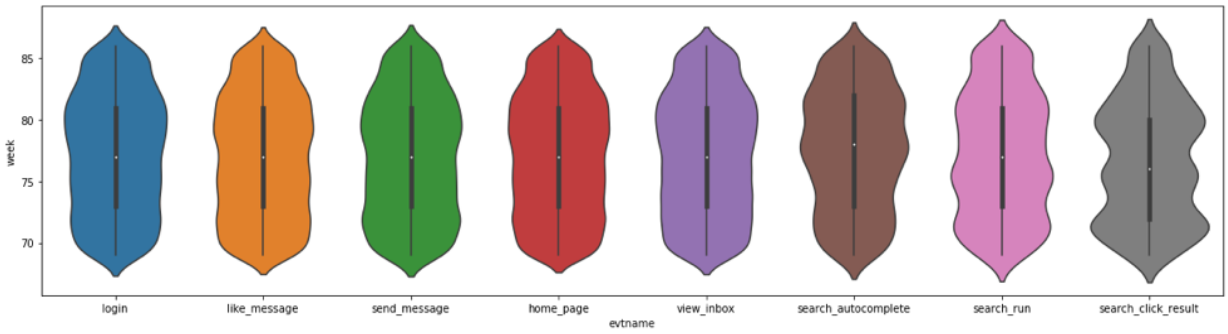
Interesting, usage drop is mainly from iphone, nexus5, samsung galaxy, all mobile devices. something is probably wrong with the mobile apps.

Hypothesis 5.1: function problem with mobile app, especially searching result

In [23]:
```
evt5=evt[(evt.event_type=='engagement') & (evt.device.isin(['iphone 4s
','iphone 5s','nexus 5','samsung galaxy s4']))]
```

In [24]:
```
plt.figure(figsize=(20,5))
sns.violinplot(x = 'evtname', y = 'week',data = evt5)
```

Out[24]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1a17b86da0>
```

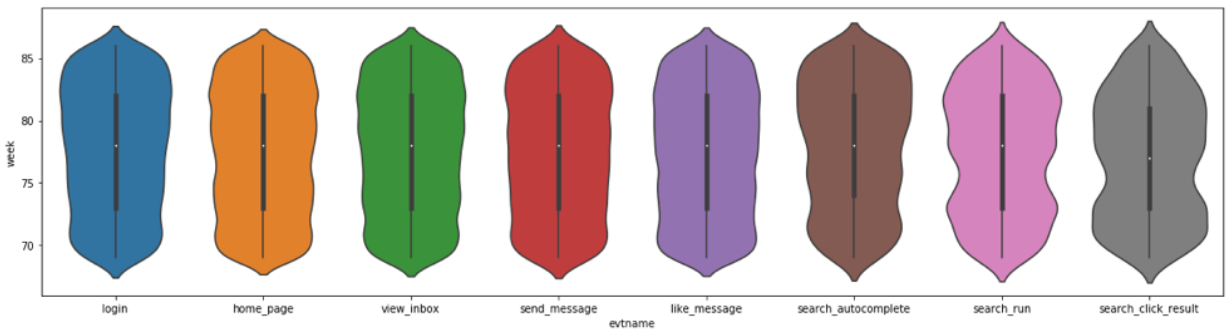


something wrong with the searching result form these devices?

In [25]:
```
evt6=evt[(evt.event_type=='engagement') & (evt.device.isin(['macbook a
ir','macbook pro']))]
```

In [26]:
```
plt.figure(figsize=(20,5))
sns.violinplot(x = 'evtname', y = 'week',data = evt6)
```

Out[26]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1a19a91fd0>
```



Somehow the desktop apps also seem to have a drop in the click rate of the search runs, the searching result might not be the mobile app issue that causes the usage drop.

Hypothesis 5.2: something with email

In [27]:
```
eml=pd.read_csv("yammer_emails.csv")
```

In [28]:
```
eml.head()
```

Out[28]:

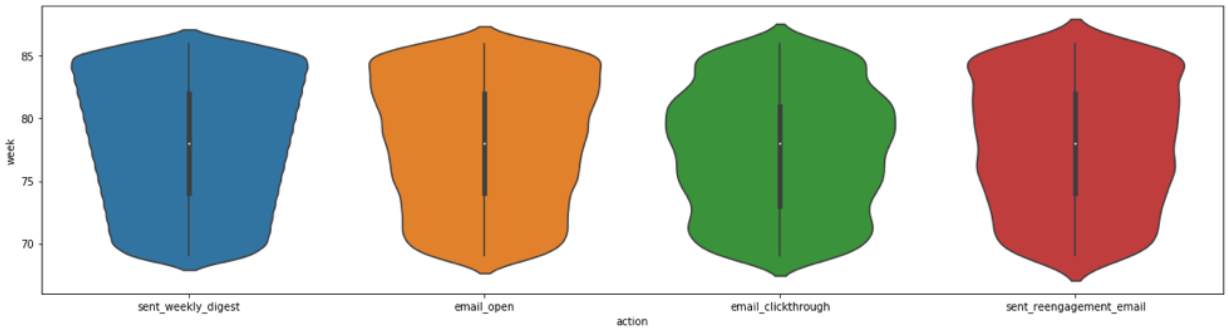
	user_id	occurred_at	action	user_type
0	0.0	2014-05-06 09:30:00	sent_weekly_digest	1.0
1	0.0	2014-05-13 09:30:00	sent_weekly_digest	1.0
2	0.0	2014-05-20 09:30:00	sent_weekly_digest	1.0
3	0.0	2014-05-27 09:30:00	sent_weekly_digest	1.0
4	0.0	2014-06-03 09:30:00	sent_weekly_digest	1.0

In [30]:
```
eml['time']=(pd.to_datetime(eml.occurred_at)-pd.to_datetime("2013-01-0
1 20:59:28")).dt.days
```

In [31]:
```
eml['week']=(eml.time)//7
```

In [32]:
```
plt.figure(figsize=(20,5))
sns.violinplot(x = 'action', y = 'week',data = eml)
```

Out[32]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1a1b8992b0>
```



something could be wrong with email_clickthrough

Conclusion:

- there could be something wrong with the email_clickthrough functionality in the mobile apps, which causes the usage drop.
- it seems there's a drop in the click rate of the search runs, but it might not be the cause of the usage drop