Srimoy_employee retention

February 21, 2019

In [1]:
```
# Lets import all the packages we would require
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
%matplotlib inline
```

In [2]:
```
employee= pd.read_csv("C:/Users/Woodrow/Downloads/employee_retention_data.csv")
employee.head(10)
```

Out[2]:

	employee_id	company_id	dept	seniority	salary	join_date	quit_date
0	13021.0	7	customer_service	28	89000.0	2014-03-24	2015-10-30
1	825355.0	7	marketing	20	183000.0	2013-04-29	2014-04-04
2	927315.0	4	marketing	14	101000.0	2014-10-13	NaN
3	662910.0	7	customer_service	20	115000.0	2012-05-14	2013-06-07
4	256971.0	2	data_science	23	276000.0	2011-10-17	2014-08-22
5	509529.0	4	data_science	14	165000.0	2012-01-30	2013-08-30
6	88600.0	4	customer_service	21	107000.0	2013-10-21	NaN
7	716309.0	2	customer_service	4	30000.0	2014-03-05	NaN
8	172999.0	9	engineer	7	160000.0	2012-12-10	2015-10-23
9	504159.0	1	sales	7	104000.0	2012-06-12	NaN

In [3]:
```
employee.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 24702 entries, 0 to 24701
```

```
Data columns (total 7 columns):
employee_id    24702 non-null float64
company_id     24702 non-null int64
dept           24702 non-null object
seniority      24702 non-null int64
salary         24702 non-null float64
join_date      24702 non-null object
quit_date      13510 non-null object
dtypes: float64(2), int64(2), object(3)
memory usage: 1.3+ MB
```

```
In [4]: employee.isnull().sum()
```

```
Out[4]: employee_id        0
        company_id         0
        dept               0
        seniority          0
        salary             0
        join_date          0
        quit_date      11192
        dtype: int64
```

```
In [5]: #Remove all the null cases for the quit date as we require
```

```
In [6]: df = employee[employee['quit_date'].notna()]
        df.head(5)
```

```
Out[6]:    employee_id  company_id             dept  seniority    salary   join_date  \
        0      13021.0           7  customer_service         28   89000.0  2014-03-24
        1     825355.0           7         marketing         20  183000.0  2013-04-29
        3     662910.0           7  customer_service         20  115000.0  2012-05-14
        4     256971.0           2      data_science         23  276000.0  2011-10-17
        5     509529.0           4      data_science         14  165000.0  2012-01-30

            quit_date
        0  2015-10-30
        1  2014-04-04
        3  2013-06-07
        4  2014-08-22
        5  2013-08-30
```

```
In [7]:  type(df['join_date'][0])
```

```
Out[7]: str
```

```
In [8]: df['join_date'] = pd.to_datetime(df['join_date'], format='%Y-%m-%d',errors='coerce')
        df['quit_date'] = pd.to_datetime(df['quit_date'], format='%Y-%m-%d',errors='coerce')
```

```
C:\Users\Woodrow\Anaconda3\lib\site-packages\ipykernel_launcher.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html
  """Entry point for launching an IPython kernel.
C:\Users\Woodrow\Anaconda3\lib\site-packages\ipykernel_launcher.py:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html
```

```
In [9]: df['diff_days'] = df['quit_date'] - df['join_date']
        #df['diff_days']=df['diff_days']/np.timedelta64(1,'D')
```

```
C:\Users\Woodrow\Anaconda3\lib\site-packages\ipykernel_launcher.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html
  """Entry point for launching an IPython kernel.
```

```
In [10]: df.head()
```

```
Out[10]:    employee_id  company_id             dept  seniority    salary  join_date  \
         0      13021.0           7  customer_service         28   89000.0 2014-03-24
         1     825355.0           7         marketing         20  183000.0 2013-04-29
         3     662910.0           7  customer_service         20  115000.0 2012-05-14
         4     256971.0           2     data_science         23  276000.0 2011-10-17
         5     509529.0           4     data_science         14  165000.0 2012-01-30

            quit_date diff_days
         0 2015-10-30  585 days
         1 2014-04-04  340 days
         3 2013-06-07  389 days
         4 2014-08-22 1040 days
         5 2013-08-30  578 days
```

```
In [11]: df.dept.value_counts()
```

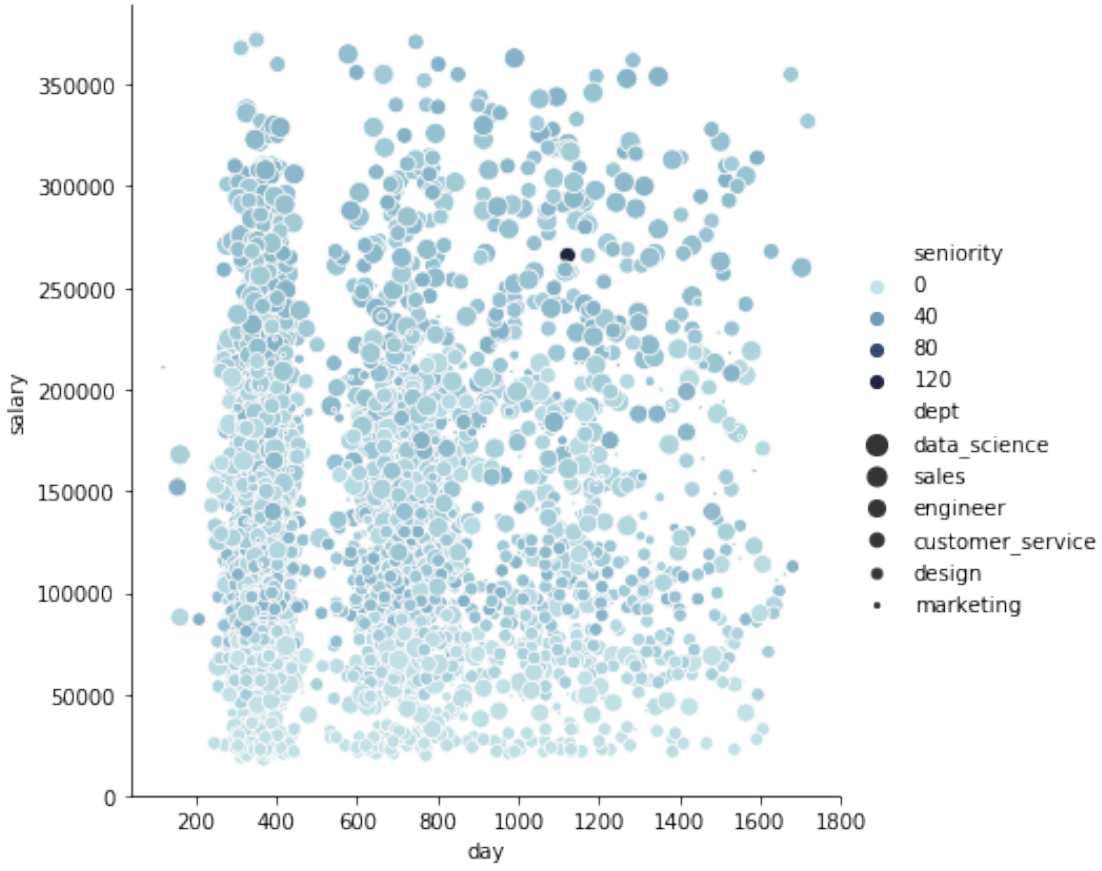
```
Out[11]: customer_service    5094
         engineer            2362
         sales               1811
         marketing           1783
         data_science        1682
         design               778
         Name: dept, dtype: int64
```

```
In [12]: df['day'] = list(map(lambda var: var.days,df['diff_days']))
```

```
C:\Users\Woodrow\Anaconda3\lib\site-packages\ipykernel_launcher.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html
  """Entry point for launching an IPython kernel.
```

```
In [13]: cmap = sns.cubehelix_palette(rot=-.2, as_cmap=True)
         sns.relplot(x='day', y="salary", hue="seniority", size="dept",
                     sizes=(5, 100), palette=cmap,
                     height=6, data=df.sample(n=None, frac=0.3, replace=False, weights=None, ra
```

```
Out[13]: <seaborn.axisgrid.FacetGrid at 0x29bfb69fef0>
```



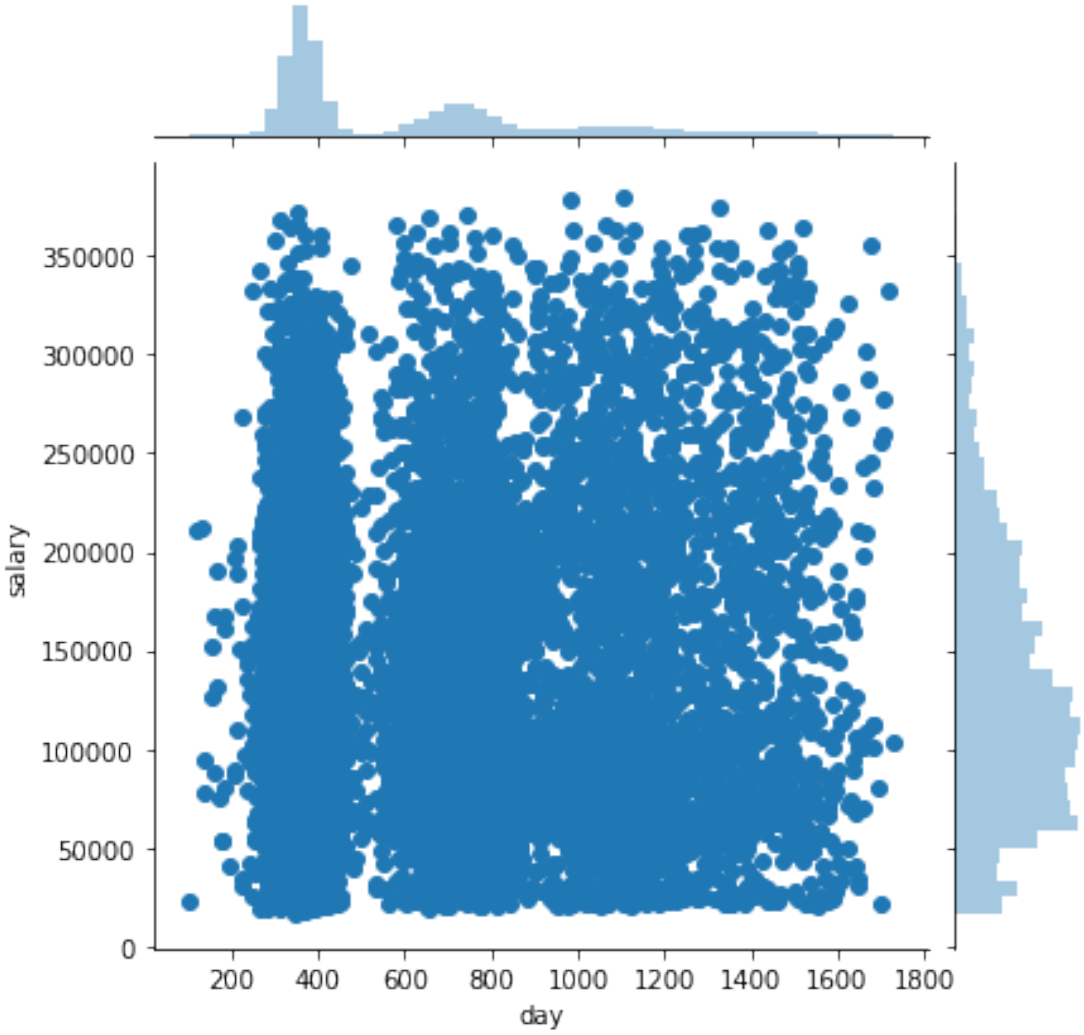

```
In [14]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 13510 entries, 0 to 24701
```

```
Data columns (total 9 columns):
employee_id    13510 non-null float64
company_id     13510 non-null int64
dept           13510 non-null object
seniority      13510 non-null int64
salary         13510 non-null float64
join_date      13510 non-null datetime64[ns]
quit_date      13510 non-null datetime64[ns]
diff_days      13510 non-null timedelta64[ns]
day            13510 non-null int64
dtypes: datetime64[ns](2), float64(2), int64(3), object(1), timedelta64[ns](1)
memory usage: 1.7+ MB
```

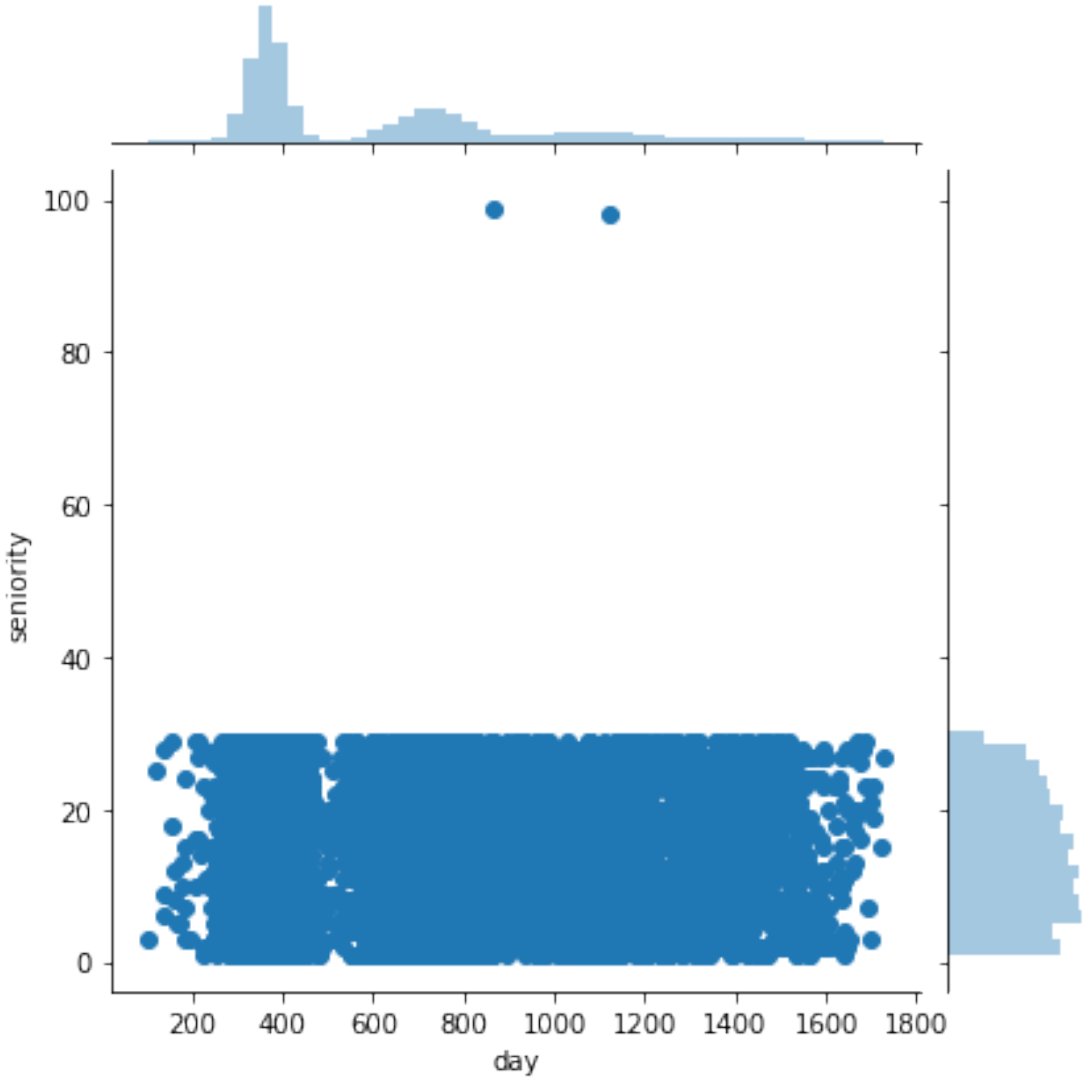
```
In [15]: sns.jointplot(x='day',y='salary',data=df)
```

```
Out[15]: <seaborn.axisgrid.JointGrid at 0x29bfbaa1518>
```



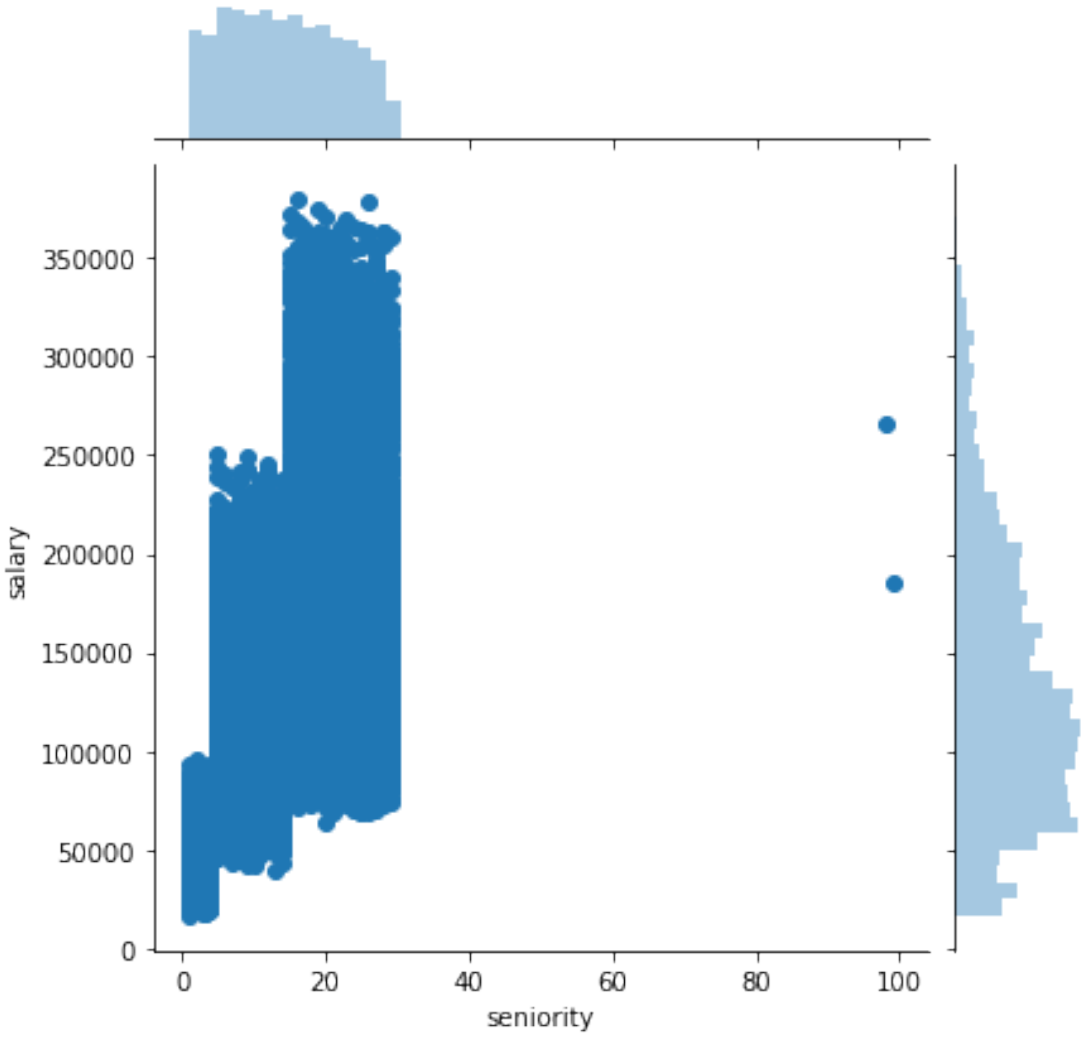
In [16]: sns.jointplot(x='day',y='seniority',data=df)

Out[16]: <seaborn.axisgrid.JointGrid at 0x29bfbaf8da0>



In [17]: sns.jointplot(x='seniority',y='salary',data=df)

Out[17]: <seaborn.axisgrid.JointGrid at 0x29bfbaf8a20>




```
In [18]: df['salary']=np.log(df['salary'])
```

```
C:\Users\Woodrow\Anaconda3\lib\site-packages\ipykernel_launcher.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html
  """Entry point for launching an IPython kernel.
```

```
In [19]: df1 = pd.get_dummies(df,drop_first=True)
         df1.drop(['quit_date','join_date','diff_days'],axis=1,inplace=True)
```

```
In [20]: X = df1.drop('day',axis=1)
         y = df1['day']
```

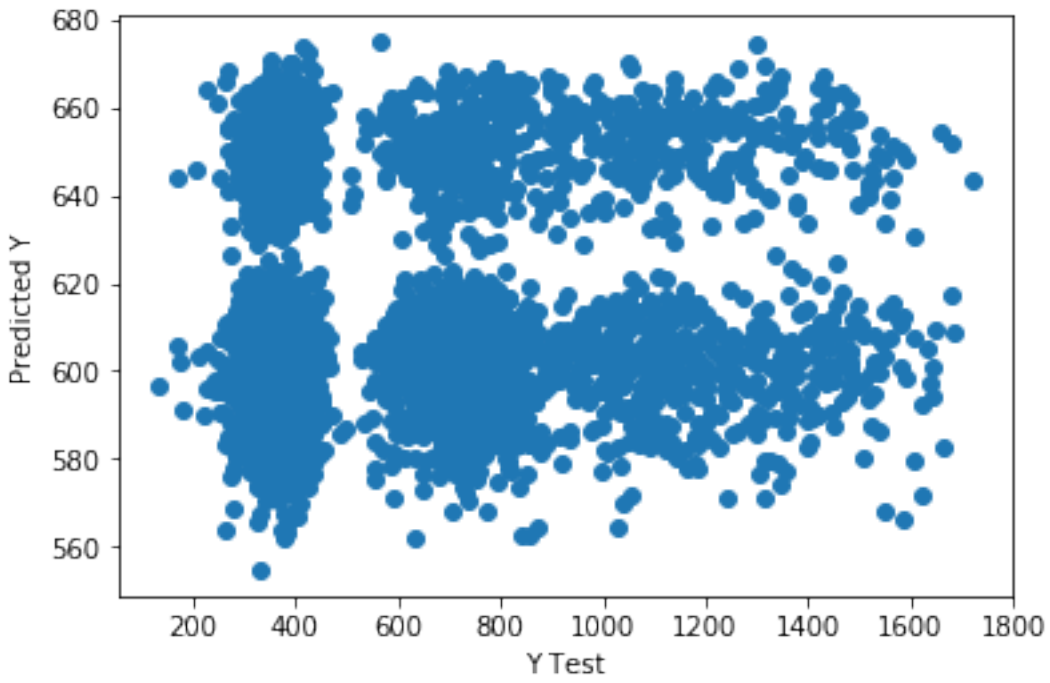
```
In [21]: from sklearn.cross_validation import train_test_split

         X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=
```

```
C:\Users\Woodrow\Anaconda3\lib\site-packages\sklearn\cross_validation.py:41: DeprecationWarning
  "This module will be removed in 0.20.", DeprecationWarning)
```

```
In [22]: from sklearn.linear_model import LinearRegression

In [23]: lm = LinearRegression()

In [24]: lm.fit(X_train,y_train)

Out[24]: LinearRegression(copy_X=True, fit_intercept=True, n_jobs=1, normalize=False)

In [25]: print('Coefficients: \n', lm.coef_)
```

```
Coefficients:
 [ 1.12287250e-05 -2.70612420e+00  1.21531510e+00 -1.83852748e+01
  6.85925892e+01  1.42939753e+01  6.63669292e+01  9.88441079e+00
 -4.81308550e+00]
```

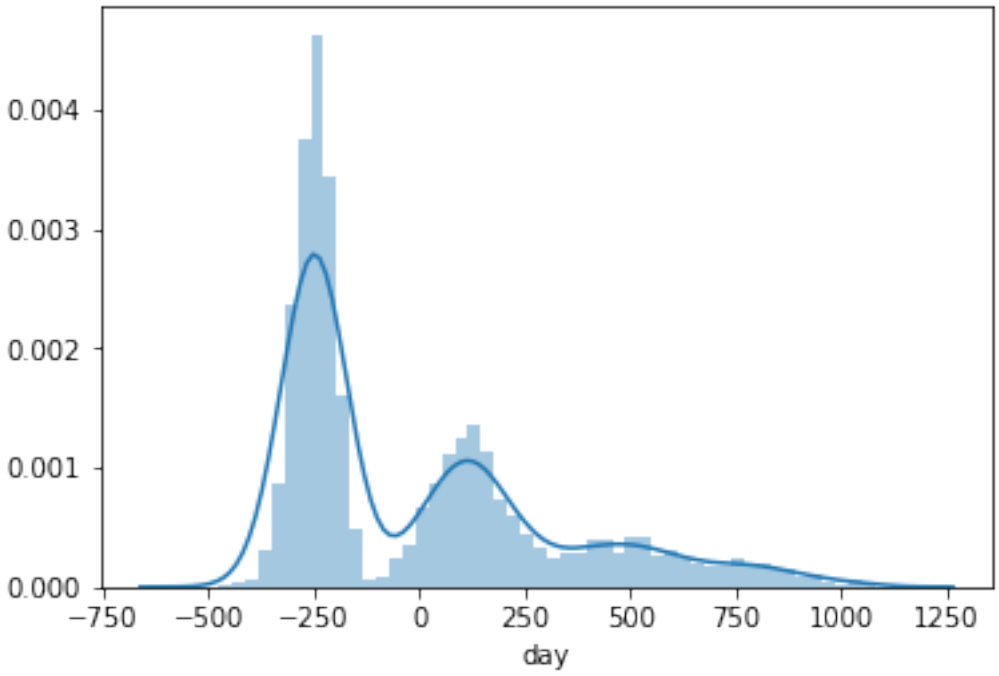
```
In [26]: predictions = lm.predict( X_test)

In [27]: plt.scatter(y_test,predictions)
         plt.xlabel('Y Test')
         plt.ylabel('Predicted Y')

Out[27]: Text(0,0.5,'Predicted Y')
```



In [28]:
```
from sklearn import metrics

        print('MAE:', metrics.mean_absolute_error(y_test, predictions))
        print('MSE:', metrics.mean_squared_error(y_test, predictions))
        print('RMSE:', np.sqrt(metrics.mean_squared_error(y_test, predictions)))
```

```
MAE: 270.1264808496829
MSE: 105062.47498802854
RMSE: 324.133421584428
```

In [29]:
```
sns.distplot((y_test-predictions),bins=50);
```



In [30]:
```
qgrid
```

```
---------------------------------------------------------------------------

NameError                                 Traceback (most recent call last)

<ipython-input-30-b82c0d283bb9> in <module>()
----> 1 qgrid
```

```
NameError: name 'qgrid' is not defined
```