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

In [2]:
```
df=pd.read_csv('data/bikes.csv')
df
```

Out[2]:

	datetime	season	holiday	workingday	weather	temp	humidity	windspeed	casual	regis
0	2011-01-01 00:00:00	Spring	0.0	0.0	Clear	9.84	81.0	NaN	3	
1	2011-01-01 01:00:00	Spring	0.0	0.0	NaN	9.02	80.0	0.0000	8	
2	2011-01-01 02:00:00	Spring	0.0	0.0	Clear	9.02	NaN	0.0000	5	
3	2011-01-01 03:00:00	Spring	0.0	0.0	Clear	9.84	75.0	0.0000	3	
4	2011-01-01 04:00:00	NaN	0.0	0.0	Clear	NaN	75.0	NaN	0	
...	...	...	...	...	...	...	...	...	...	...
10881	2012-12-19 19:00:00	Winter	0.0	1.0	Clear	15.58	50.0	26.0027	7	
10882	2012-12-19 20:00:00	Winter	0.0	1.0	NaN	14.76	NaN	NaN	10	
10883	2012-12-19 21:00:00	NaN	0.0	1.0	Clear	13.94	61.0	15.0013	4	
10884	2012-12-19 22:00:00	Winter	NaN	1.0	Clear	13.94	NaN	6.0032	12	
10885	2012-12-19 23:00:00	Winter	0.0	1.0	Clear	13.12	66.0	8.9981	4	

10886 rows × 11 columns

In [3]:
```
df.describe()
```

Out[3]:

	holiday	workingday	temp	humidity	windspeed	casual	registere
count	10030.000000	9388.000000	8104.000000	7462.000000	6820.000000	10886.000000	10886.00000
mean	0.029113	0.678206	20.317665	61.790673	12.708806	36.021955	155.55217
std	0.168131	0.467189	7.818568	19.262084	8.131154	49.960477	151.03903

	holiday	workingday	temp	humidity	windspeed	casual	registere
min	0.000000	0.000000	0.820000	0.000000	0.000000	0.000000	0.00000
25%	0.000000	0.000000	13.940000	47.000000	7.001500	4.000000	36.00000
50%	0.000000	1.000000	20.500000	62.000000	12.998000	17.000000	118.00000
75%	0.000000	1.000000	26.240000	77.000000	16.997900	49.000000	222.00000
max	1.000000	1.000000	41.000000	100.000000	56.996900	367.000000	886.00000

In [4]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10886 entries, 0 to 10885
Data columns (total 11 columns):
 #   Column              Non-Null Count  Dtype  
---  ------              --------------  -----  
 0   datetime            10886 non-null  object 
 1   season              10672 non-null  object 
 2   holiday             10030 non-null  float64
 3   workingday          9388 non-null   float64
 4   weather             8746 non-null   object 
 5   temp                8104 non-null   float64
 6   humidity            7462 non-null   float64
 7   windspeed           6820 non-null   float64
 8   casual              10886 non-null  int64  
 9   registered          10886 non-null  int64  
 10  rented_bikes_count  10886 non-null  int64  
dtypes: float64(5), int64(3), object(3)
memory usage: 935.6+ KB
```

In [5]:
```
df.columns
```

Out[5]:
```
Index(['datetime', 'season', 'holiday', 'workingday', 'weather', 'temp',
       'humidity', 'windspeed', 'casual', 'registered', 'rented_bikes_count'],
      dtype='object')
```

In [6]:
```
df['registered'].value_counts()[5]
```

Out[6]:
```
177
```

In [7]:
```
df['casual'].value_counts()[20]
```

Out[7]:
```
120
```

In [8]:
```
df['rented_bikes_count'].value_counts()[14]
```

Out[8]:
```
66
```

In [9]:
```
df['rented_bikes_count'].value_counts()
```

Out[9]:
```
5      169
4      149
3      144
6      135
2      132
      ...
667      1
603      1
587      1
970      1
```

```
843      1
Name: rented_bikes_count, Length: 822, dtype: int64
```

In [10]:
```
df['season'].value_counts()
```

Out[10]:
```
Winter    2688
Fall      2680
Summer    2670
Spring    2634
Name: season, dtype: int64
```

In [11]:
```
df['weather'].value_counts()
```

Out[11]:
```
Clear    5793
Mist     2259
Rainy     693
Snowy       1
Name: weather, dtype: int64
```

In [12]:
```
df['registered'].max()
```

Out[12]:
```
886
```

In [13]:
```
df['casual'].max()
```

Out[13]:
```
367
```

so regigestered is more

In [14]:
```
df[['registered','rented_bikes_count']].corr()
```

Out[14]:

	registered	rented_bikes_count
registered	1.000000	0.970948
rented_bikes_count	0.970948	1.000000

In [15]:
```
df['registered'].mean()
```

Out[15]:
```
155.5521771082124
```

data visualization

In [16]:
```
tips=sns.load_dataset('bikes')
tips
```

Out[16]:

	datetime	season	holiday	workingday	weather	temp	humidity	windspeed	casual	regis
0	2011-01-01 00:00:00	Spring	0.0	0.0	Clear	9.84	81.0	NaN	3	
1	2011-01-01 01:00:00	Spring	0.0	0.0	NaN	9.02	80.0	0.0000	8	
2	2011-01-01 02:00:00	Spring	0.0	0.0	Clear	9.02	NaN	0.0000	5	

	datetime	season	holiday	workingday	weather	temp	humidity	windspeed	casual	regis
3	2011-01-01 03:00:00	Spring	0.0	0.0	Clear	9.84	75.0	0.0000	3	
4	2011-01-01 04:00:00	NaN	0.0	0.0	Clear	NaN	75.0	NaN	0	
...	...	...	...	...	...	...	...	...	...	...
10881	2012-12-19 19:00:00	Winter	0.0	1.0	Clear	15.58	50.0	26.0027	7	
10882	2012-12-19 20:00:00	Winter	0.0	1.0	NaN	14.76	NaN	NaN	10	
10883	2012-12-19 21:00:00	NaN	0.0	1.0	Clear	13.94	61.0	15.0013	4	
10884	2012-12-19 22:00:00	Winter	NaN	1.0	Clear	13.94	NaN	6.0032	12	
10885	2012-12-19 23:00:00	Winter	0.0	1.0	Clear	13.12	66.0	8.9981	4	

10886 rows × 11 columns

In [17]:
```
tips.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10886 entries, 0 to 10885
Data columns (total 11 columns):
 #   Column              Non-Null Count  Dtype  
---  ------              --------------  -----  
 0   datetime            10886 non-null  object 
 1   season              10672 non-null  object 
 2   holiday             10030 non-null  float64
 3   workingday          9388 non-null   float64
 4   weather             8746 non-null   object 
 5   temp                8104 non-null   float64
 6   humidity            7462 non-null   float64
 7   windspeed           6820 non-null   float64
 8   casual              10886 non-null  int64  
 9   registered          10886 non-null  int64  
 10  rented_bikes_count  10886 non-null  int64  
dtypes: float64(5), int64(3), object(3)
memory usage: 935.6+ KB
```

In [18]:
```
tips[(tips['season']=='Spring')&(tips['workingday']=='1.0')].mean().casual
```

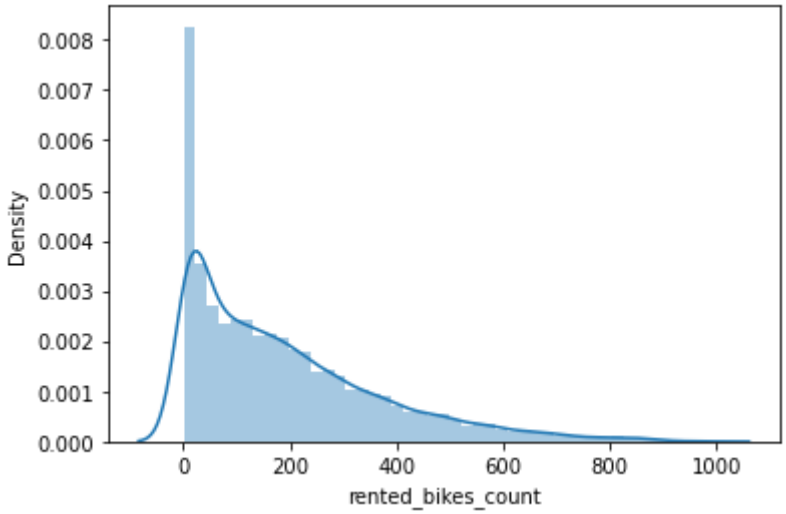
Out[18]:
```
nan
```

In [19]:
```
sns.distplot(tips['rented_bikes_count'])
```

```
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\distributions.py:2551: FutureWarn
ing: `distplot` is a deprecated function and will be removed in a future version. Pl
ease adapt your code to use either `displot` (a figure-level function with similar f
```

```
lexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

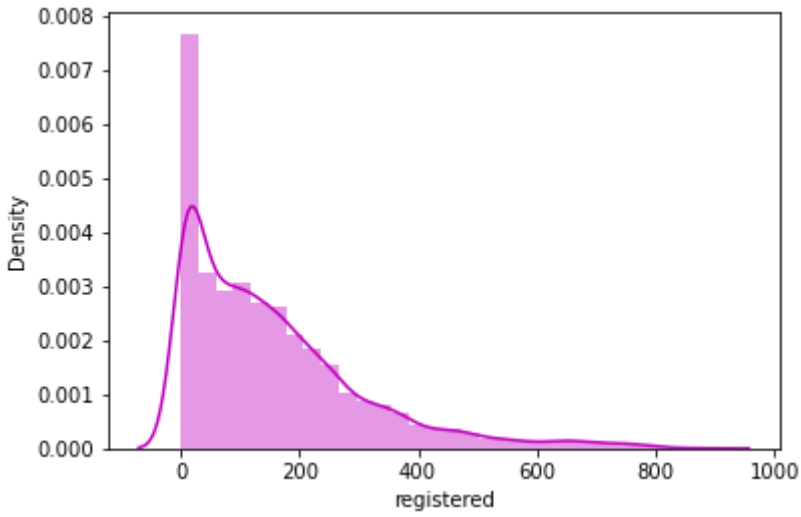
Out[19]:
```
<AxesSubplot:xlabel='rented_bikes_count', ylabel='Density'>
```



In [20]:
```
sns.distplot(tips['registered'],color='m',bins=30)
```

```
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\distributions.py:2551: FutureWarn
ing: `distplot` is a deprecated function and will be removed in a future version. Pl
ease adapt your code to use either `displot` (a figure-level function with similar f
lexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

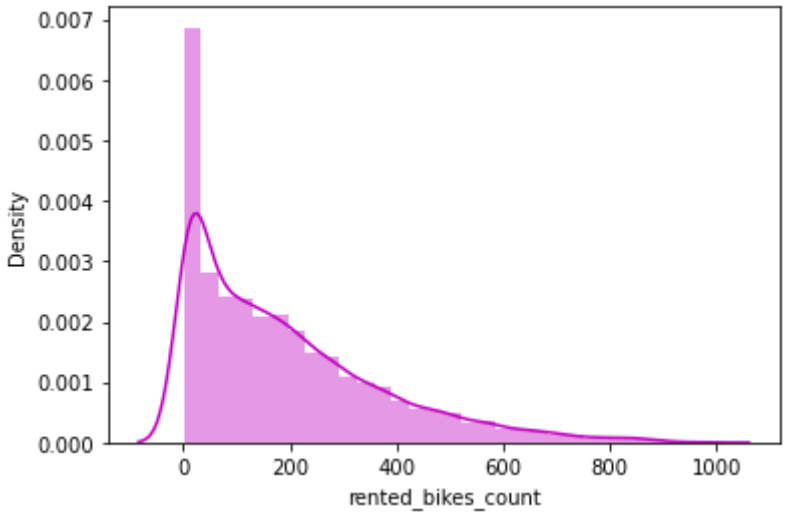
Out[20]:
```
<AxesSubplot:xlabel='registered', ylabel='Density'>
```



In [21]:
```
sns.distplot(tips['rented_bikes_count'],color='m',bins=30)
```

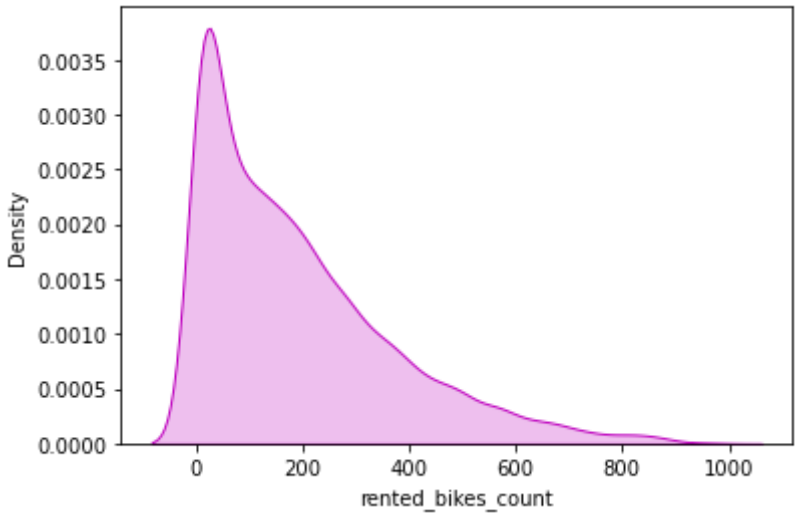
```
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\distributions.py:2551: FutureWarn
ing: `distplot` is a deprecated function and will be removed in a future version. Pl
ease adapt your code to use either `displot` (a figure-level function with similar f
lexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

Out[21]:
```
<AxesSubplot:xlabel='rented_bikes_count', ylabel='Density'>
```



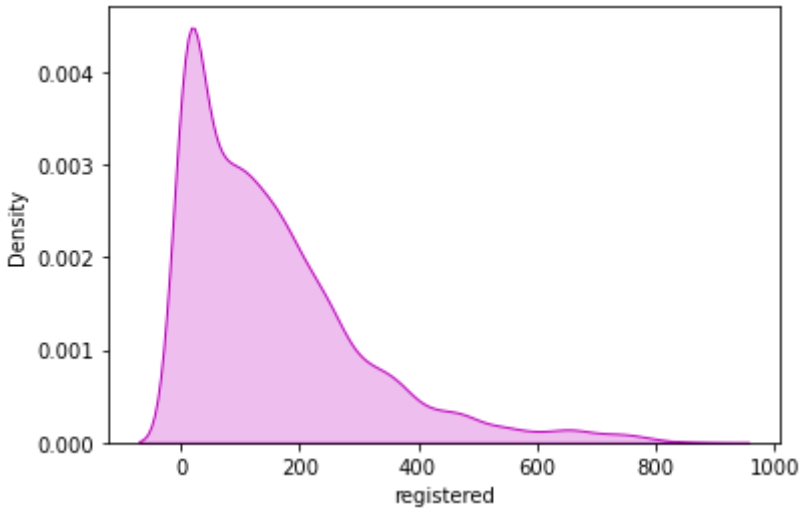
In [22]:
```
sns.kdeplot(tips['rented_bikes_count'],color='m',shade=True)
```

Out[22]: <AxesSubplot:xlabel='rented_bikes_count', ylabel='Density'>



In [23]:
```
sns.kdeplot(tips['registered'],color='m',shade=True)
```

Out[23]: <AxesSubplot:xlabel='registered', ylabel='Density'>

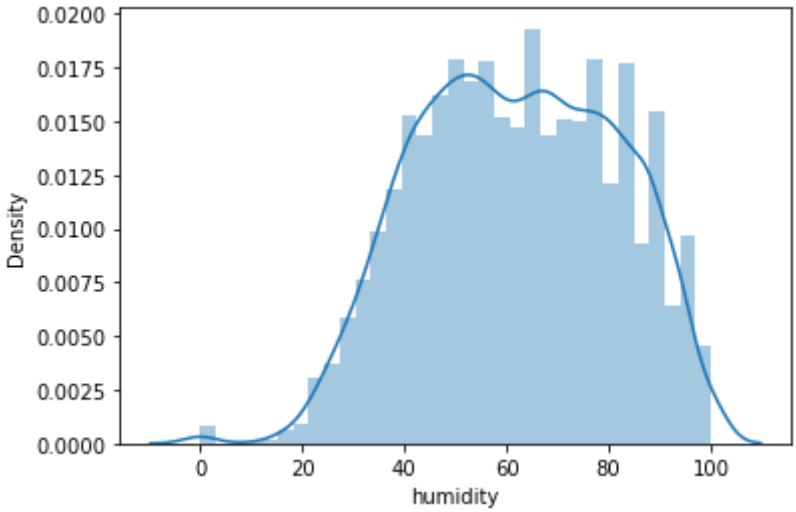


In [24]:
```
sns.distplot(tips['humidity'])
```

```
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\distributions.py:2551: FutureWarn
ing: `distplot` is a deprecated function and will be removed in a future version. Pl
ease adapt your code to use either `displot` (a figure-level function with similar f
```

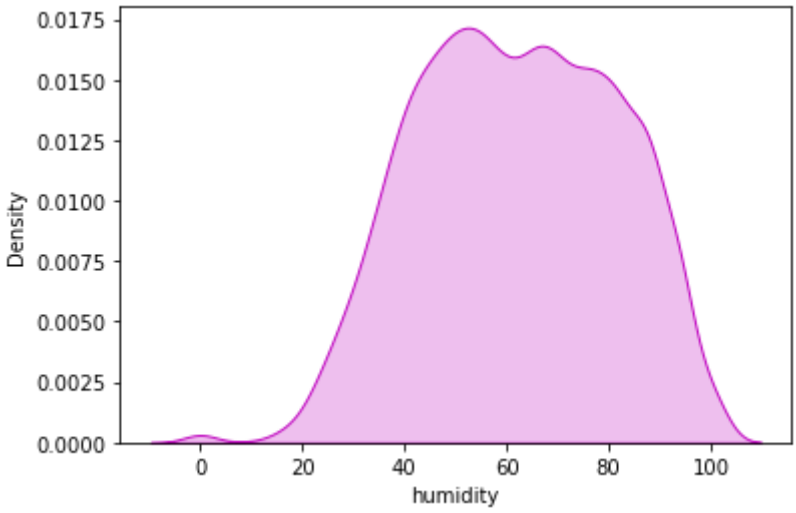
```
lexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

Out[24]:
```
<AxesSubplot:xlabel='humidity', ylabel='Density'>
```



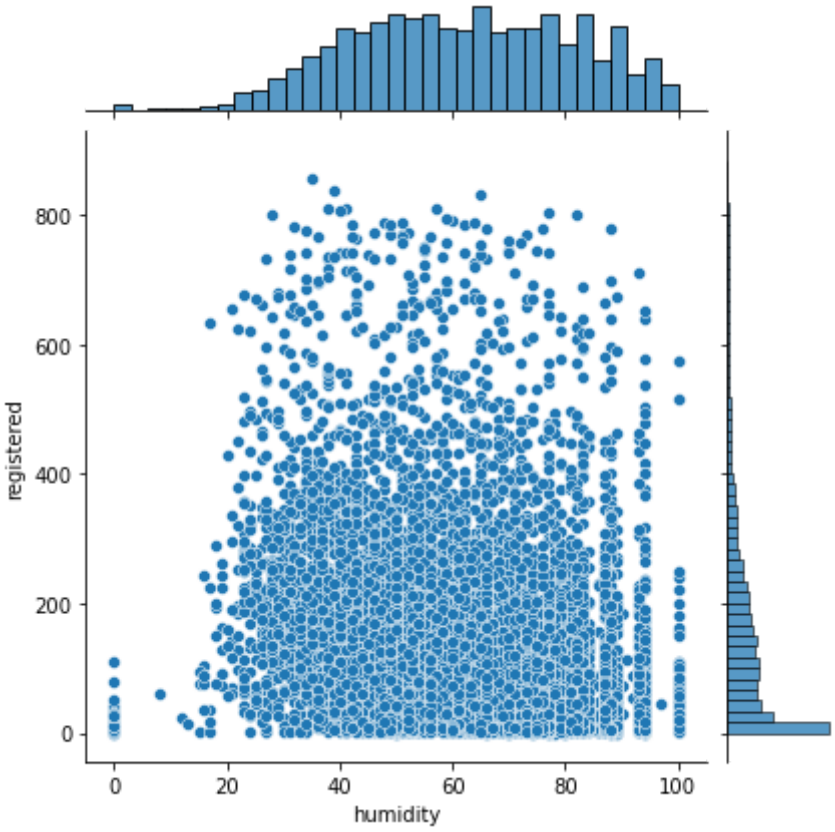
In [25]:
```
sns.kdeplot(tips['humidity'],color='m',shade=True)
```

Out[25]:
```
<AxesSubplot:xlabel='humidity', ylabel='Density'>
```



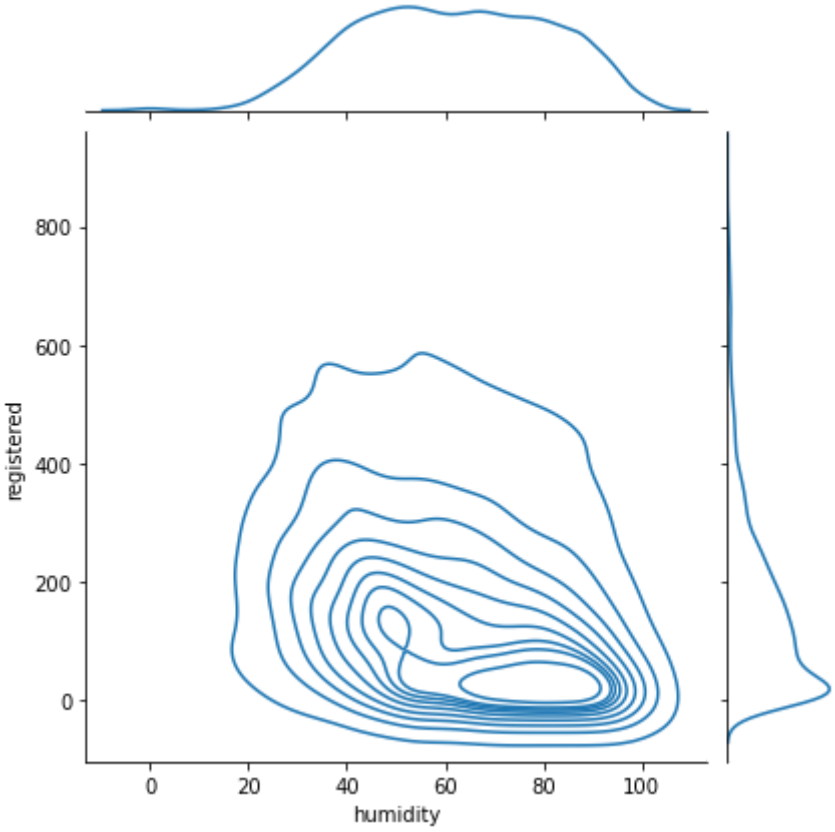
In [26]:
```
sns.jointplot(x='humidity',y='registered',data=tips)
```

Out[26]:
```
<seaborn.axisgrid.JointGrid at 0x191c5a8b0d0>
```



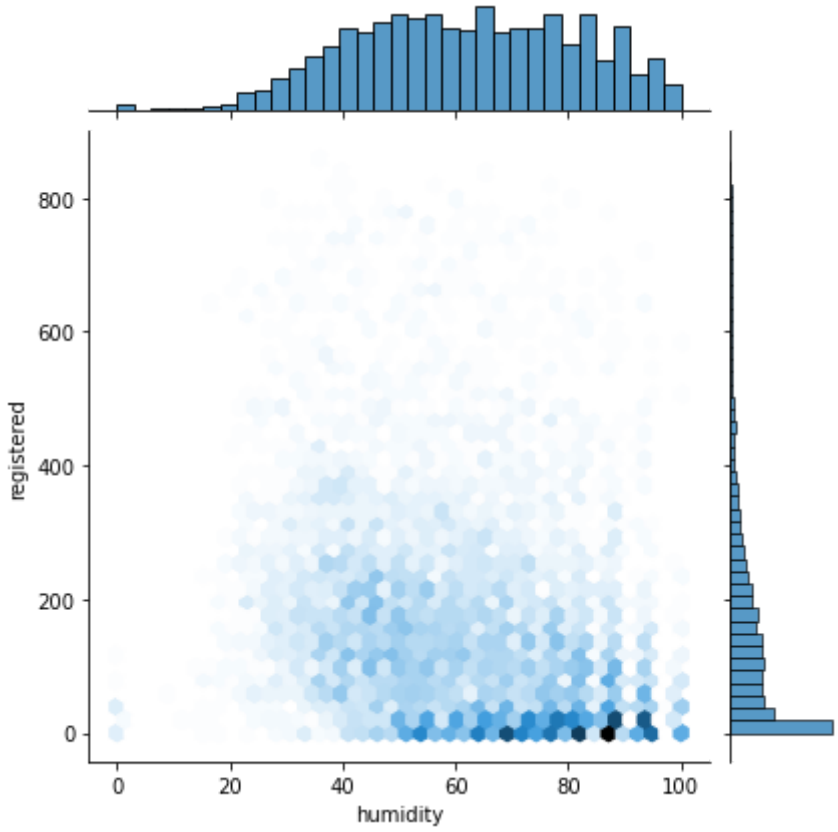
In [27]:
```
sns.jointplot(x='humidity',y='registered',data=tips,kind='kde')
```

Out[27]: <seaborn.axisgrid.JointGrid at 0x191c5c91af0>



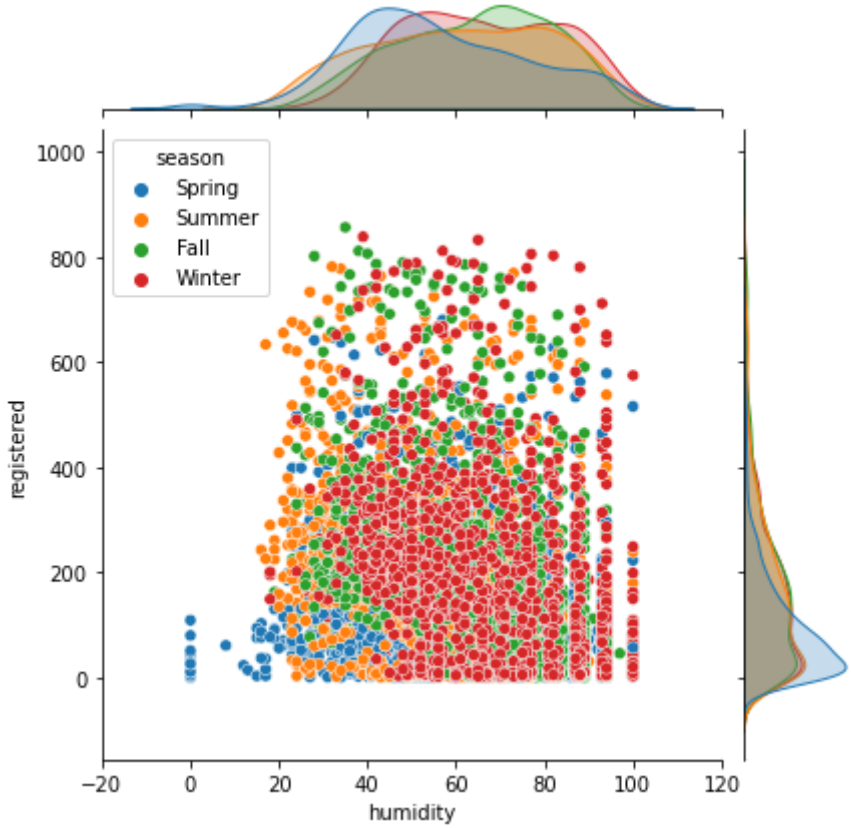
In [28]:
```
sns.jointplot(x='humidity',y='registered',data=tips,kind='hex')
```

Out[28]: <seaborn.axisgrid.JointGrid at 0x191c593f580>



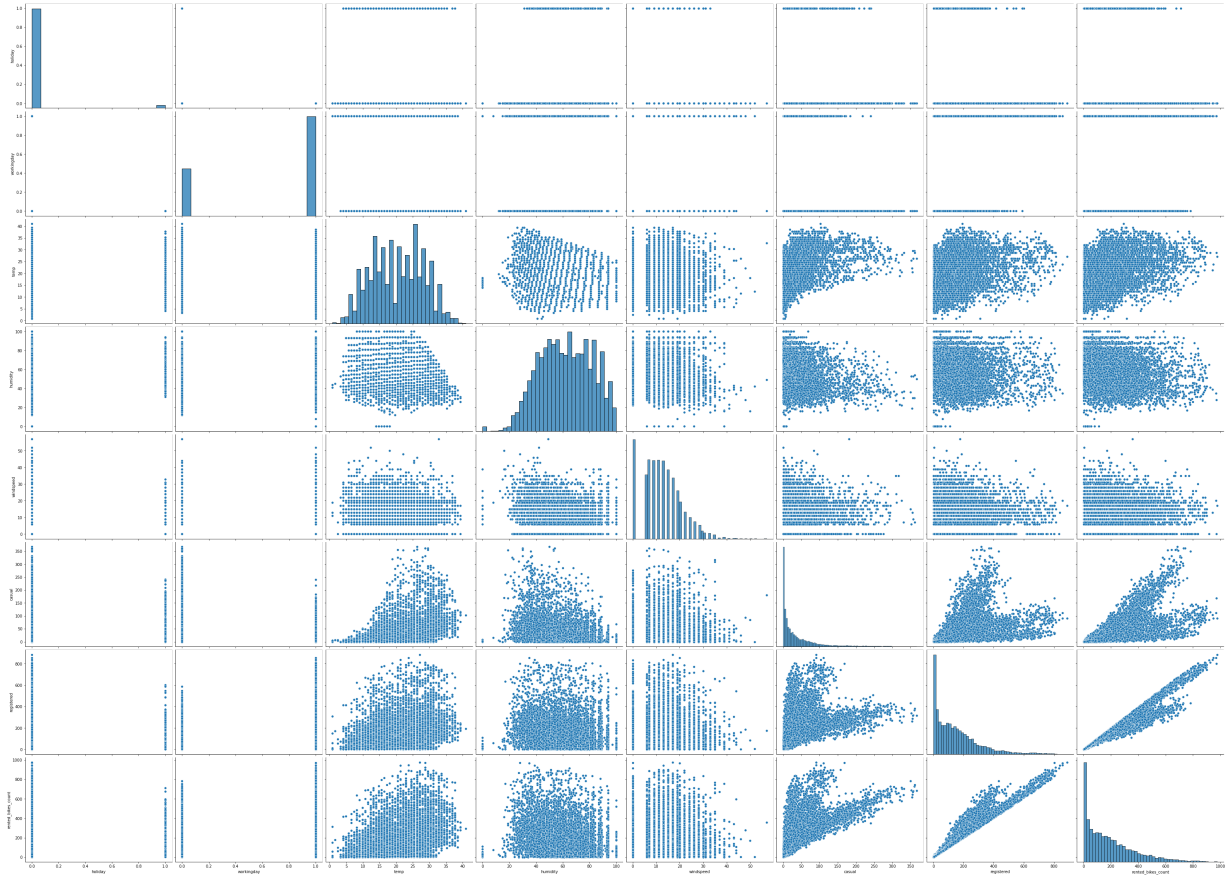
In [29]:
```
sns.jointplot(x='humidity',y='registered',data=tips,kind='scatter',hue='season')
```

Out[29]: <seaborn.axisgrid.JointGrid at 0x191c6eeb4c0>



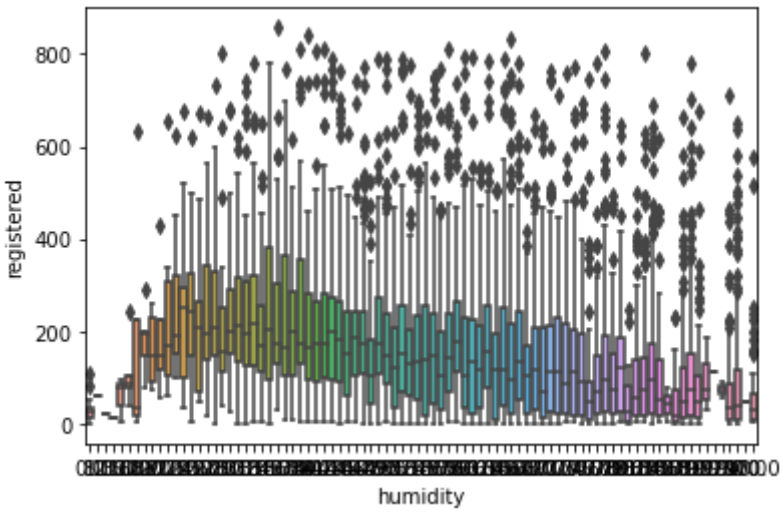
In [30]:
```
sns.pairplot(tips,height=4,aspect=1.4)
```

Out[30]: <seaborn.axisgrid.PairGrid at 0x191c6ff31c0>



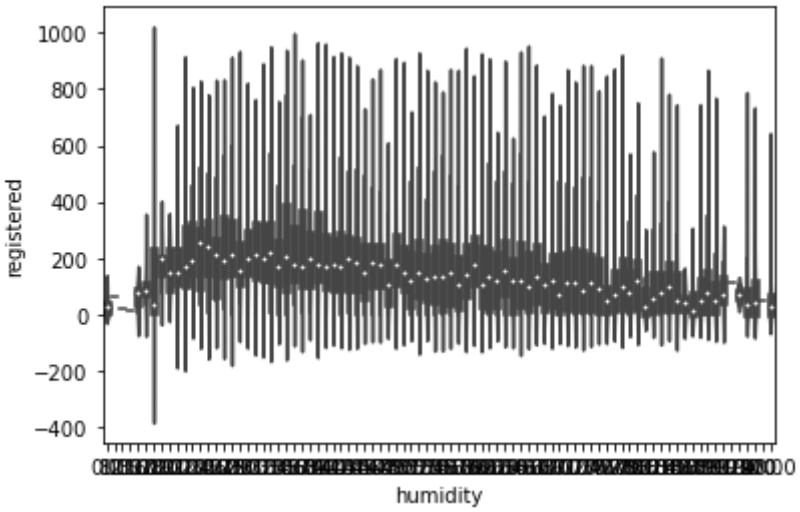
In [31]:
```
sns.boxplot(x='humidity',y='registered',data=tips)
```

Out[31]: <AxesSubplot:xlabel='humidity', ylabel='registered'>



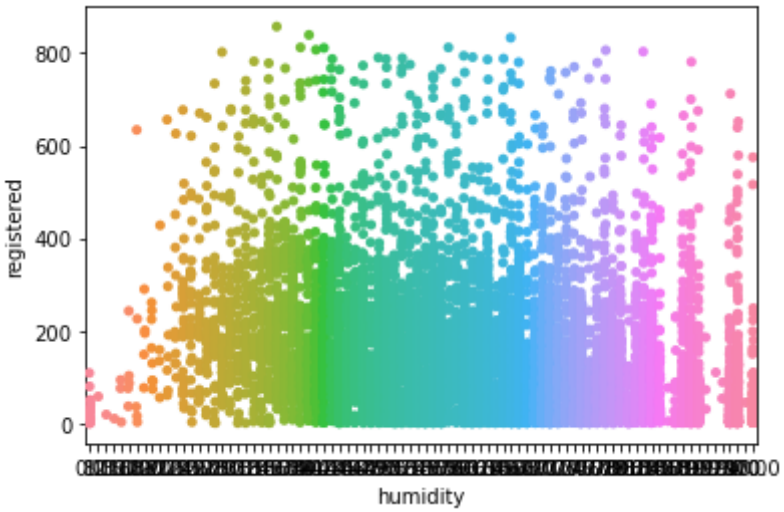
In [32]:
```
sns.violinplot(x='humidity',y='registered',data=tips)
```

Out[32]: <AxesSubplot:xlabel='humidity', ylabel='registered'>



In [33]:
```
sns.stripplot(x='humidity',y='registered',data=tips)
```

Out[33]: <AxesSubplot:xlabel='humidity', ylabel='registered'>



In [34]:
```
sns.swarmplot(x='humidity',y='registered',data=tips)
```

```
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
78.9% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
33.3% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
20.0% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
37.5% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
12.5% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
30.8% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
56.7% of the points cannot be placed; you may want to decrease the size of the marke
```

```
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
46.2% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
56.5% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
48.1% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
57.6% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
70.2% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
68.2% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
58.5% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
65.5% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
60.5% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
81.3% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
71.8% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
70.6% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
78.6% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
81.2% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
77.3% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
80.7% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
83.8% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
```

```
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
78.8% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
83.5% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
84.1% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
82.7% of the points cannot be placed; you may want to decrease the size of the marke
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  warnings.warn(msg, UserWarning)
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C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
85.0% of the points cannot be placed; you may want to decrease the size of the marke
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  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
87.3% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
87.6% of the points cannot be placed; you may want to decrease the size of the marke
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C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
90.4% of the points cannot be placed; you may want to decrease the size of the marke
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  warnings.warn(msg, UserWarning)
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C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
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C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
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```
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```

```
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  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
72.7% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
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C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
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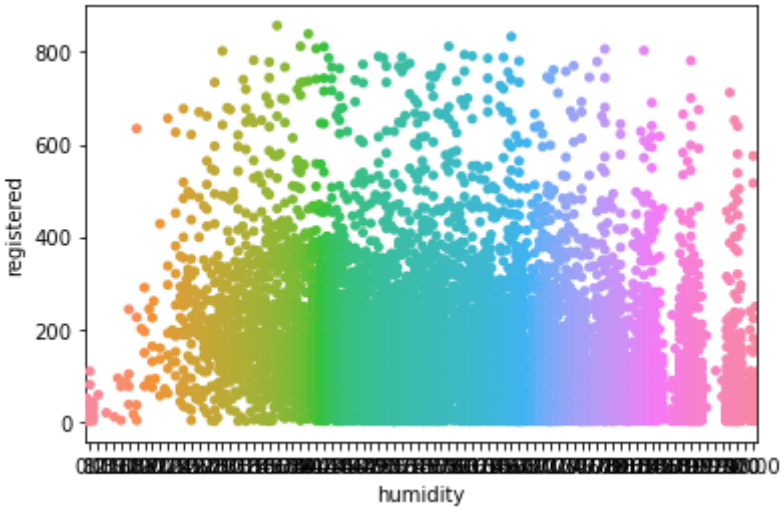
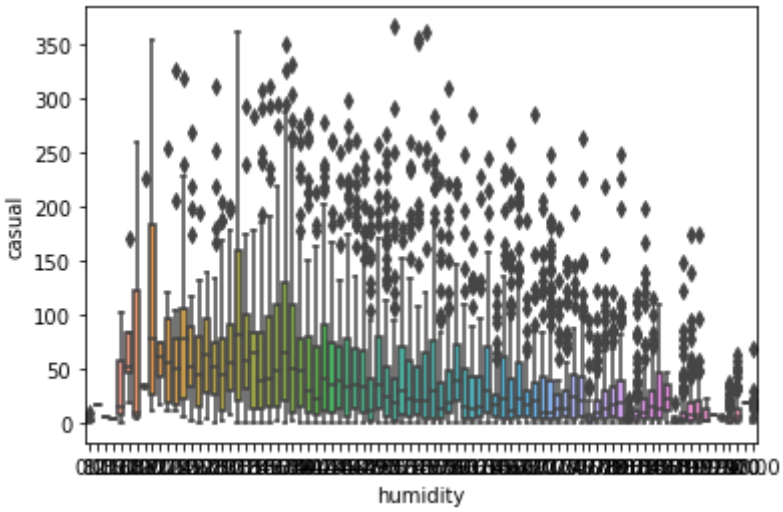
  warnings.warn(msg, UserWarning)
C:\Users\ahmed\anaconda3\lib\site-packages\seaborn\categorical.py:1296: UserWarning:
91.3% of the points cannot be placed; you may want to decrease the size of the marke
rs or use stripplot.
  warnings.warn(msg, UserWarning)
```

Out[34]: <AxesSubplot:xlabel='humidity', ylabel='registered'>



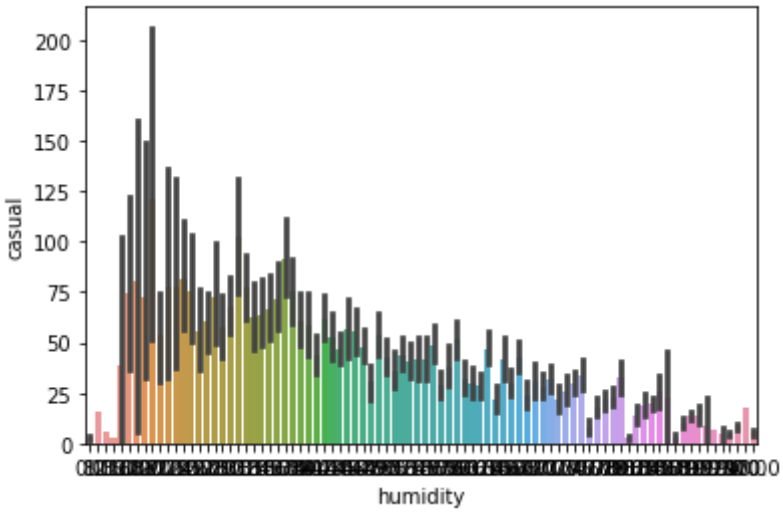
In [35]:
```
sns.boxplot(x='humidity',y='casual',data=tips)
```

Out[35]: <AxesSubplot:xlabel='humidity', ylabel='casual'>



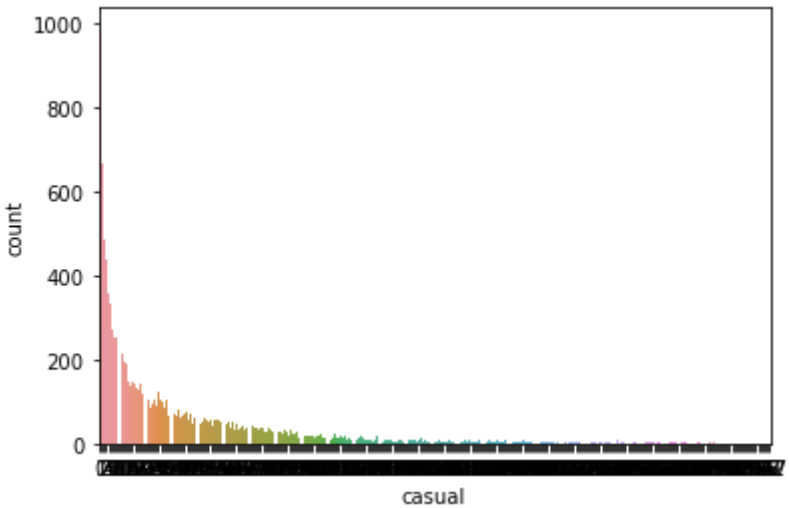
In [36]:
```
sns.barplot(x='humidity',y='casual',data=tips)
```

Out[36]:
```
<AxesSubplot:xlabel='humidity', ylabel='casual'>
```



In [38]:
```
sns.countplot(x='casual',data=tips)
```

Out[38]:
```
<AxesSubplot:xlabel='casual', ylabel='count'>
```



In [41]:
```
tips.corr()
```

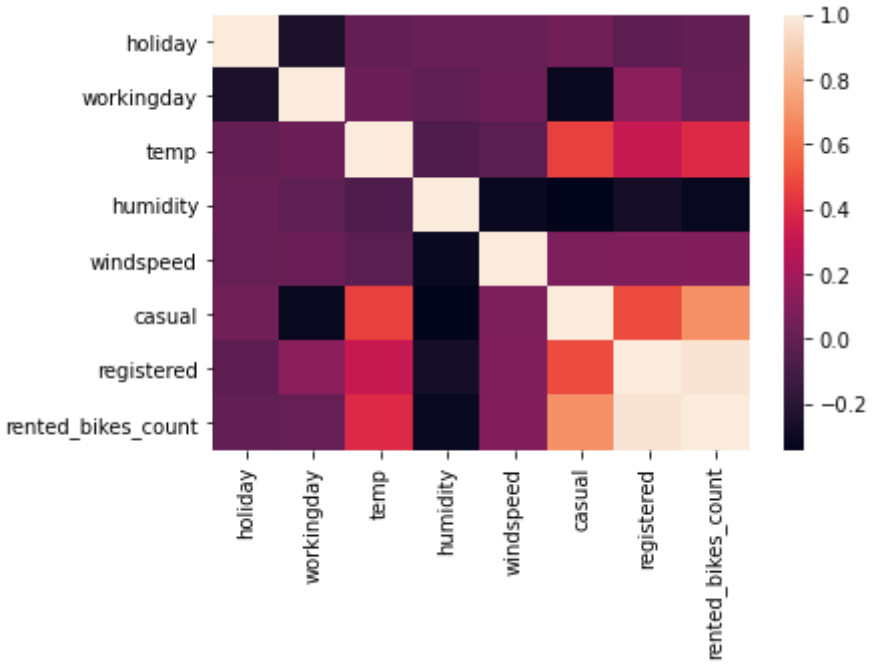
Out[41]:

	holiday	workingday	temp	humidity	windspeed	casual	registered
holiday	1.000000	-0.249189	-0.001047	0.016190	0.010463	0.042519	-0.021017

	holiday	workingday	temp	humidity	windspeed	casual	registered
workingday	-0.249189	1.000000	0.018954	-0.019167	0.020668	-0.318348	0.118612
temp	-0.001047	0.018954	1.000000	-0.068240	-0.025425	0.466035	0.315430
humidity	0.016190	-0.019167	-0.068240	1.000000	-0.312628	-0.344939	-0.266432
windspeed	0.010463	0.020668	-0.025425	-0.312628	1.000000	0.085055	0.089105
casual	0.042519	-0.318348	0.466035	-0.344939	0.085055	1.000000	0.497250
registered	-0.021017	0.118612	0.315430	-0.266432	0.089105	0.497250	1.000000
rented_bikes_count	-0.005827	0.010940	0.391867	-0.317282	0.097747	0.690414	0.970948

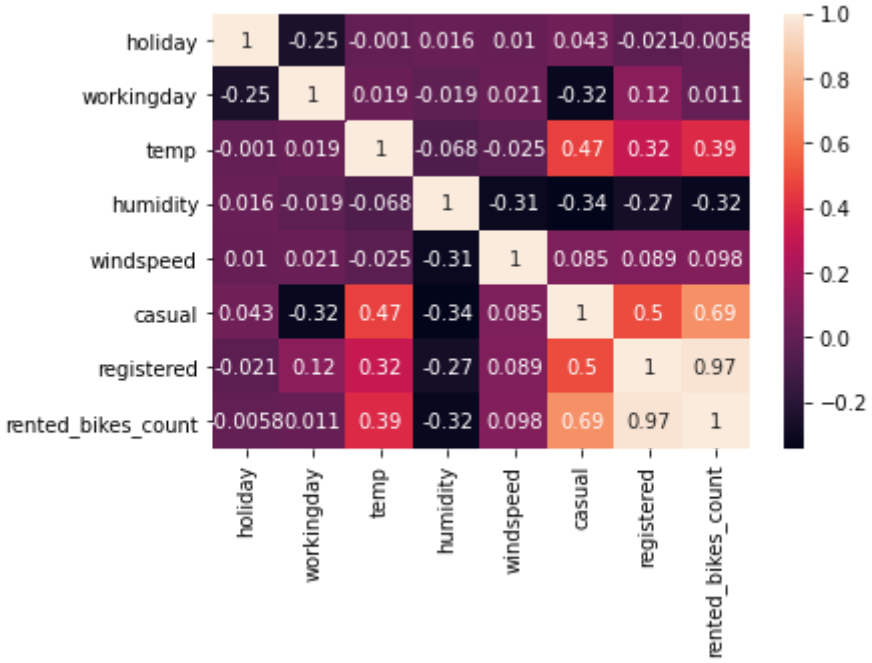
In [42]:
```
sns.heatmap(tips.corr())
```

Out[42]: <AxesSubplot:>



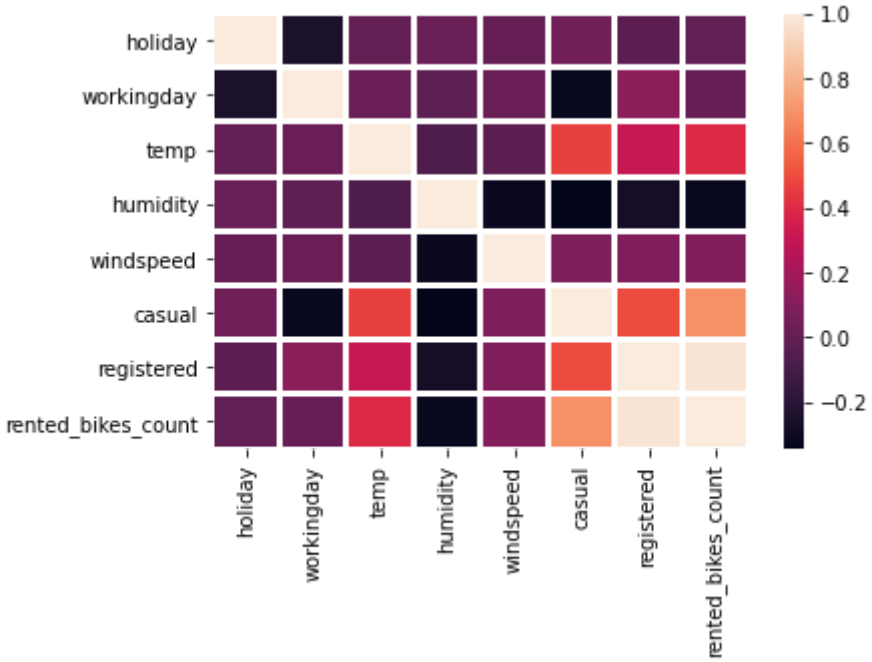
In [43]:
```
sns.heatmap(tips.corr(),annot=True)
```

Out[43]: <AxesSubplot:>



In [44]:
```
sns.heatmap(tips.corr(),linecolor='white',linewidths=2)
```

Out[44]: <AxesSubplot:>



In [ ]: