



DATA VISUALIZATION WITH SEABORN

# Categorical Plot Types

Chris Moffitt  
Instructor

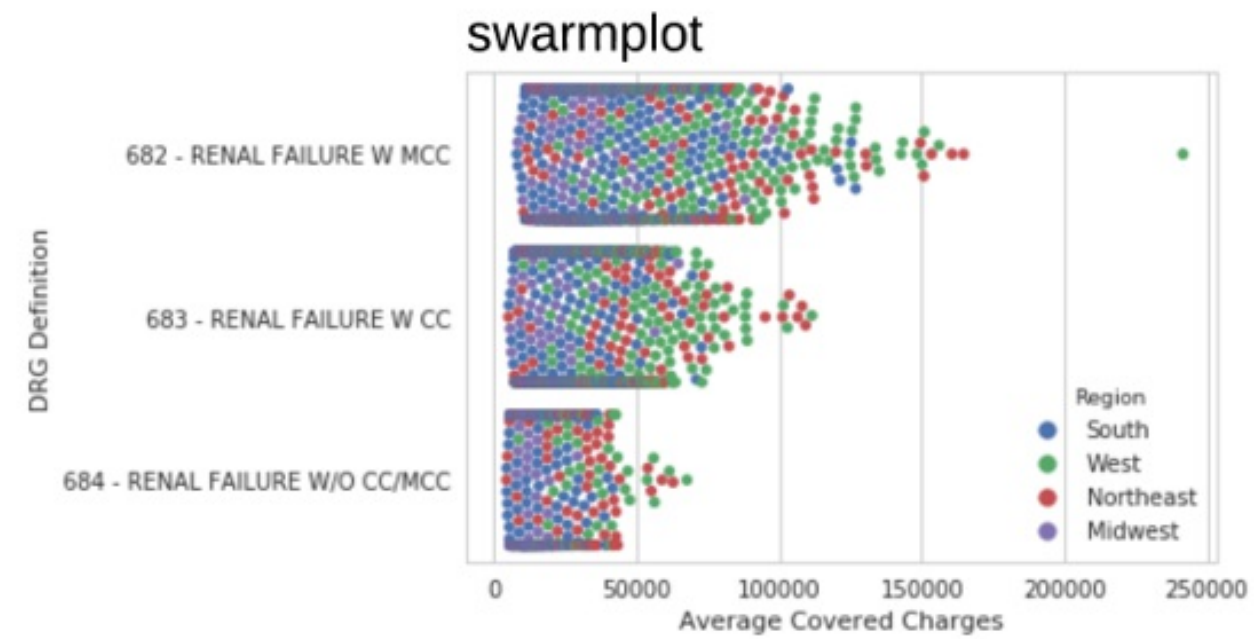
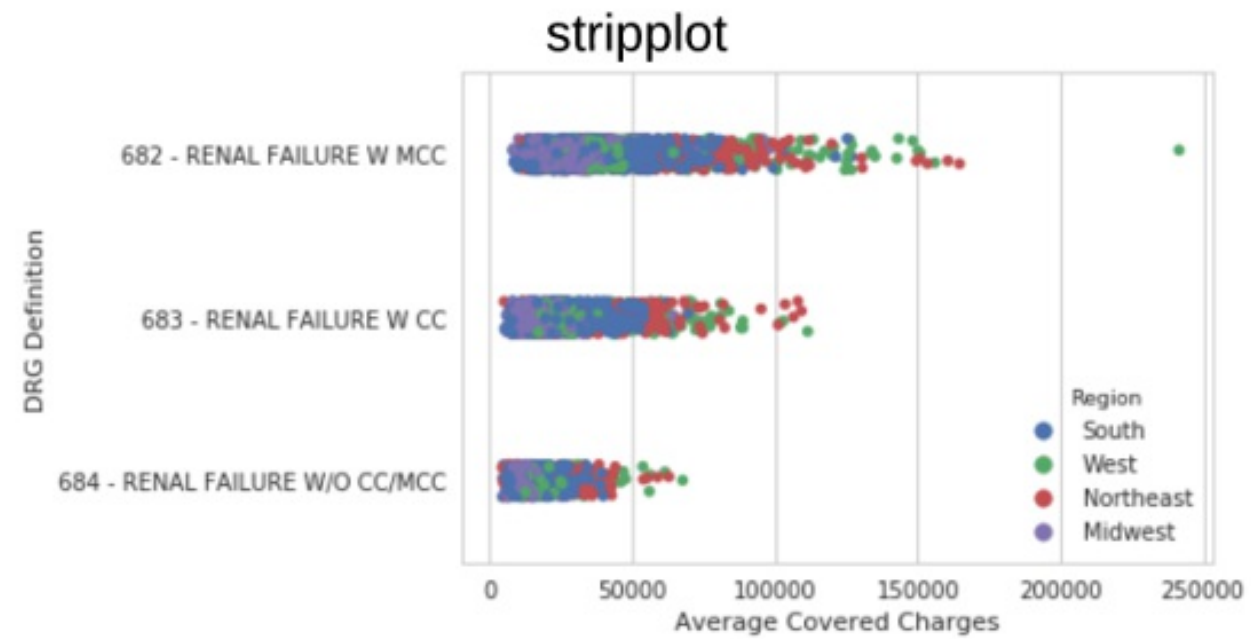


# Categorical Data

- Data which takes on a limited and fixed number of values
- Normally combined with numeric data
- Examples include:
  - Geography (country, state, region)
  - Gender
  - Ethnicity
  - Blood type
  - Eye color

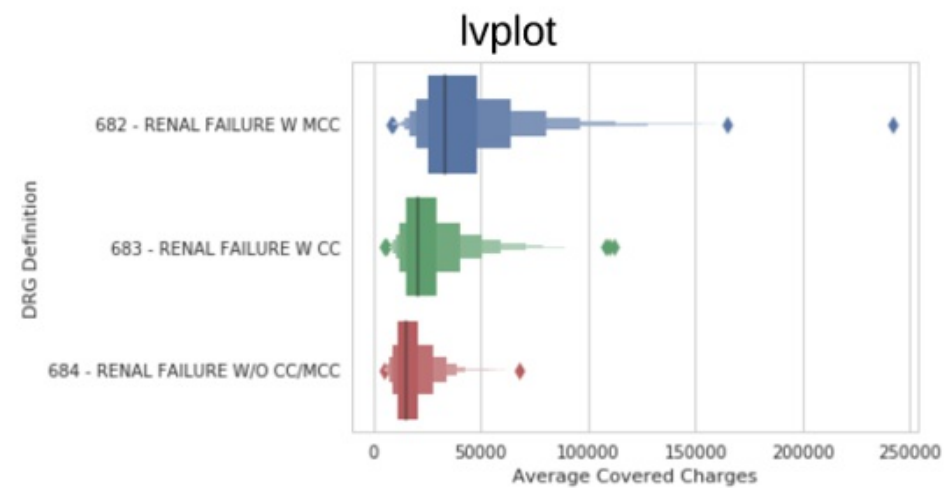
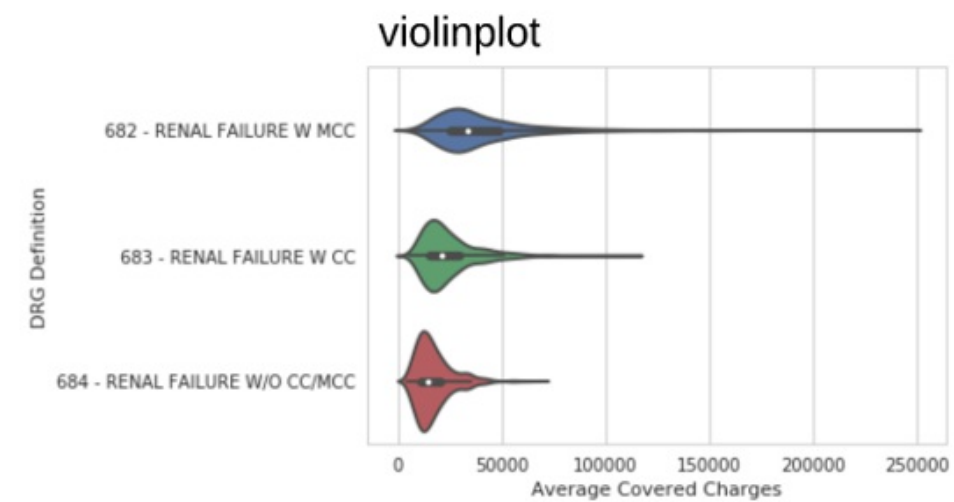
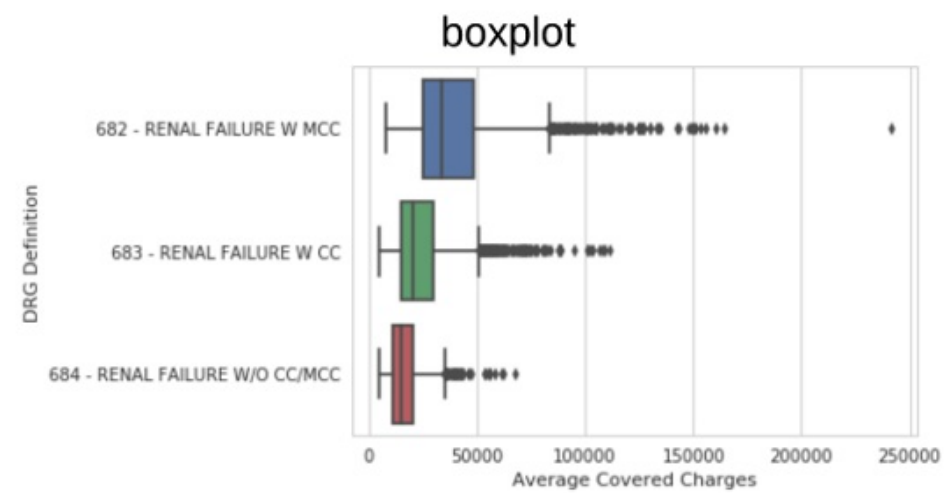


# Plot types - show each observation



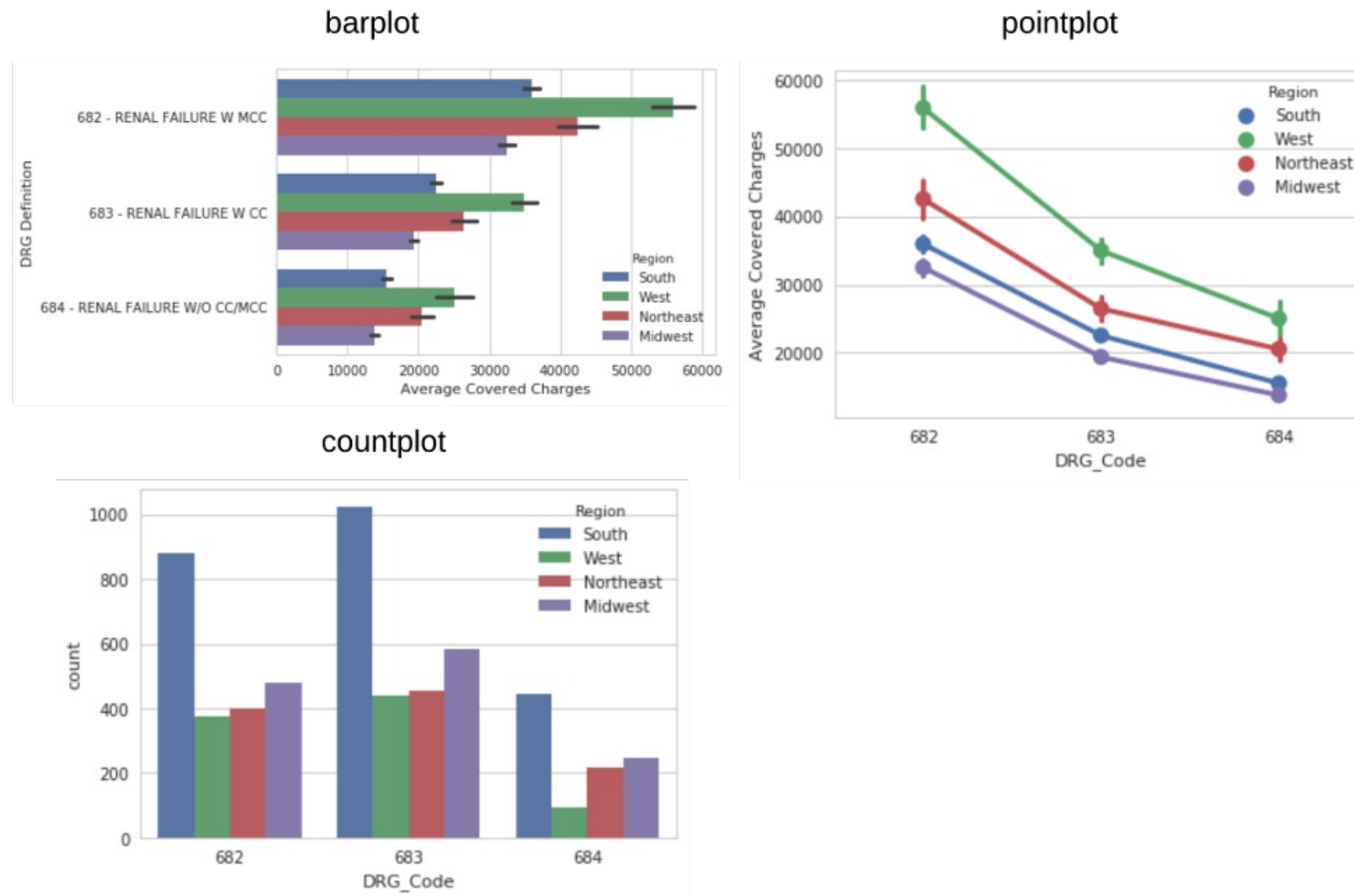


# Plot types - abstract representations



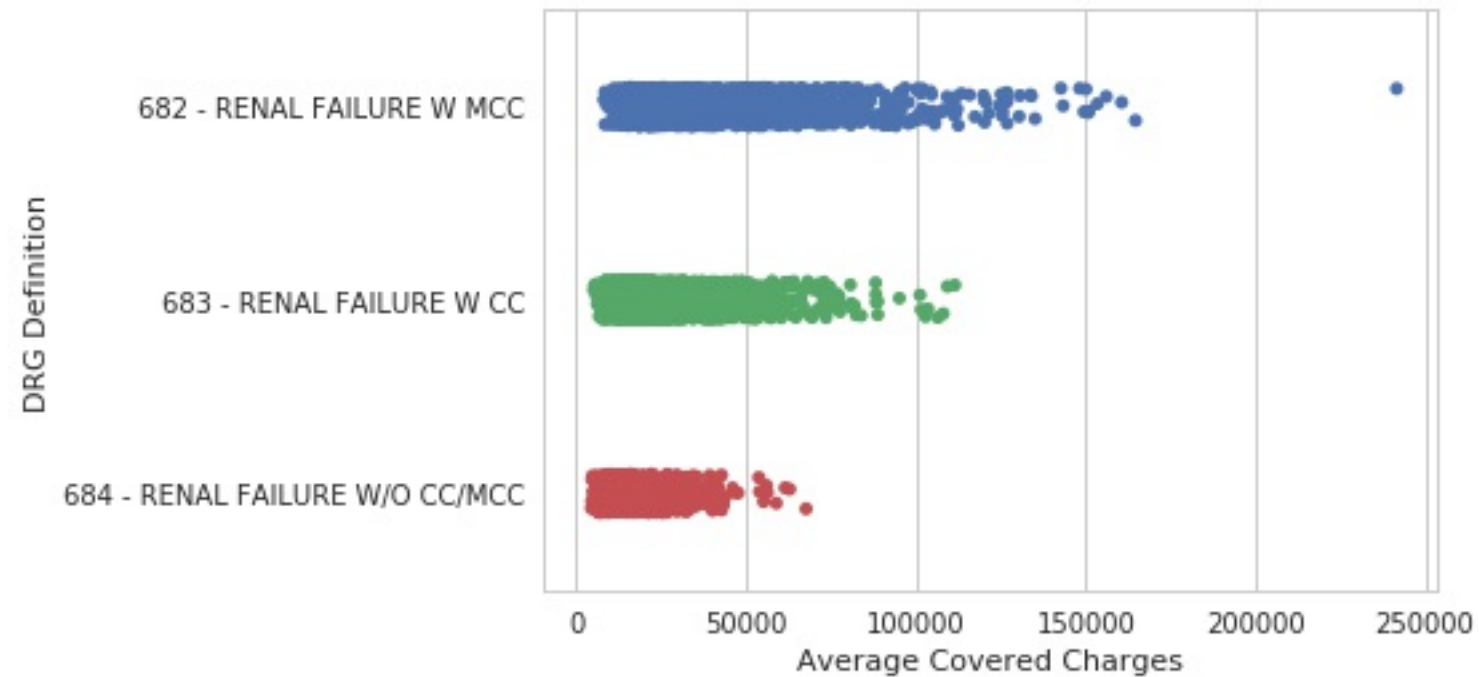


# Plot types - statistical estimates



# Plots of each observation - stripplot

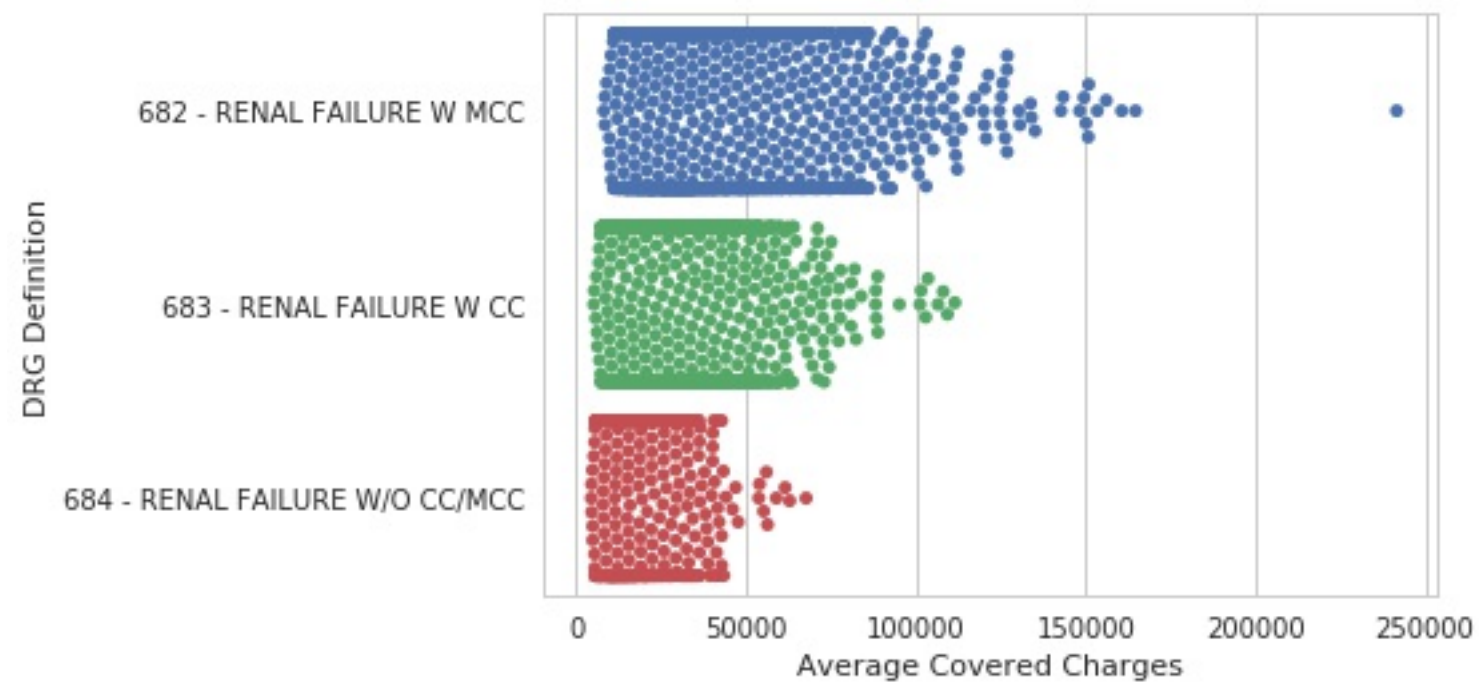
```
sns.stripplot(data=df, y="DRG Definition",  
              x="Average Covered Charges",  
              jitter=True)
```





# Plots of each observation - swarmplot

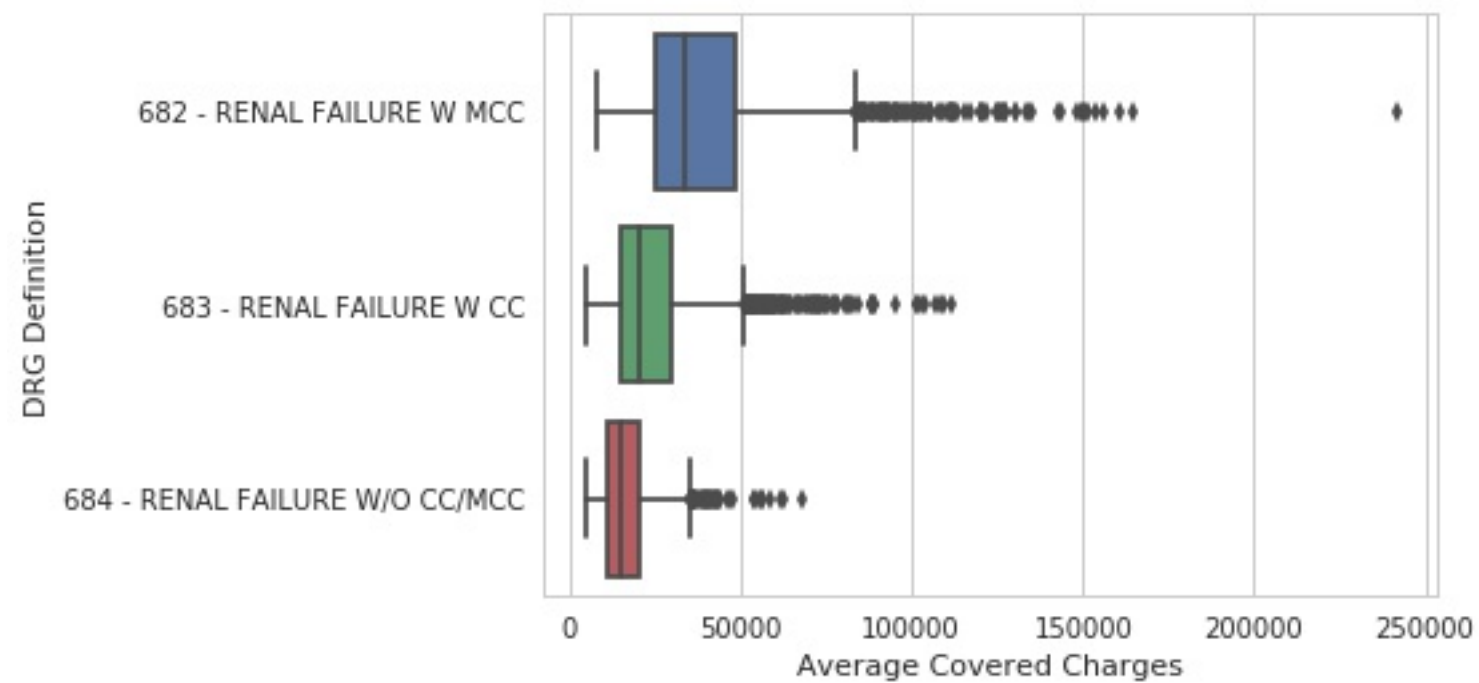
```
sns.swarmplotplot(data=df, y="DRG Definition",  
                  x="Average Covered Charges")
```





# Abstract representations - boxplot

```
sns.boxplot(data=df, y="DRG Definition",  
            x="Average Covered Charges")
```

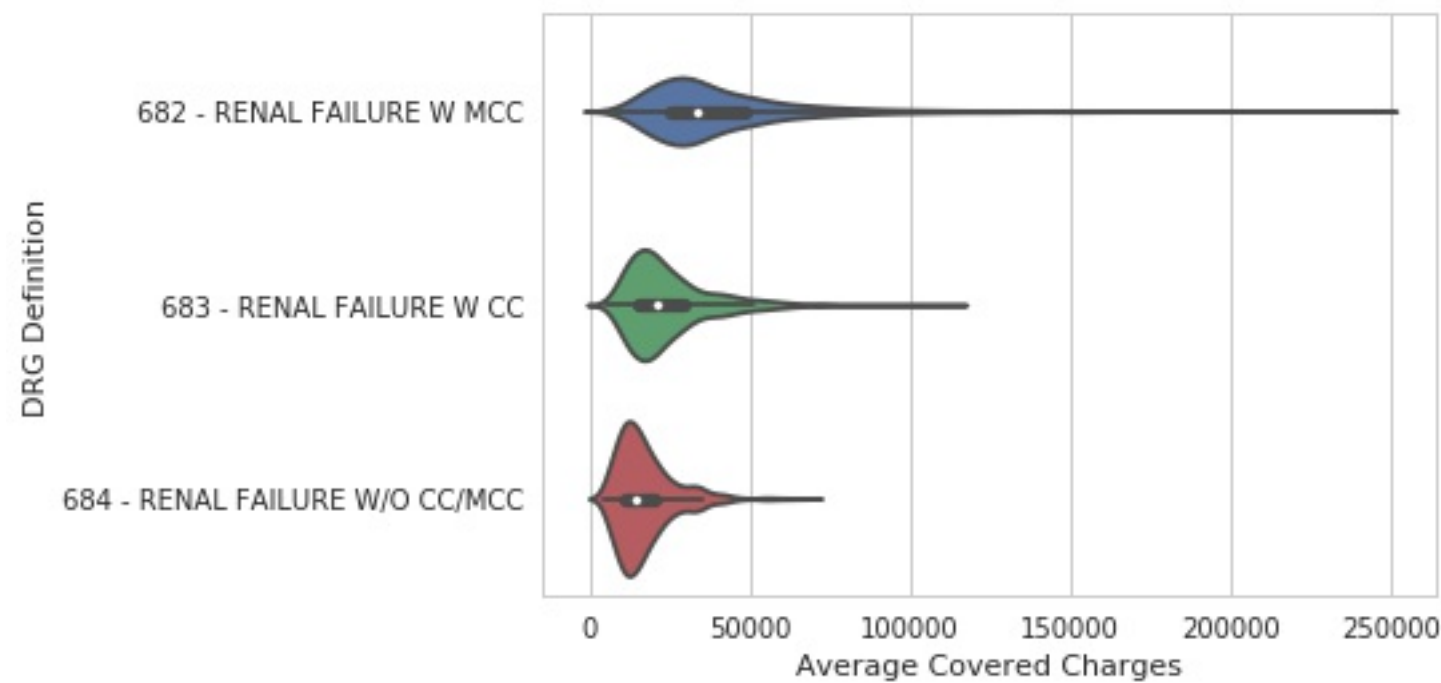






# Abstract representation - violinplot

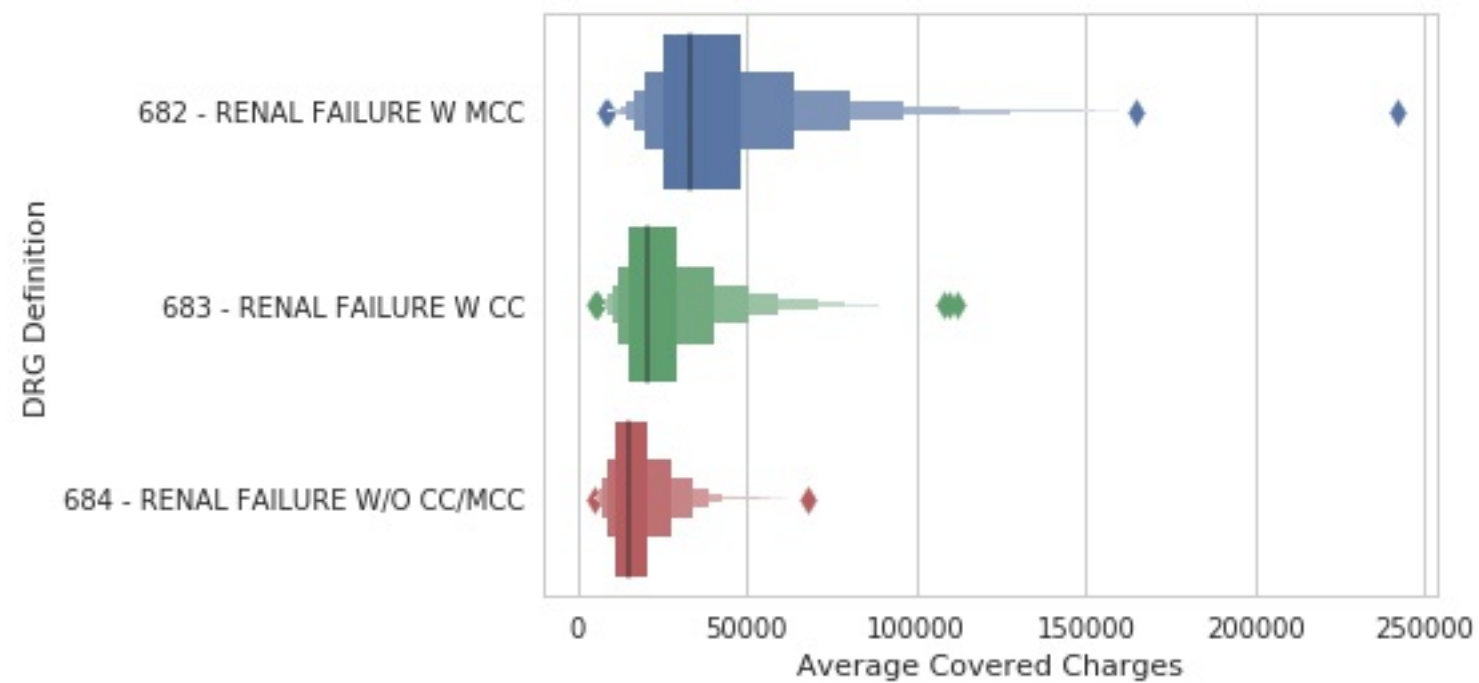
```
sns.violinplot(data=df, y="DRG Definition",  
               x="Average Covered Charges")
```





# Abstract representation - lvplot

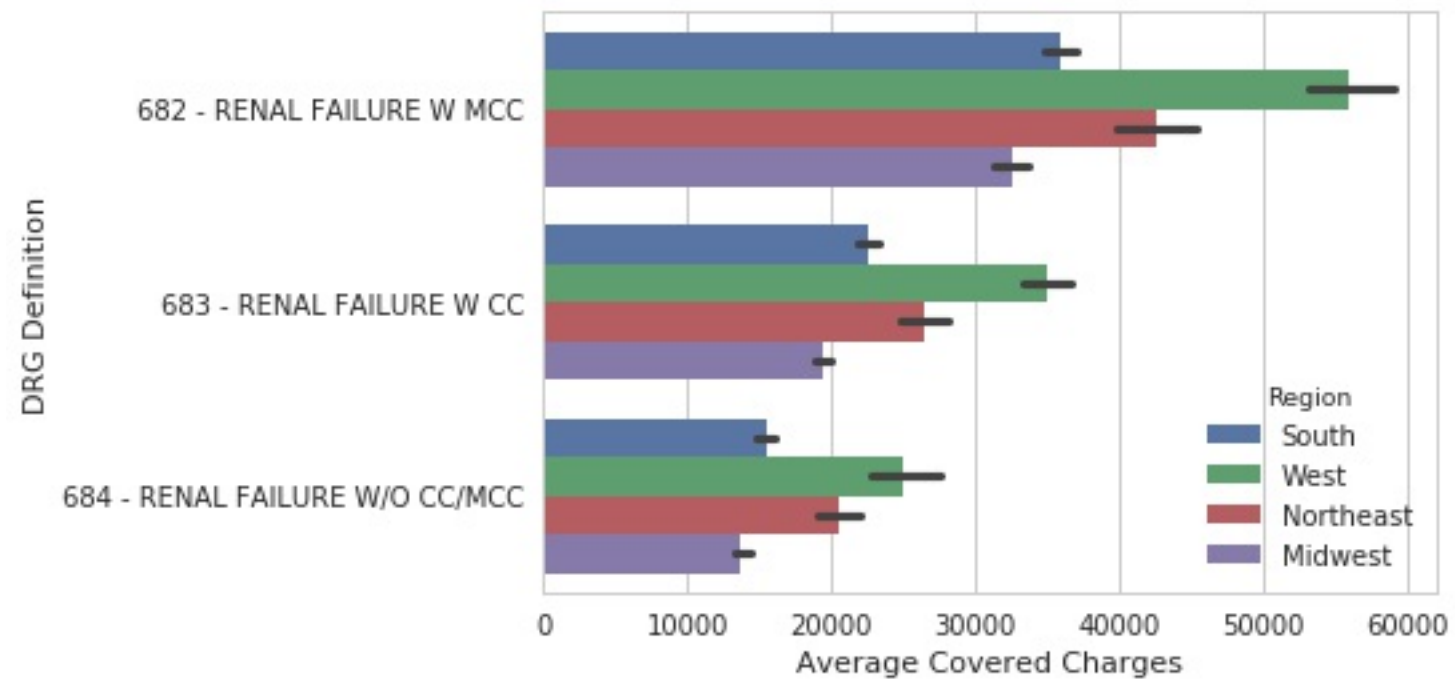
```
sns.lvplot(data=df, y="DRG Definition",  
           x="Average Covered Charges")
```





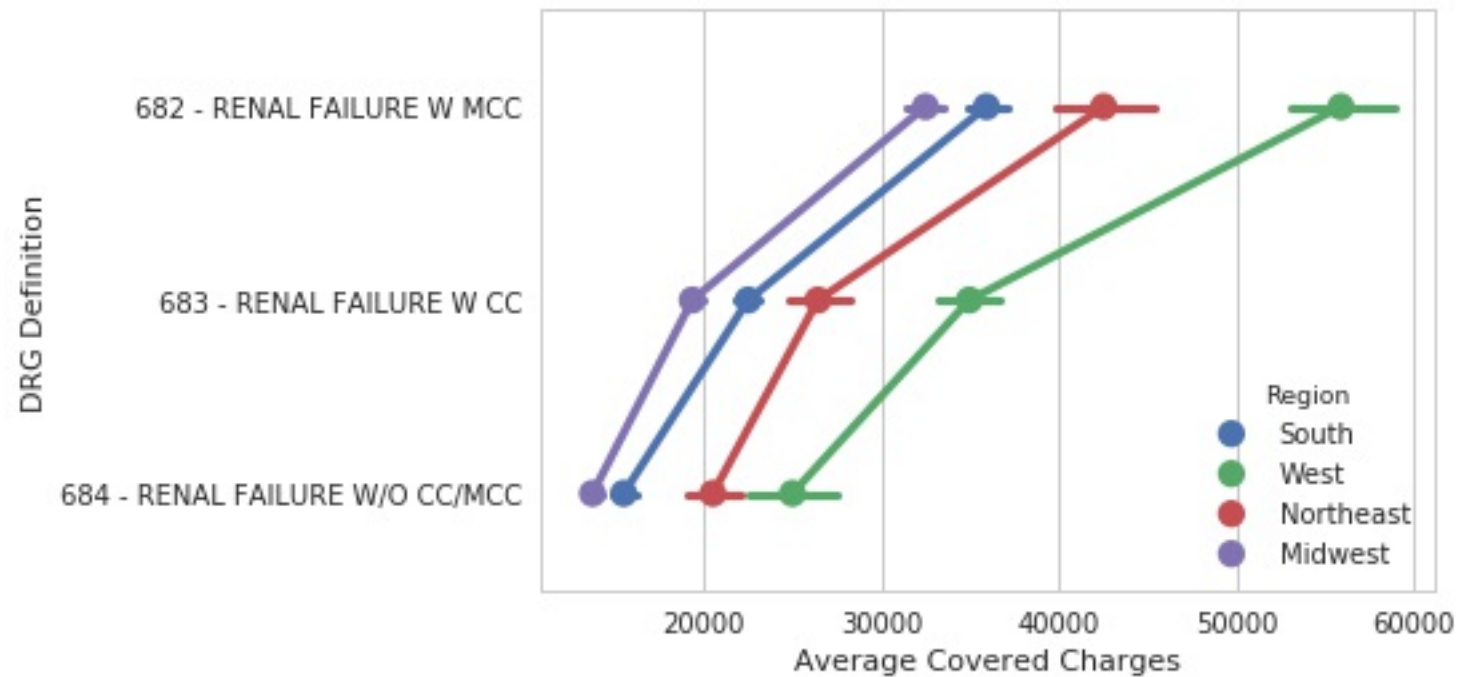
# Statistical estimates - barplot

```
sns.barplot(data=df, y="DRG Definition",  
            x="Average Covered Charges",  
            hue="Region")
```



# Statistical estimates - pointplot

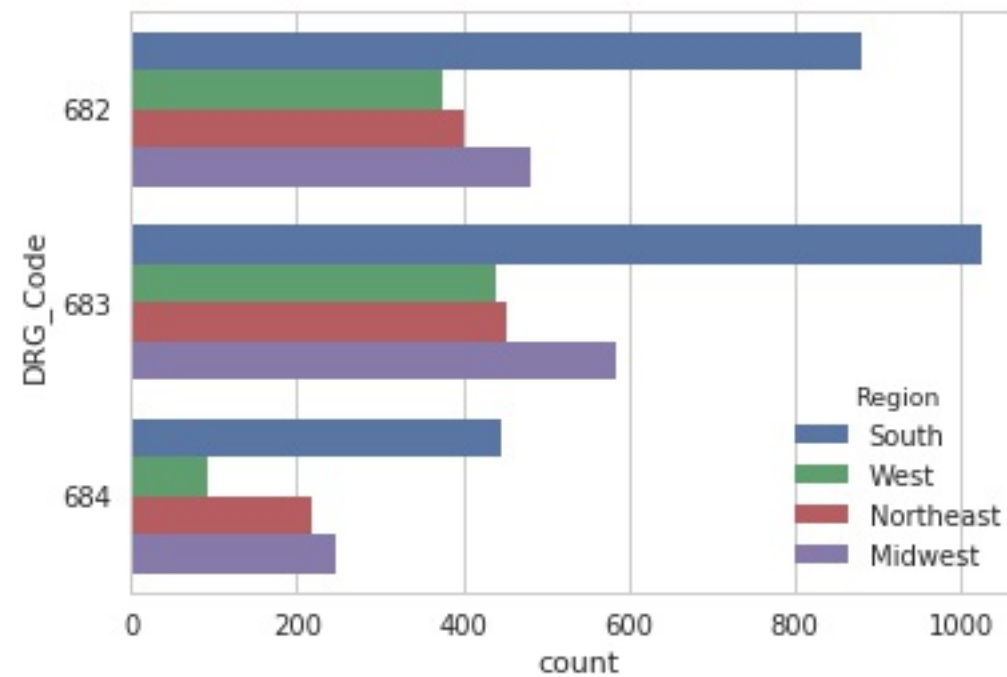
```
sns.pointplot(data=df, y="DRG Definition",  
             x="Average Covered Charges",  
             hue="Region")
```





# Statistical estimates - countplot

```
sns.countplot(data=df, y="DRG_Code", hue="Region")
```





## DATA VISUALIZATION WITH SEABORN

**Let's practice!**



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# Regression Plots

Chris Moffitt  
Instructor



# Bicycle Dataset

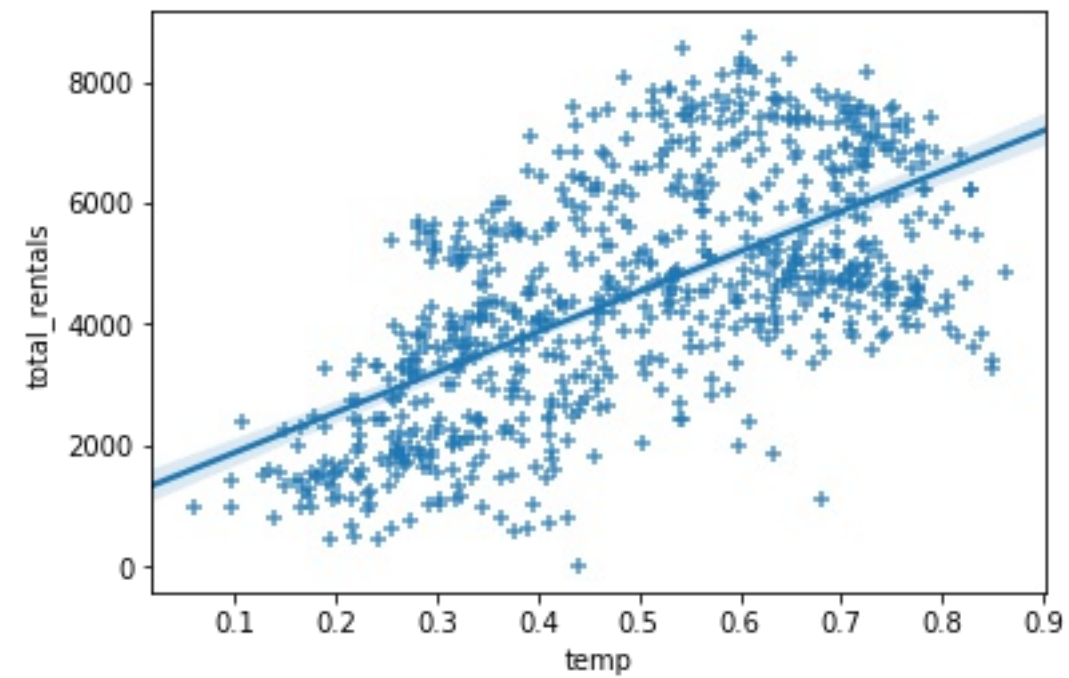
- Aggregated bicycle sharing data in Washington DC
- Data includes:
  - Rental amounts
  - Weather information
  - Calendar information
- Can we predict rental amounts?





# Plotting with regplot

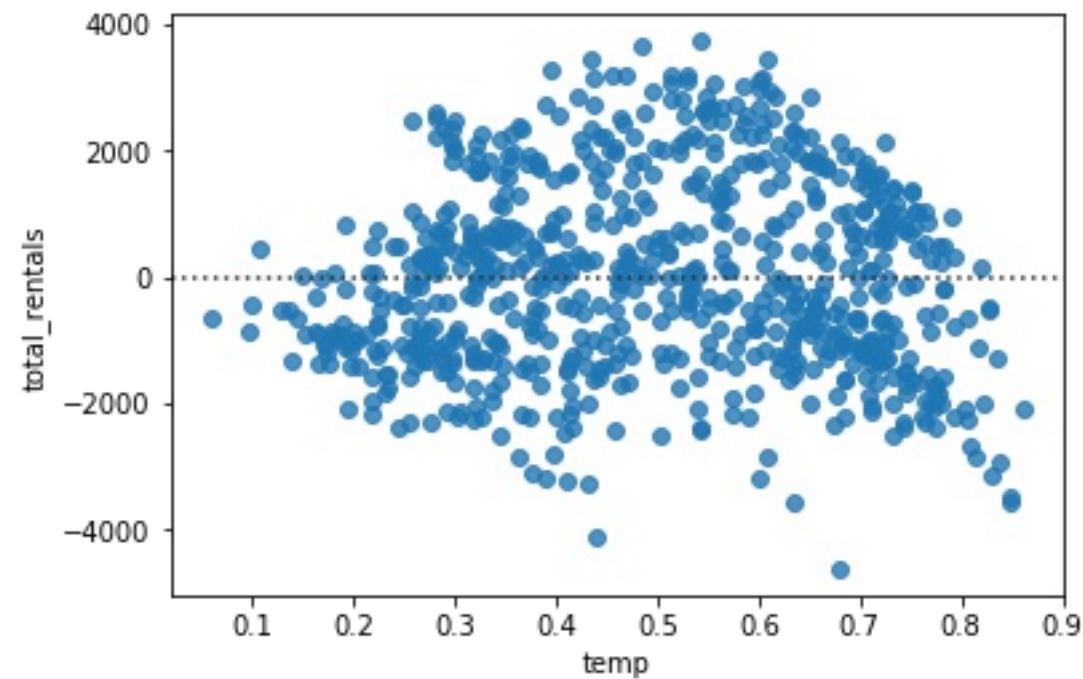
```
sns.regplot(data=df, x='temp', y='total_rentals', marker='+')
```



# Evaluating regression with residplot

- A residual plot is useful for evaluating the fit of a model
- Seaborn supports through residplot function

```
sns.residplot(data=df, x='temp', y='total_rentals')
```

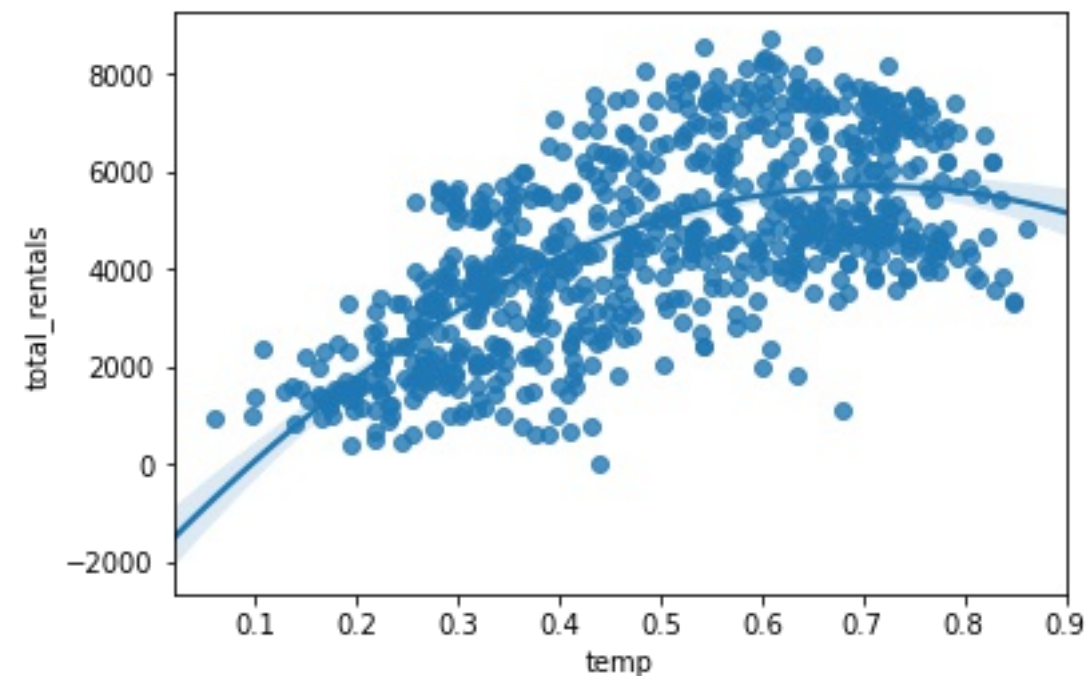




# Polynomial regression

- Seaborn supports polynomial regression using the order parameter

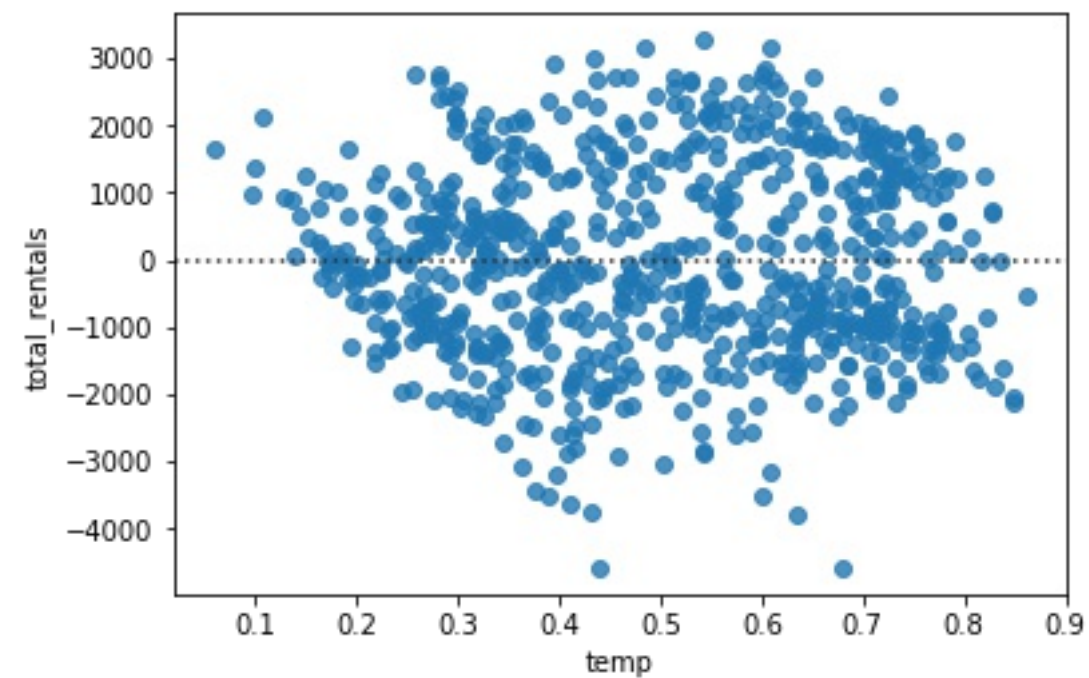
```
sns.regplot(data=df, x='temp', y='total_rentals', order=2)
```





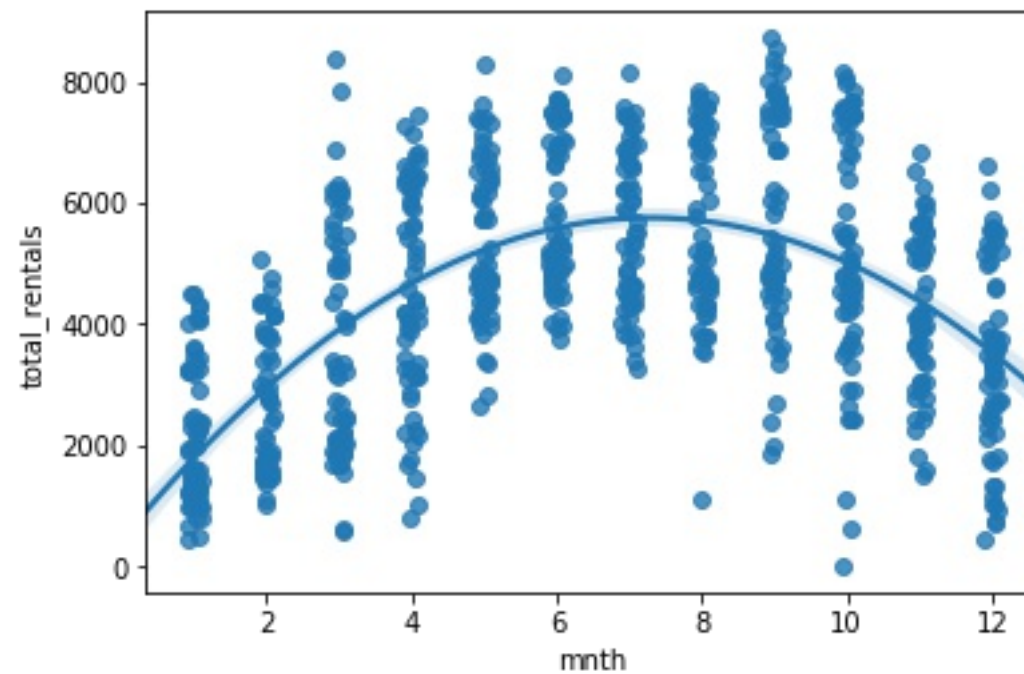
# residplot with polynomial regression

```
sns.residplot(data=df, x='temp', y='total_rentals', order=2)
```



# Categorical values

```
sns.regplot(data=df, x='mnth', y='total_rentals', x_jitter=.1, order=2)
```

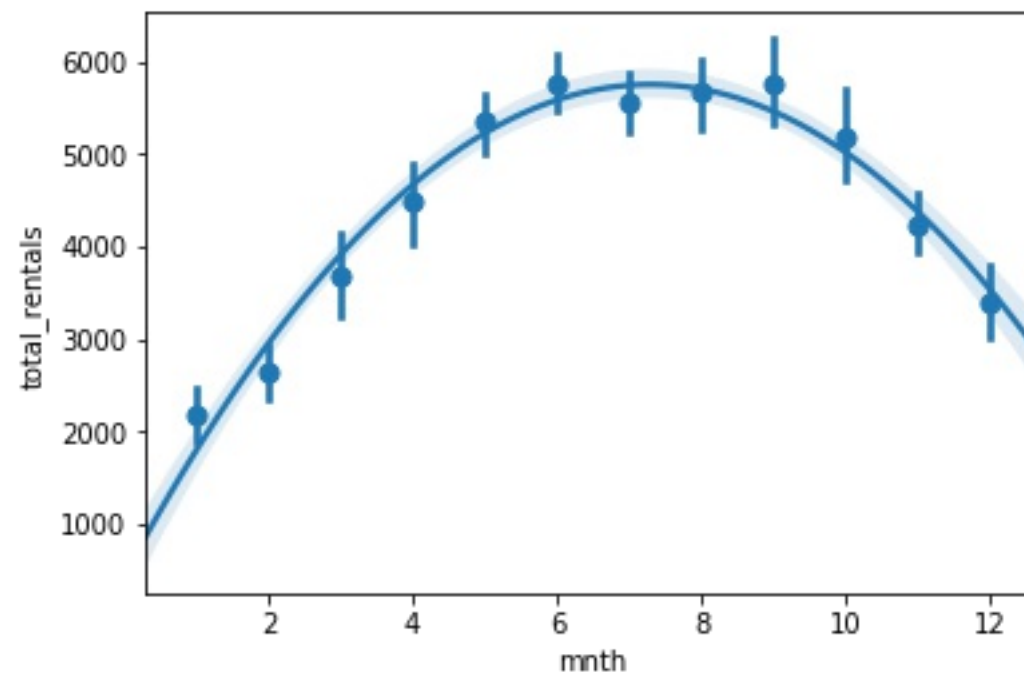




# Estimators

- In some cases, an `x_estimator` can be useful for highlighting trends

```
sns.regplot(data=df, x='mnth', y='total_rentals',  
            x_estimator=np.mean, order=2)
```

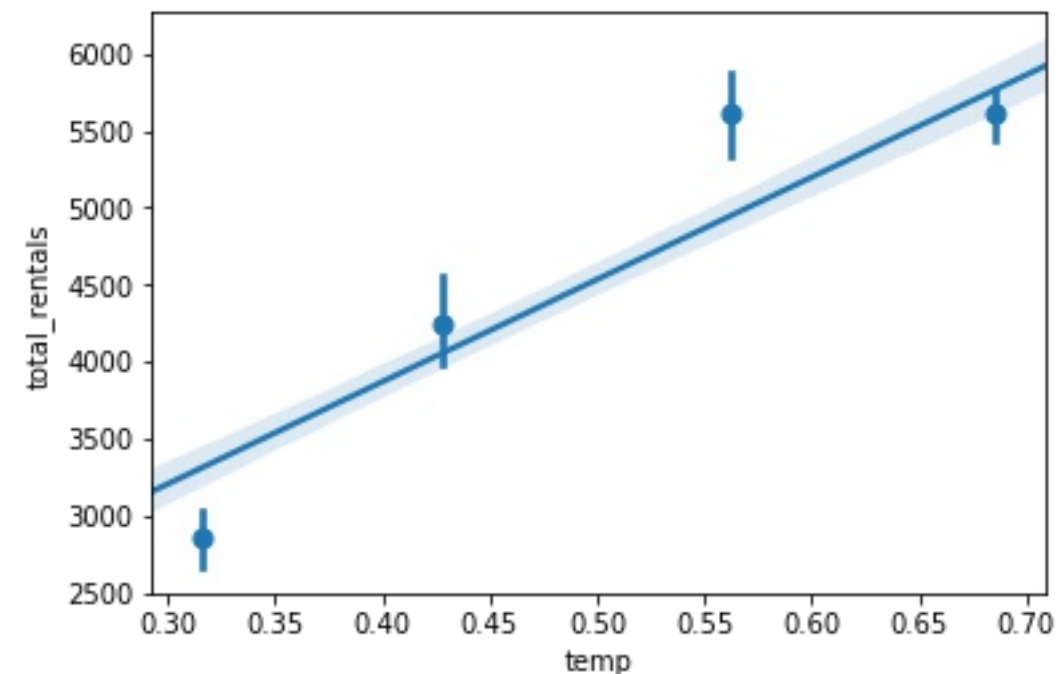




# Binning the data

- `x_bins` can be used to divide the data into discrete bins
- The regression line is still fit against all the data

```
sns.regplot(data=df, x='temp', y='total_rentals', x_bins=4)
```





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# Matrix Plots

Chris Moffitt  
Instructor

# Getting data in the right format

- Seaborn's heatmap() function requires data to be in a grid format
- pandas crosstab() is frequently used to manipulate the data

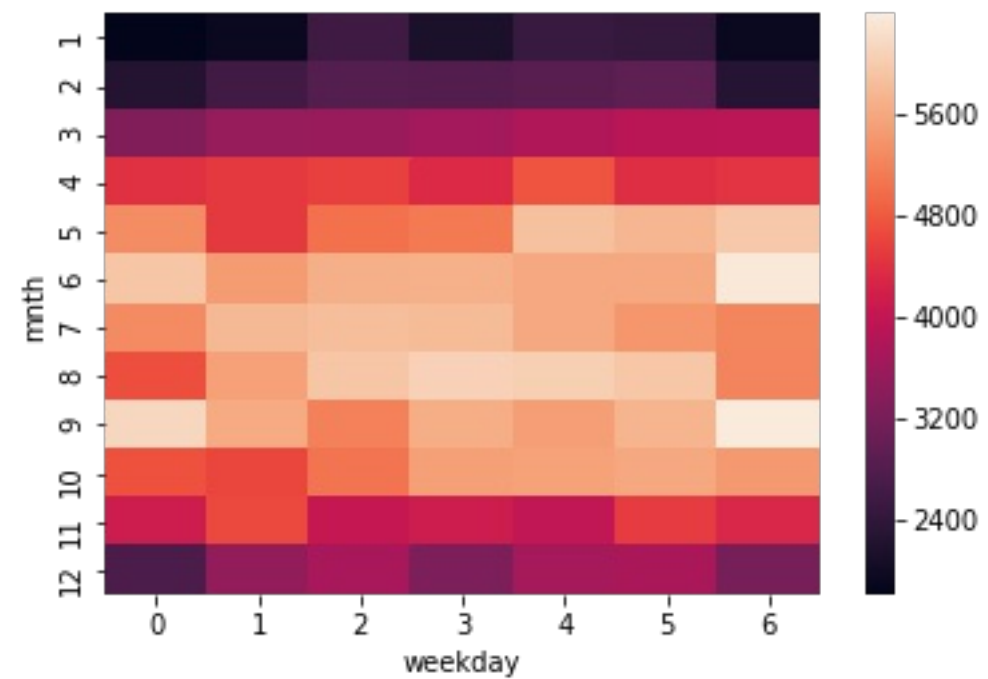
```
pd.crosstab(df["mnth"], df["weekday"], values=df["total_rentals"],  
            aggfunc='mean').round(0)
```

weekday	0	1	2	3	4	5	6
mnth							
1	1816.0	1927.0	2568.0	2139.0	2513.0	2446.0	1957.0
2	2248.0	2604.0	2824.0	2813.0	2878.0	2933.0	2266.0
3	3301.0	3546.0	3574.0	3670.0	3817.0	3926.0	3939.0
4	4417.0	4516.0	4556.0	4331.0	4764.0	4387.0	4446.0
5	5320.0	4512.0	5025.0	5119.0	5893.0	5751.0	5978.0
6	5940.0	5478.0	5681.0	5701.0	5622.0	5616.0	6344.0
7	5298.0	5792.0	5844.0	5814.0	5624.0	5406.0	5232.0
8	4703.0	5518.0	5930.0	6077.0	6038.0	5958.0	5224.0
9	6160.0	5637.0	5184.0	5668.0	5486.0	5747.0	6394.0
10	4735.0	4632.0	5065.0	5505.0	5537.0	5623.0	5445.0
11	4126.0	4658.0	4040.0	4136.0	3994.0	4524.0	4288.0
12	2740.0	3498.0	3713.0	3270.0	3711.0	3742.0	3195.0



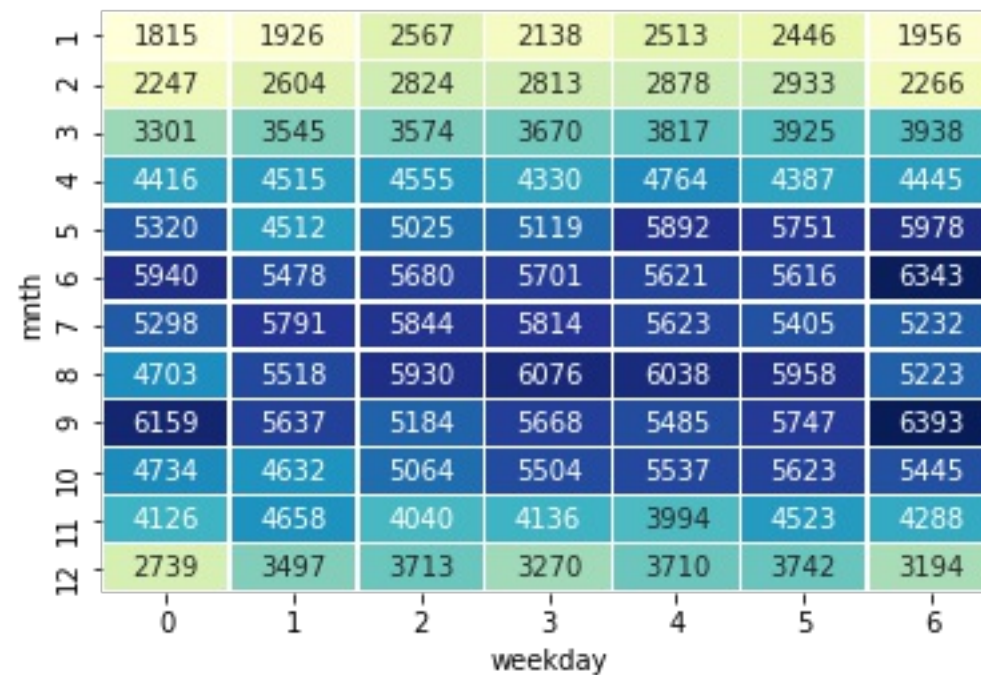
# Build a heatmap

```
sns.heatmap(pd.crosstab(df["mnth"], df["weekday"],  
                        values=df["total_rentals"], aggfunc='mean'))
```



# Customize a heatmap

```
sns.heatmap(df_crosstab, annot=True, fmt="d",  
            cmap="YlGnBu", cbar=False, linewidths=.5)
```

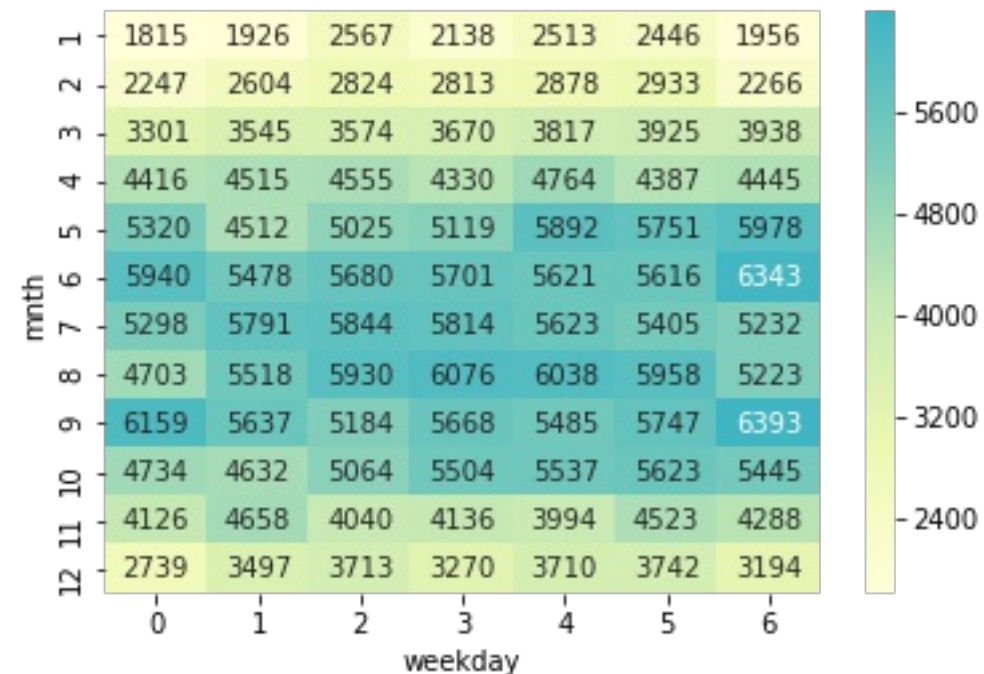




# Centering a heatmap

- Seaborn support centering the heatmap colors on a specific value

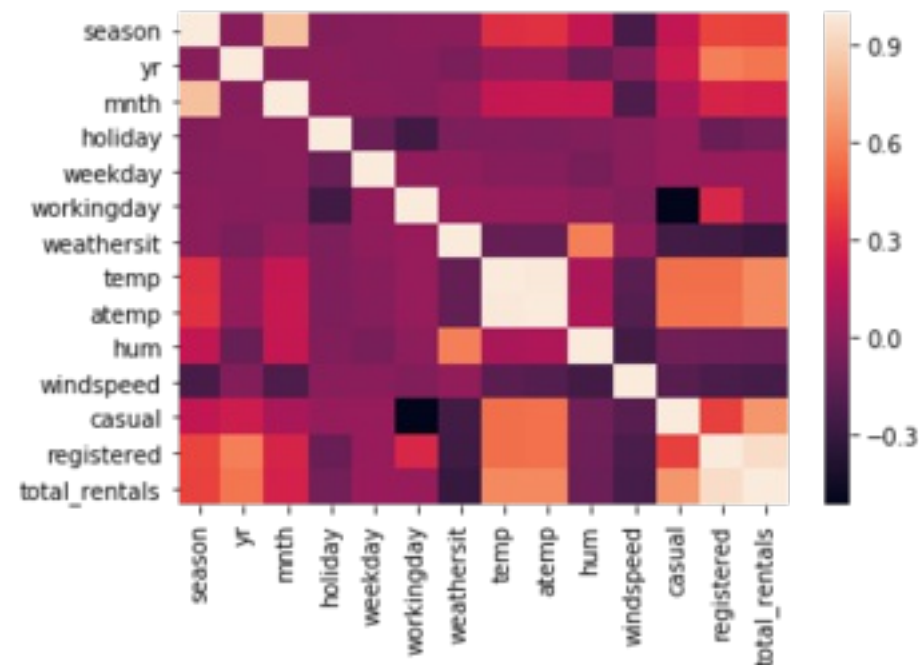
```
sns.heatmap(df_crosstab, annot=True, fmt="d", cmap="YlGnBu", cbar=True,  
            center=df_crosstab.loc[9, 6])
```



# Plotting a correlation matrix

- Pandas corr function calculates correlations between columns in a dataframe
- The output can be converted to a heatmap with seaborn

```
sns.heatmap(df.corr())
```





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