Week 3 Homework - Jon Workman

In [319]:
```
from datetime import date
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score
from matplotlib import pyplot as plt
import seaborn as sns
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import classification_report, confusion_matrix
from sklearn.metrics import roc_curve
%matplotlib inline
```

In [320]:
```
df = pd.read_csv('seattleWeather_1948-2017.csv').dropna()
```

Clean data and add feature

In [321]:
```
df.RAIN = df.RAIN.astype(int)
df['DATE'] =  pd.to_datetime(df['DATE'], format='%Y-%m-%d')
df['MONTH'] = pd.DatetimeIndex(df['DATE']).month
#df['MONTH'] = df['DATE'].apply(date.isoweekday)
```

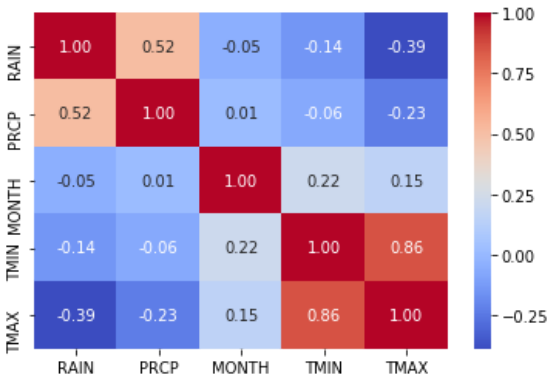
In [322]:
```
df.head()
```

Out[322]:

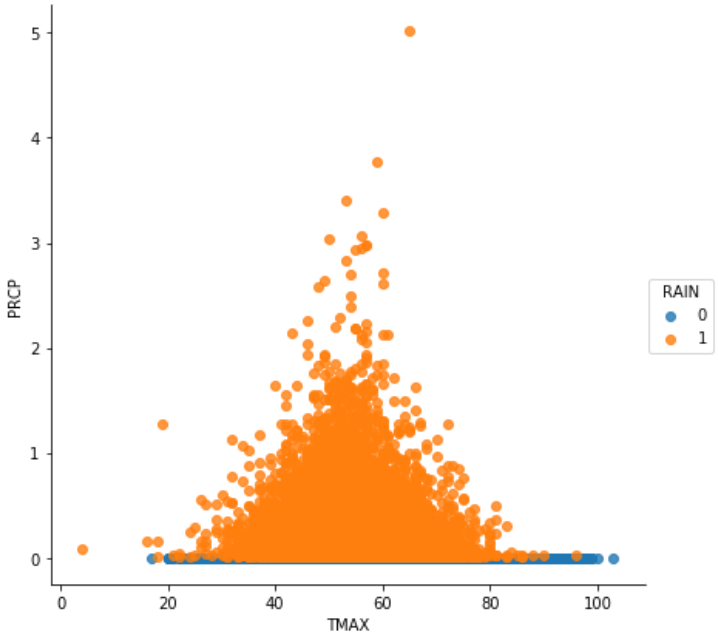
	DATE	PRCP	TMAX	TMIN	RAIN	MONTH
0	1948-01-01	0.47	51	42	1	1
1	1948-01-02	0.59	45	36	1	1
2	1948-01-03	0.42	45	35	1	1
3	1948-01-04	0.31	45	34	1	1
4	1948-01-05	0.17	45	32	1	1

Visualisation

In [324]:
```
g = sns.heatmap(df[['RAIN', 'PRCP','MONTH','TMIN','TMAX']].corr(),annot=True, fmt = ".2f", cmap
 = "coolwarm")
```



In [325]:
```
g = sns.lmplot(x='TMAX', y= 'PRCP', data=df, fit_reg=False, hue='RAIN', size=6)
```



Split dataset

In [328]:
```
start1 = pd.datetime(1950, 1, 1)
end1 = pd.datetime(2009, 12, 31)
start2 = pd.datetime(2010,1,1)
end2 = pd.datetime(2017,12,31)

df_train = df[(df.DATE >= start1) & (df.DATE <= end1)]
df_validation = df[(df.DATE >= start2) & (df.DATE <= end2)]
```

In [329]:
```
df_train.shape
```

Out[329]: (21912, 6)

In [330]:
```
df_validation.shape
```

Out[330]: (2905, 6)

Train and test

In [331]:
```
X_train, X_test, y_train, y_test = train_test_split(df_train.drop(['DATE', 'MONTH', 'RAIN'],axi
s=1),df_train['RAIN'],
test_size=0.30, random_state=0)
```

In [332]:
```
logmodel = LogisticRegression()
logmodel.fit(X_train,y_train)
```

Out[332]:
```
LogisticRegression(C=1.0, class_weight=None, dual=False, fit_intercept=True,
          intercept_scaling=1, max_iter=100, multi_class='ovr', n_jobs=1,
          penalty='l2', random_state=None, solver='liblinear', tol=0.0001,
          verbose=0, warm_start=False)
```

In [333]:
```
logpredictions = logmodel.predict(X_test)
```

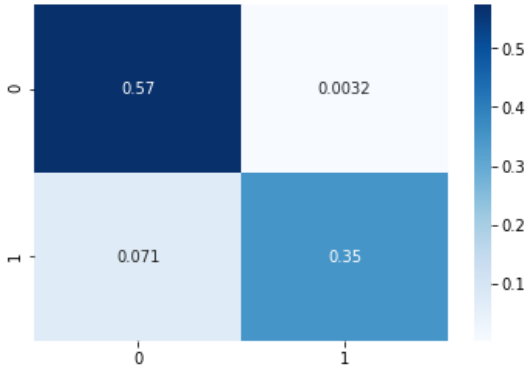
In [334]:
```
print(accuracy_score(y_test,logpredictions))
```

```
0.92576817767
```

In [335]:
```
print(confusion_matrix(y_test,logpredictions))
sns.heatmap(confusion_matrix(y_test, logpredictions) / len(y_test), cmap='Blues', annot=True)
```

```
[[3769   21]
 [ 467 2317]]
```

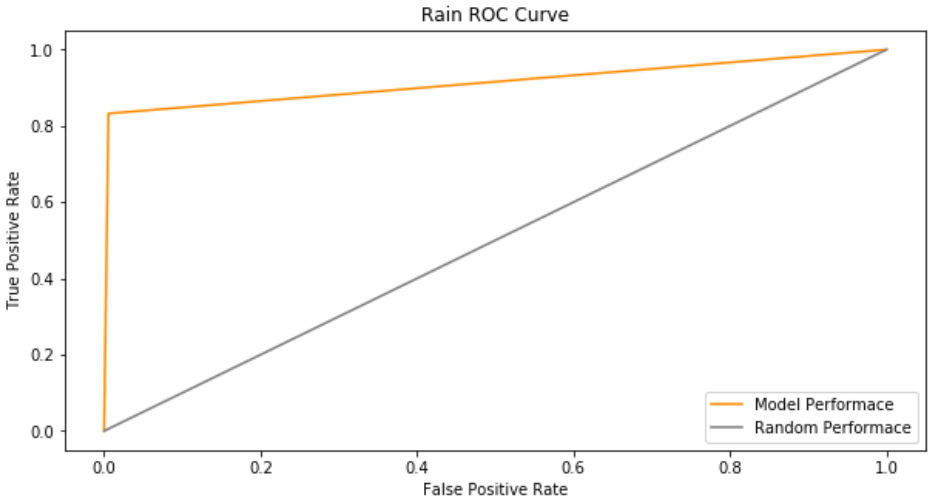
Out[335]: <matplotlib.axes._subplots.AxesSubplot at 0x1a2a54fef0>



In [336]:
```
fpr, tpr, thresholds = roc_curve(y_test, logpredictions)

fig, ax = plt.subplots(1, figsize=(10, 5))
plt.plot(fpr, tpr, color='darkorange', label='Model Performace')
plt.plot([0, 1], [0, 1], color='gray', label='Random Performace')
plt.xlabel('False Positive Rate')
plt.ylabel('True Positive Rate')
plt.title('Rain ROC Curve')
plt.legend(loc="lower right")
```

Out[336]: <matplotlib.legend.Legend at 0x1a28797b70>



In [337]:
```
print(classification_report(y_test,logpredictions))
```

```
             precision    recall  f1-score   support

          0       0.89      0.99      0.94      3790
          1       0.99      0.83      0.90      2784

avg / total       0.93      0.93      0.92      6574
```

Validate

In [339]:
```
X_train2, X_test2, y_train2, y_test2 = train_test_split(df_validation.drop(['DATE', 'MONTH', 'R
AIN'],axis=1),df_validation['RAIN'],
test_size=0.30,random_state=0)
```

In [340]:
```
logmodel2 = LogisticRegression()
logmodel2.fit(X_test2,y_test2)
```

Out[340]:
```
LogisticRegression(C=1.0, class_weight=None, dual=False, fit_intercept=True,
          intercept_scaling=1, max_iter=100, multi_class='ovr', n_jobs=1,
          penalty='l2', random_state=None, solver='liblinear', tol=0.0001,
          verbose=0, warm_start=False)
```

In [341]:
```
logpredictions2 = logmodel2.predict(X_test2)
```

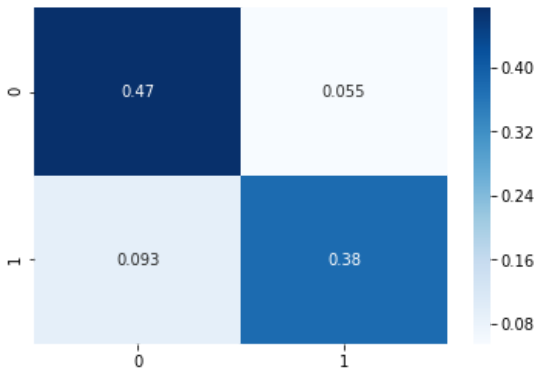
In [342]:
```
print(accuracy_score(y_test2,logpredictions2))
```

```
0.852064220183
```

In [343]:
```
print(confusion_matrix(y_test2,logpredictions2))
sns.heatmap(confusion_matrix(y_test2, logpredictions2) / len(y_test2), cmap='Blues', annot=True
)
```

```
[[413  48]
 [ 81 330]]
```

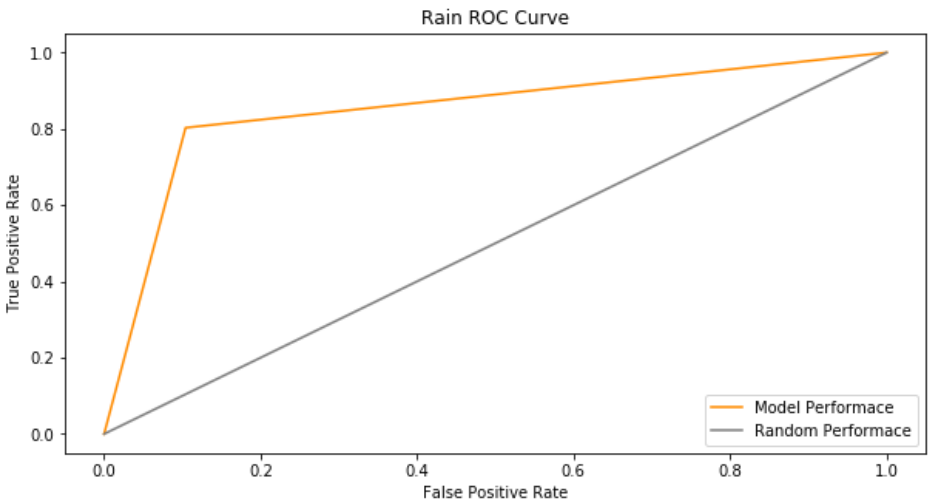
Out[343]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1a28c722b0>
```



In [344]:
```
fpr, tpr, thresholds = roc_curve(y_test2, logpredictions2)

fig, ax = plt.subplots(1, figsize=(10, 5))
plt.plot(fpr, tpr, color='darkorange', label='Model Performace')
plt.plot([0, 1], [0, 1], color='gray', label='Random Performace')
plt.xlabel('False Positive Rate')
plt.ylabel('True Positive Rate')
plt.title('Rain ROC Curve')
plt.legend(loc="lower right")
```

Out[344]:
```
<matplotlib.legend.Legend at 0x1a29f9eac8>
```



In [345]:
```
print(classification_report(y_test2,logpredictions2))
```

```
             precision    recall  f1-score   support

          0       0.84      0.90      0.86       461
          1       0.87      0.80      0.84       411

avg / total       0.85      0.85      0.85       872
```