Weather History

Importing Libraries

In [93]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings("ignore")
import tensorflow
from tensorflow import keras
from tensorflow.keras import Sequential
from tensorflow.keras.layers import Dense,Flatten
from tensorflow.keras.layers import Dropout
```

Reading DataFrame

In [94]:
```
df=pd.read_csv('/content/weatherHistory.csv',parse_dates=True)
df.head()
```

Out[94]:

	Formatted Date	Summary	Precip Type	Temperature (C)	Apparent Temperature (C)	Humidity	Wind Speed (km/h)	Wind Bearing (degrees)	Visi
0	2006-04-01 00:00:00.000 +0200	Partly Cloudy	rain	9.472222	7.388889	0.89	14.1197	251.0	15
1	2006-04-01 01:00:00.000 +0200	Partly Cloudy	rain	9.355556	7.227778	0.86	14.2646	259.0	15
2	2006-04-01 02:00:00.000 +0200	Mostly Cloudy	rain	9.377778	9.377778	0.89	3.9284	204.0	14
3	2006-04-01 03:00:00.000 +0200	Partly Cloudy	rain	8.288889	5.944444	0.83	14.1036	269.0	15
4	2006-04-01 04:00:00.000 +0200	Mostly Cloudy	rain	8.755556	6.977778	0.83	11.0446	259.0	15

In [95]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 96453 entries, 0 to 96452
Data columns (total 12 columns):
 #   Column                    Non-Null Count  Dtype  
---  ------                    --------------  -----  
 0   Formatted Date            96453 non-null  object 
 1   Summary                   96453 non-null  object 
 2   Precip Type               95936 non-null  object 
 3   Temperature (C)           96453 non-null  float64
 4   Apparent Temperature (C)  96453 non-null  float64
 5   Humidity                  96453 non-null  float64
 6   Wind Speed (km/h)         96453 non-null  float64
 7   Wind Bearing (degrees)    96453 non-null  float64
 8   Visibility (km)           96453 non-null  float64
 9   Loud Cover                96453 non-null  float64
 10  Pressure (millibars)      96453 non-null  float64
 11  Daily Summary             96453 non-null  object 
dtypes: float64(8), object(4)
memory usage: 8.8+ MB
```

In [96]:
```
#converting date column into datetime format
df['Formatted Date']=pd.to_datetime(df['Formatted Date'])
```

In [97]:
```
df.describe()
```

Out[97]:

	Temperature (C)	Apparent Temperature (C)	Humidity	Wind Speed (km/h)	Wind Bearing (degrees)	Visibility (km)	
count	96453.000000	96453.000000	96453.000000	96453.000000	96453.000000	96453.000000	96
mean	11.932678	10.855029	0.734899	10.810640	187.509232	10.347325	
std	9.551546	10.696847	0.195473	6.913571	107.383428	4.192123	
min	-21.822222	-27.716667	0.000000	0.000000	0.000000	0.000000	
25%	4.688889	2.311111	0.600000	5.828200	116.000000	8.339800	
50%	12.000000	12.000000	0.780000	9.965900	180.000000	10.046400	
75%	18.838889	18.838889	0.890000	14.135800	290.000000	14.812000	
max	39.905556	39.344444	1.000000	63.852600	359.000000	16.100000	

In [98]:
```
# plt.figure(figsize=(20,6))
# sns.lineplot(data=df,x='Formatted Date',y='Temperature (C)')
```

Percentage of Missing Values

In [99]:
```
100*df.isnull().sum()/len(df)
```

Out[99]:
```
Formatted Date               0.000000
Summary                      0.000000
Precip Type                  0.536012
Temperature (C)              0.000000
Apparent Temperature (C)     0.000000
Humidity                     0.000000
Wind Speed (km/h)            0.000000
Wind Bearing (degrees)       0.000000
Visibility (km)              0.000000
Loud Cover                   0.000000
Pressure (millibars)         0.000000
Daily Summary                0.000000
dtype: float64
```

In [99]:
```
```

In [100]:
```
df.dropna(inplace=True)
```

In [101]:
```
df.columns
```

Out[101]:
```
Index(['Formatted Date', 'Summary', 'Precip Type', 'Temperature (C)',
       'Apparent Temperature (C)', 'Humidity', 'Wind Speed (km/h)',
       'Wind Bearing (degrees)', 'Visibility (km)', 'Loud Cover',
       'Pressure (millibars)', 'Daily Summary'],
      dtype='object')
```

Feature Selection

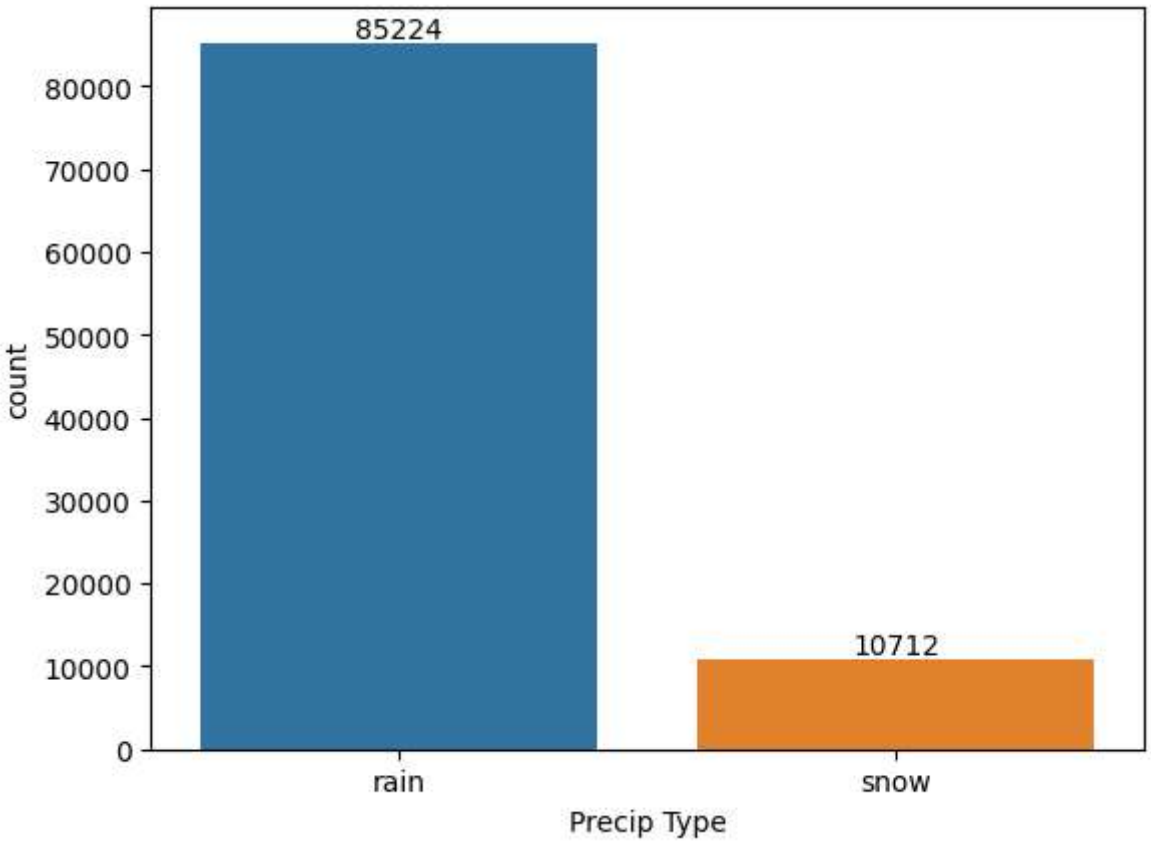
In [102]:
```
df.drop(['Formatted Date','Summary','Daily Summary','Loud Cover'],axis=1,inpl
df.head()
```

Out[102]:

	Precip Type	Temperature (C)	Apparent Temperature (C)	Humidity	Wind Speed (km/h)	Wind Bearing (degrees)	Visibility (km)	Pressure (millibars)
0	rain	9.472222	7.388889	0.89	14.1197	251.0	15.8263	1015.13
1	rain	9.355556	7.227778	0.86	14.2646	259.0	15.8263	1015.63
2	rain	9.377778	9.377778	0.89	3.9284	204.0	14.9569	1015.94
3	rain	8.288889	5.944444	0.83	14.1036	269.0	15.8263	1016.41
4	rain	8.755556	6.977778	0.83	11.0446	259.0	15.8263	1016.51

Target Feature Countplot

In [103]:
```
ax=sns.countplot(x='Precip Type',data=df)
for container in ax.containers:
        ax.bar_label(container)
```



In [104]:
```
df['Precip Type']=df['Precip Type'].map({'rain':0,'snow':1})
```

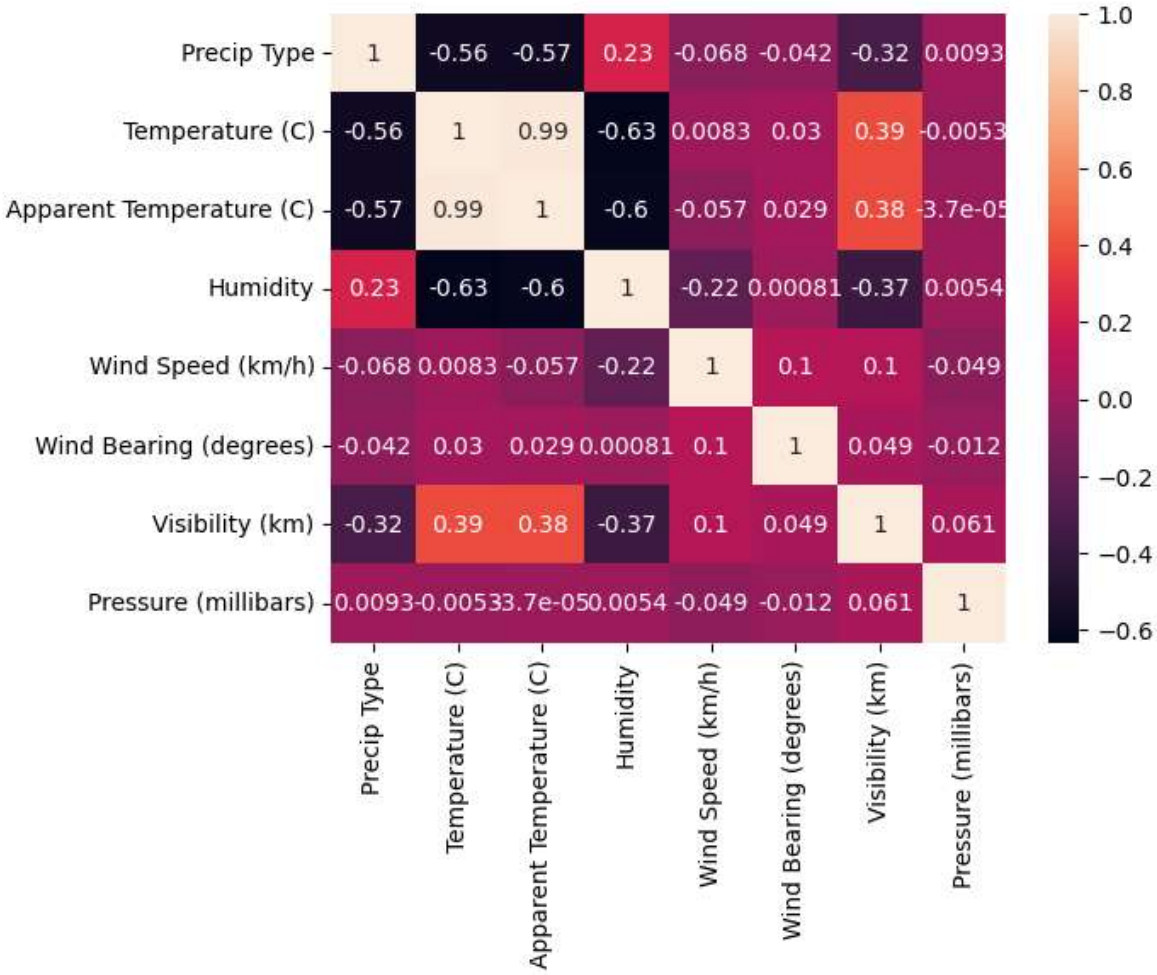
In [105]:
```
df['Precip Type'].value_counts()
```

Out[105]:
```
0    85224
1    10712
Name: Precip Type, dtype: int64
```

Correalation

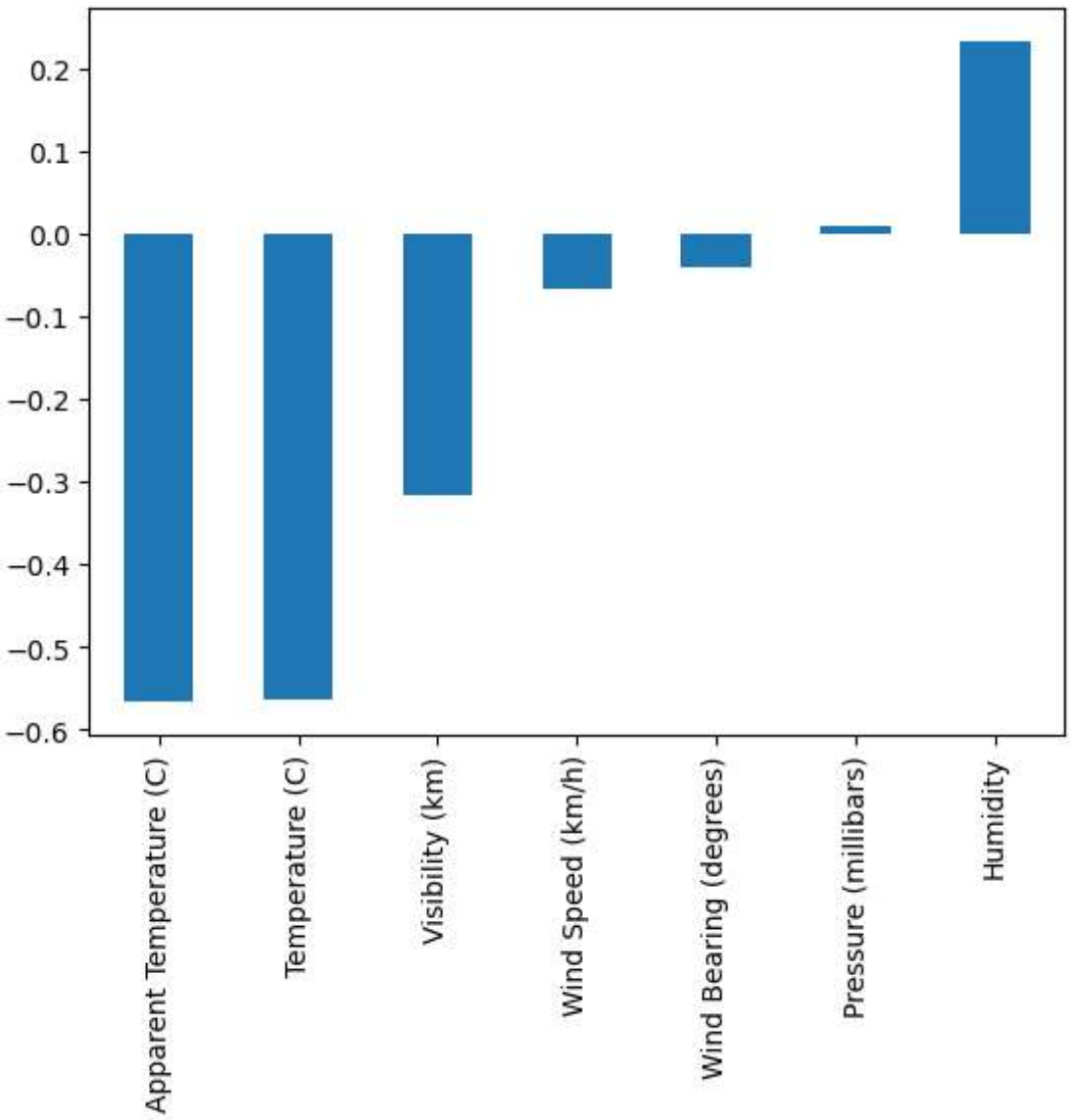
In [106]:
```
sns.heatmap(df.corr(), annot=True)
```

Out[106]: <Axes: >



In [107]:
```
df.corr()['Precip Type'][1:].sort_values().plot(kind='bar')
```

Out[107]: <Axes: >



Seaperating Independant and Dependant variable

In [108]:
```
x=df.drop('Precip Type',axis=1).values
y=df['Precip Type'].values
```

Scaling

In [109]:
```
from sklearn.preprocessing import StandardScaler
sc=StandardScaler()
#x=sc.fit_transform(x)
x_train=sc.fit_transform(x_train)
x_test=sc.fit_transform(x_test)
```

Spliting Dataset into Training and testing dataset

In [110]:
```
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test = train_test_split(x,y,test_size=0.25,random
```

In [111]:
```
model = Sequential()

model.add(Dense(units=30,activation='relu'))
model.add(Dropout(0.5))
model.add(Dense(units=15,activation='relu'))
model.add(Dropout(0.5))
model.add(Dense(units=1,activation='sigmoid'))
model.compile(loss='binary_crossentropy', optimizer='adam',metrics=['accuracy
```

In [112]:
```
model.fit(x=x_train, y=y_train, epochs=10,validation_split=0.20)
```

```
Epoch 1/10
1799/1799 [==============================] - 6s 3ms/step - loss: 9.6485 - ac
curacy: 0.8466 - val_loss: 0.3802 - val_accuracy: 0.8878
Epoch 2/10
1799/1799 [==============================] - 4s 2ms/step - loss: 0.4314 - ac
curacy: 0.8867 - val_loss: 0.3518 - val_accuracy: 0.8878
Epoch 3/10
1799/1799 [==============================] - 4s 2ms/step - loss: 0.3709 - ac
curacy: 0.8874 - val_loss: 0.3508 - val_accuracy: 0.8878
Epoch 4/10
1799/1799 [==============================] - 5s 3ms/step - loss: 0.3576 - ac
curacy: 0.8879 - val_loss: 0.3508 - val_accuracy: 0.8878
Epoch 5/10
1799/1799 [==============================] - 4s 2ms/step - loss: 0.3523 - ac
curacy: 0.8884 - val_loss: 0.3504 - val_accuracy: 0.8878
Epoch 6/10
1799/1799 [==============================] - 4s 2ms/step - loss: 0.3502 - ac
curacy: 0.8886 - val_loss: 0.3501 - val_accuracy: 0.8881
Epoch 7/10
1799/1799 [==============================] - 5s 3ms/step - loss: 0.3494 - ac
curacy: 0.8887 - val_loss: 0.3500 - val_accuracy: 0.8881
Epoch 8/10
1799/1799 [==============================] - 4s 2ms/step - loss: 0.3494 - ac
curacy: 0.8886 - val_loss: 0.3494 - val_accuracy: 0.8881
Epoch 9/10
1799/1799 [==============================] - 4s 2ms/step - loss: 0.3483 - ac
curacy: 0.8888 - val_loss: 0.3488 - val_accuracy: 0.8883
Epoch 10/10
1799/1799 [==============================] - 5s 3ms/step - loss: 0.3464 - ac
curacy: 0.8890 - val_loss: 0.3104 - val_accuracy: 0.8885
```

Out[112]:
```
<keras.callbacks.History at 0x7f29144ddfc0>
```

In [113]:
```
df_loss=pd.DataFrame(model.history.history)
```

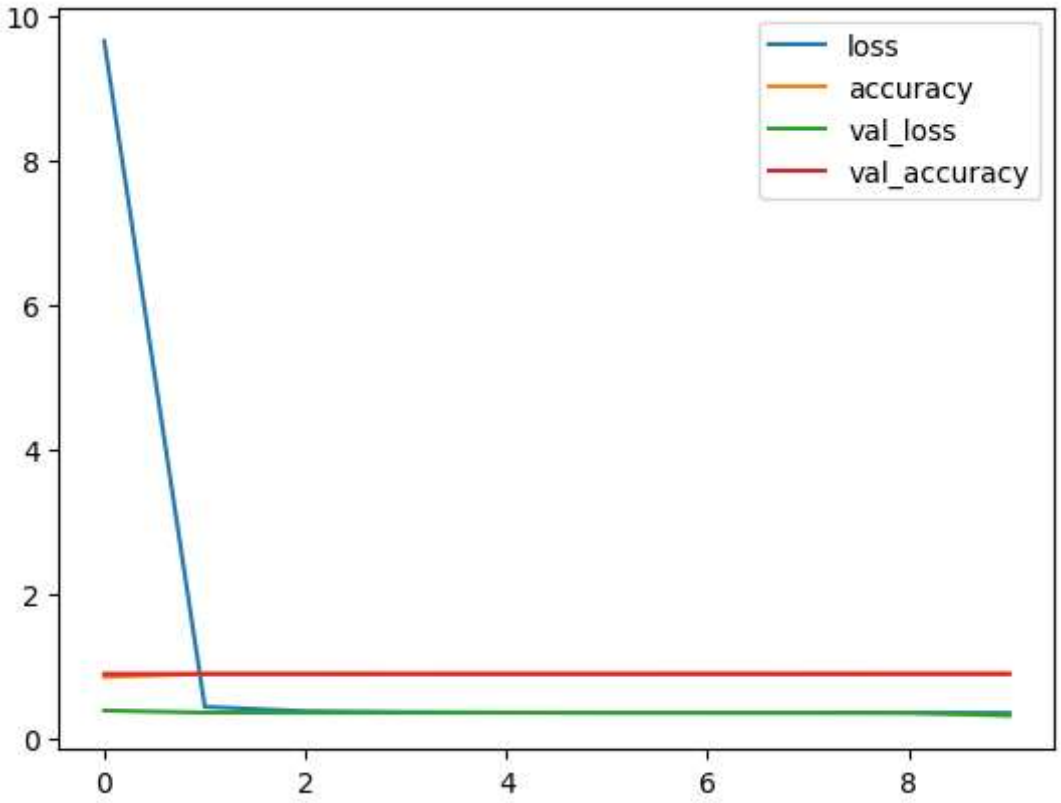
In [114]:
```
df_loss.head()
```

Out[114]:

	loss	accuracy	val_loss	val_accuracy
0	9.648497	0.846598	0.380229	0.887847
1	0.431357	0.886659	0.351760	0.887847
2	0.370932	0.887354	0.350817	0.887847
3	0.357593	0.887928	0.350759	0.887847
4	0.352304	0.888379	0.350448	0.887847

In [115]:
```
df_loss.plot()
```

Out[115]: <Axes: >



In [116]:
```
ypred=model.predict(x_test)
ypred[:5]
```

```
750/750 [==============================] - 1s 1ms/step
```

Out[116]:
```
array([[0.06897467],
       [0.05574806],
       [0.11547198],
       [0.09866229],
       [0.04226653]], dtype=float32)
```

In [117]:
```
ypred=np.where(ypred>0.5,1,0)
ypred
```

Out[117]:
```
array([[0],
       [0],
       [0],
       ...,
       [0],
       [0],
       [0]])
```

Model Evaluation

In [118]:
```
from sklearn.metrics import classification_report,confusion_matrix
```

In [119]:
```
print(classification_report(y_test,ypred))
```

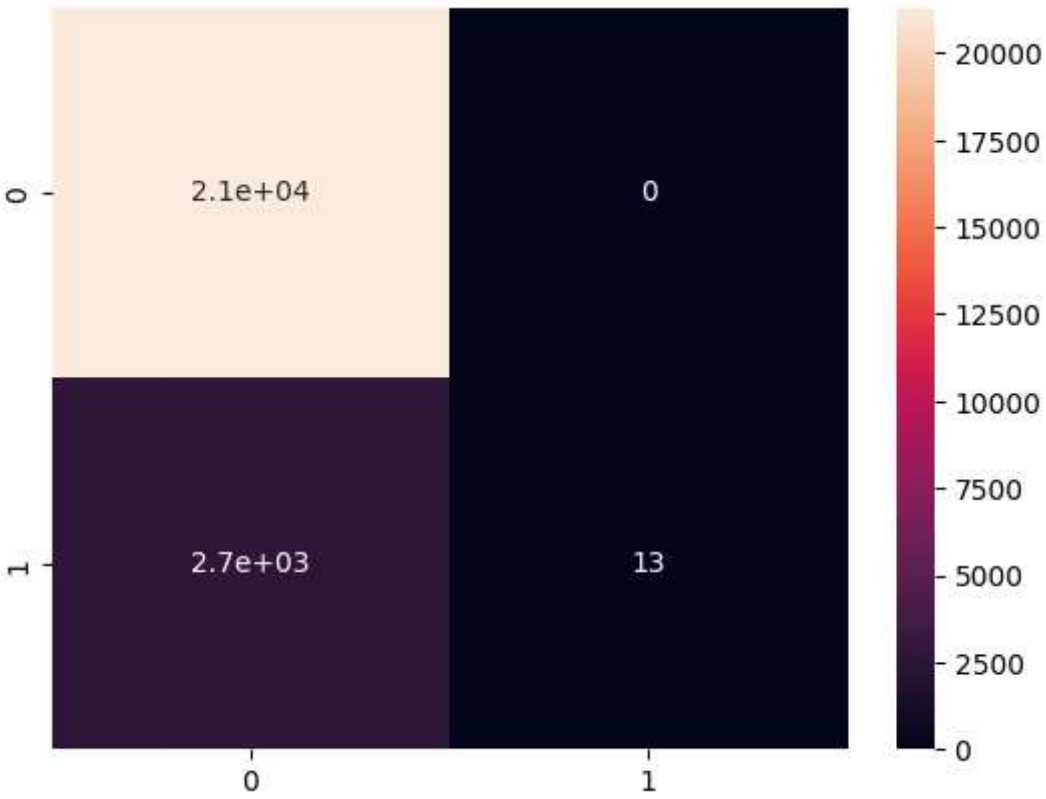
```
              precision    recall  f1-score   support

           0       0.89      1.00      0.94     21306
           1       1.00      0.00      0.01      2678

    accuracy                           0.89     23984
   macro avg       0.94      0.50      0.48     23984
weighted avg       0.90      0.89      0.84     23984
```

In [120]:
```
confusion_matrix(y_test,ypred)
```

Out[120]:
```
array([[21306,     0],
       [ 2665,    13]])
```

In [121]:
```
sns.heatmap(confusion_matrix(y_test,ypred),annot=True)
```

Out[121]: <Axes: >



Prediction Unseen feature

In [122]:
```
a=[[9.5,7.3,0.7,13,200,14,1000]]
model.predict(sc.transform(a))
```

```
1/1 [==============================] - 0s 20ms/step
```

Out[122]:
```
array([[0.09303749]], dtype=float32)
```

In [122]:
```

```