Analize the dataset https://www.kaggle.com/fmena14/volcanoesvenus (https://www.kaggle.com/fmena14/volcanoesvenus) and predict if the image of Venus surface has a Volcano

Using the tools:

`DecisionTreeClassifier`, `GaussianNB` and `RandomForestClassifier`

In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.naive_bayes import GaussianNB
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import accuracy_score
```

Exploratory Analysis

In [2]:
```
df_train = pd.read_csv("Volcanoes_train/train_images.csv",header=None)
df_test = pd.read_csv("Volcanoes_test/test_images.csv",header=None)
print("Shapes training: ",df_train.shape)
print("Shapes test: ",df_test.shape)
df_train.head()
```

```
Shapes training:  (7000, 12100)
Shapes test:  (2734, 12100)
```

Out[2]:

	0	1	2	3	4	5	6	7	8	9	...	12090	12091	12092	12093	12094	12095	12096	12097	12098	12099
0	95	101	99	103	95	86	96	89	70	104	...	111	107	92	89	103	99	117	116	118	96
1	91	92	91	89	92	93	96	101	107	104	...	103	92	93	95	98	105	104	100	90	81
2	87	70	72	74	84	78	93	104	106	106	...	84	71	95	102	94	80	91	80	84	90
3	0	0	0	0	0	0	0	0	0	0	...	94	81	89	84	80	90	92	80	88	96
4	114	118	124	119	95	118	105	116	123	112	...	116	113	102	93	109	104	106	117	111	115

5 rows × 12100 columns

In [3]:
```
train_labels = pd.read_csv("Volcanoes_train/train_labels.csv")
test_labels = pd.read_csv("Volcanoes_test/test_labels.csv")
print("Shapes labels training: ", train_labels.shape)
print("Shapes labels test: ", test_labels.shape)
train_labels.head()
```

```
Shapes labels training:  (7000, 4)
Shapes labels test:  (2734, 4)
```

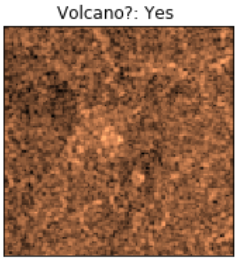
Out[3]:

	Volcano?	Type	Radius	Number Volcanoes
0	1	3.0	17.46	1.0
1	0	NaN	NaN	NaN
2	0	NaN	NaN	NaN
3	0	NaN	NaN	NaN
4	0	NaN	NaN	NaN

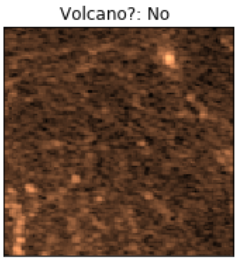
To see the images of Venus

In [57]:
```
train_reshape = df_train.values.reshape((df_train.shape[0],1,110,110)) #to recover matrix form
train_reshape_graunded_to_rgb = train_reshape/255.0
train_reshape_graunded_to_rgb_transpose = train_reshape_graunded_to_rgb.transpose([0, 2, 3, 1])
```

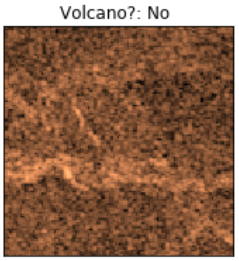
In [72]:
```
label_names = ["No","Yes"]
def visualize(X,Y):
    aux = train_reshape_graunded_to_rgb_transpose[X]

    f,ax = plt.subplots(1,figsize=(8,3))
    ax.set_title("Volcano?: %s "%(label_names[Y["Volcano?"][X]]))

    ax.imshow(aux[:,:,0],cmap='copper')
    ax.set_yticks([])
    ax.set_xticks([])
    plt.show()
    print(Y.loc[X,:])

visualize(0,train_labels), visualize(20,train_labels), visualize(6500,train_labels)
```




```
Volcano?             1.00
Type                 3.00
Radius              17.46
Number Volcanoes     1.00
Name: 0, dtype: float64
```




```
Volcano?            0.0
Type                NaN
Radius              NaN
Number Volcanoes    NaN
Name: 20, dtype: float64
```




```
Volcano?            0.0
Type                NaN
Radius              NaN
Number Volcanoes    NaN
Name: 6500, dtype: float64
```

Out[72]:
```
(None, None, None)
```

Let's get just the first column from the labels

In [4]:
```
y_train_label = train_labels[['Volcano?']].copy()
y_test_label = test_labels[['Volcano?']].copy()
```

In [5]:
```
y_train_label.head()
```

Out[5]:

	Volcano?
0	1
1	0
2	0
3	0
4	0

Try to predict using the Decision Tree

In [9]:
```
volcanoesVenus_classifier = DecisionTreeClassifier(max_leaf_nodes=70, random_state=0)
volcanoesVenus_classifier.fit(df_train, y_train_label)
```

Out[9]:
```
DecisionTreeClassifier(class_weight=None, criterion='gini', max_depth=None,
            max_features=None, max_leaf_nodes=70,
            min_impurity_decrease=0.0, min_impurity_split=None,
            min_samples_leaf=1, min_samples_split=2,
            min_weight_fraction_leaf=0.0, presort=False, random_state=0,
            splitter='best')
```

In [10]:
```
predictionsVolcanoes = volcanoesVenus_classifier.predict(df_test)
```

In [11]:
```
predictionsVolcanoes[:10]
```

Out[11]:
```
array([0, 0, 1, 0, 1, 0, 0, 0, 0, 0], dtype=int64)
```

In [12]:
```
y_test_label['Volcano?'][:10]
```

Out[12]:
```
0    0
1    0
2    1
3    0
4    1
5    0
6    0
7    0
8    0
9    0
Name: Volcano?, dtype: int64
```

In [13]:
```
accuracy_score(y_true = y_test_label, y_pred = predictionsVolcanoes)
```

Out[13]:
```
0.9008778346744697
```

Try to predict using the Gaussian NB

In [14]:
```
gnb = GaussianNB()

model = gnb.fit(df_train, y_train_label.values.ravel())
```

In [15]:
```
preds = gnb.predict(df_test)
accuracy_score(y_test_label, preds)
```

Out[15]:
```
0.3357717629846379
```

Try to predict using the Random Forest

In [16]:
```
volcanoesVenus_RandForest = RandomForestClassifier(max_depth=2, random_state=0)
volcanoesVenus_RandForest.fit(df_train, y_train_label.values.ravel())
```

Out[16]:
```
RandomForestClassifier(bootstrap=True, class_weight=None, criterion='gini',
            max_depth=2, max_features='auto', max_leaf_nodes=None,
            min_impurity_decrease=0.0, min_impurity_split=None,
            min_samples_leaf=1, min_samples_split=2,
            min_weight_fraction_leaf=0.0, n_estimators=10, n_jobs=1,
            oob_score=False, random_state=0, verbose=0, warm_start=False)
```

In [17]:
```
predictionsVolcanoesRandomFor = volcanoesVenus_RandForest.predict(df_test)
```

In [18]:
```
accuracy_score(y_test_label, predictionsVolcanoesRandomFor)
```

Out[18]: 0.8427212874908558