Importing Data Set & Libraries

In [15]:

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn import tree
from sklearn import metrics
%matplotlib inline

df  = pd.read_csv(r'C:\Users\Shyam Adsul\Desktop\glass.csv')
```

In [16]:

```
df
```

Out[16]:

	RI	Na	Mg	Al	Si	K	Ca	Ba	Fe	Type
0	1.52101	13.64	4.49	1.10	71.78	0.06	8.75	0.00	0.0	1
1	1.51761	13.89	3.60	1.36	72.73	0.48	7.83	0.00	0.0	1
2	1.51618	13.53	3.55	1.54	72.99	0.39	7.78	0.00	0.0	1
3	1.51766	13.21	3.69	1.29	72.61	0.57	8.22	0.00	0.0	1
4	1.51742	13.27	3.62	1.24	73.08	0.55	8.07	0.00	0.0	1
...	...	...	...	...	...	...	...	...	...	...
209	1.51623	14.14	0.00	2.88	72.61	0.08	9.18	1.06	0.0	7
210	1.51685	14.92	0.00	1.99	73.06	0.00	8.40	1.59	0.0	7
211	1.52065	14.36	0.00	2.02	73.42	0.00	8.44	1.64	0.0	7
212	1.51651	14.38	0.00	1.94	73.61	0.00	8.48	1.57	0.0	7
213	1.51711	14.23	0.00	2.08	73.36	0.00	8.62	1.67	0.0	7

214 rows × 10 columns

In [17]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 214 entries, 0 to 213
Data columns (total 10 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   RI      214 non-null    float64
 1   Na      214 non-null    float64
 2   Mg      214 non-null    float64
 3   Al      214 non-null    float64
 4   Si      214 non-null    float64
 5   K       214 non-null    float64
 6   Ca      214 non-null    float64
 7   Ba      214 non-null    float64
 8   Fe      214 non-null    float64
 9   Type    214 non-null    int64  
dtypes: float64(9), int64(1)
memory usage: 16.8 KB
```

In [48]:

```
df.isnull().sum()
```

Out[48]:

```
RI      0
```

```
Na      0
Mg      0
Al      0
Si      0
K       0
Ca      0
Ba      0
Fe      0
Type    0
dtype: int64
```

In [18]:

```
df.describe()
```

Out[18]:

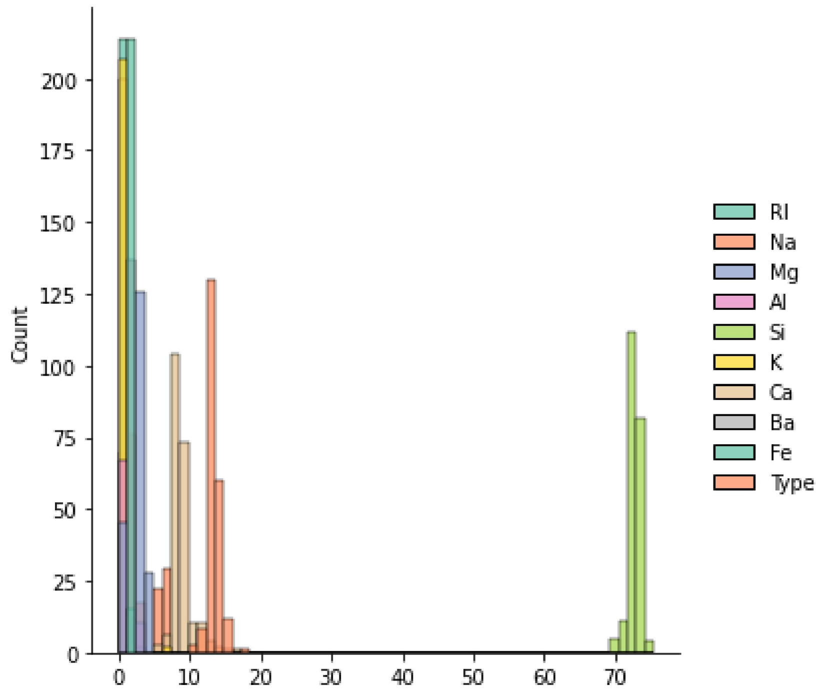
	RI	Na	Mg	Al	Si	K	Ca	Ba	Fe	Type
count	214.000000	214.000000	214.000000	214.000000	214.000000	214.000000	214.000000	214.000000	214.000000	214.000000
mean	1.518365	13.407850	2.684533	1.444907	72.650935	0.497056	8.956963	0.175047	0.057009	2.780374
std	0.003037	0.816604	1.442408	0.499270	0.774546	0.652192	1.423153	0.497219	0.097439	2.103739
min	1.511150	10.730000	0.000000	0.290000	69.810000	0.000000	5.430000	0.000000	0.000000	1.000000
25%	1.516523	12.907500	2.115000	1.190000	72.280000	0.122500	8.240000	0.000000	0.000000	1.000000
50%	1.517680	13.300000	3.480000	1.360000	72.790000	0.555000	8.600000	0.000000	0.000000	2.000000
75%	1.519157	13.825000	3.600000	1.630000	73.087500	0.610000	9.172500	0.000000	0.100000	3.000000
max	1.533930	17.380000	4.490000	3.500000	75.410000	6.210000	16.190000	3.150000	0.510000	7.000000

In [19]:

```
sns.displot(palette= 'Set2',data=df)
```

Out[19]:

```
<seaborn.axisgrid.FacetGrid at 0x21398b4ee80>
```

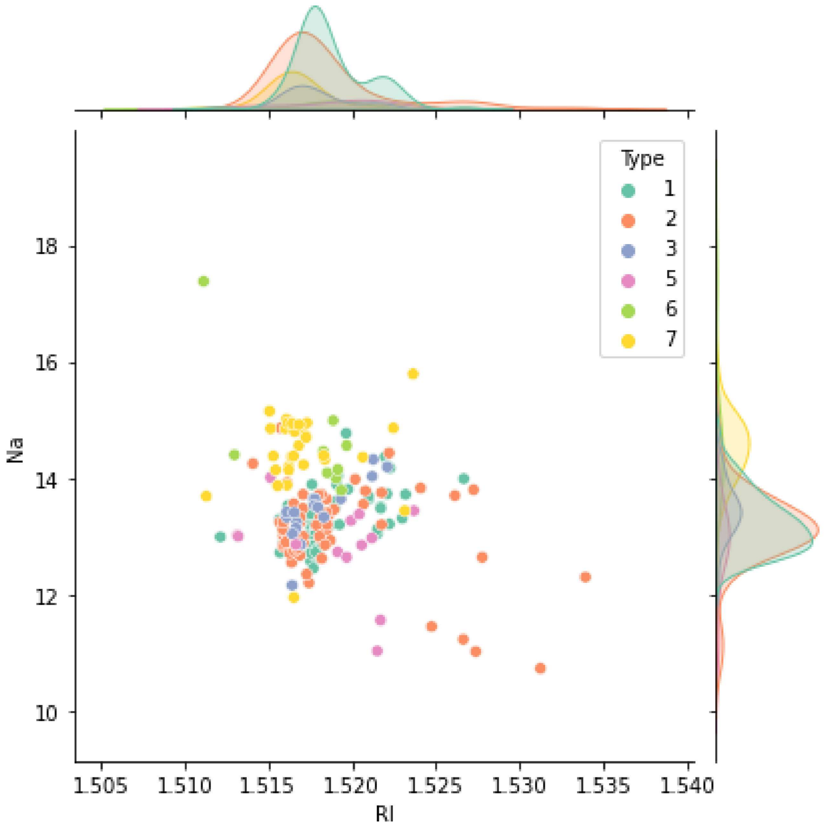


In [20]:

```
sns.jointplot(x='RI',y='Na',hue='Type',palette= 'Set2',data=df)
```

Out[20]:

```
<seaborn.axisgrid.JointGrid at 0x2139babd730>
```



In [31]:

```
X = df.drop(['Type'],axis=1)
y = df['Type']
```

In [49]:

```
x_train,x_test,y_train, y_test = train_test_split(X,y, test_size=0.30)
```

Decision Tree

In [50]:

```
model = tree.DecisionTreeClassifier()
```

In [51]:

```
model.fit(x_train,y_train)
```

Out[51]:

```
DecisionTreeClassifier()
```

In [52]:

```
pred_model = model.predict(x_test)
```

In [53]:

```
pred_model
```

Out[53]:

```
array([2, 2, 2, 3, 2, 5, 7, 5, 5, 1, 7, 1, 7, 1, 3, 2, 1, 5, 2, 1, 2, 2,
       1, 3, 2, 2, 2, 3, 2, 1, 1, 2, 5, 3, 2, 2, 7, 2, 5, 5, 7, 1, 1, 1,
       1, 3, 2, 7, 5, 2, 2, 3, 7, 6, 1, 1, 7, 1, 1, 2, 6, 1, 1, 1, 7],
      dtype=int64)
```

In [54]:

```
print (metrics.confusion_matrix(y_test,pred_model))
```

```
[[15  4  2  0  0  0]
 [ 1 13  1  3  2  0]
 [ 2  2  3  0  0  0]
 [ 0  0  0  4  0  0]
 [ 1  1  1  0  0  1]
 [ 0  0  0  1  0  8]]
```

In [55]:

```
print (metrics.accuracy_score(y_test,pred_model)*100,"%")
```

```
66.15384615384615 %
```

In [56]:
```
result = pd.crosstab(y_test, pred_model, rownames=['Actual'], colnames=['Predicted'],margins=True)
result
```

Out[56]:

Predicted	1	2	3	5	6	7	All
Actual							
1	15	4	2	0	0	0	21
2	1	13	1	3	2	0	20
3	2	2	3	0	0	0	7
5	0	0	0	4	0	0	4
6	1	1	1	0	0	1	4
7	0	0	0	1	0	8	9
All	19	20	7	8	2	9	65

Random Forest

In [57]:
```
from sklearn.ensemble import RandomForestClassifier
```

In [58]:
```
model_forest = RandomForestClassifier()
model_forest.fit(x_train, y_train)
```

Out[58]:
```
RandomForestClassifier()
```

In [59]:
```
Y_pred = model_forest.predict(x_test)  # test the output by changing values
```

In [60]:
```
Y_pred
```

Out[60]:
```
array([1, 2, 1, 3, 2, 5, 7, 5, 7, 1, 7, 6, 7, 1, 3, 2, 1, 5, 2, 1, 2, 2,
       1, 1, 1, 2, 2, 2, 2, 1, 2, 1, 5, 3, 2, 2, 7, 2, 5, 5, 7, 2, 1, 1,
       1, 1, 2, 7, 5, 2, 2, 6, 6, 5, 1, 1, 7, 1, 1, 1, 1, 1, 1, 1, 7],
      dtype=int64)
```

In [61]:
```
print (metrics.accuracy_score(y_test,Y_pred)*100,"%")
```

```
80.0 %
```

In [62]:
```
result = pd.crosstab(y_test, Y_pred, rownames=['Actual'], colnames=['Predicted'], margins=True)
result
```

Out[62]:

Predicted	1	2	3	5	6	7	All
Actual							
1	20	1	0	0	0	0	21
2	1	14	1	4	0	0	20
3	3	2	2	0	0	0	7
5	0	0	0	4	0	0	4
6	0	1	0	0	3	0	4
7	0	0	0	0	0	9	9
All	24	18	3	8	3	9	65

Inferance

steps performed are as follow: 1)importing libraries 2)loading dataset 3)seeing info of data 4)then described the data for 20,50,75 %tile. 5)Zero Null Values. 6)data range is in small so no scaling and also decision tree no need to for scaling dataset. 7)Then Splitting Data Set in ratio of 70:30 8)After building model decision tree got 66.15384615384615 % 9)After building model random forest got 80.0 % 10)But if I buid model on 75:25 accuracy of random forest stay at 70% So i used 70:30 for splitting data as training and testing.

In [ ]:

In [ ]: