Import Necessary libraries

In [45]:
```python
import pandas as pd
import numpy as np
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import accuracy_score
from sklearn.model_selection import cross_val_score
```

Data Collection

In [9]:
```python
# Import Dataset
glassdata=pd.read_csv('glass.csv')
glassdata
```

Out[9]:

	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 [5]:
```python
glassdata.head()
```

Out[5]:

	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	0.0	0.0	1
1	1.51761	13.89	3.60	1.36	72.73	0.48	7.83	0.0	0.0	1
2	1.51618	13.53	3.55	1.54	72.99	0.39	7.78	0.0	0.0	1
3	1.51766	13.21	3.69	1.29	72.61	0.57	8.22	0.0	0.0	1
4	1.51742	13.27	3.62	1.24	73.08	0.55	8.07	0.0	0.0	1

In [6]:
```python
glassdata.describe()
```

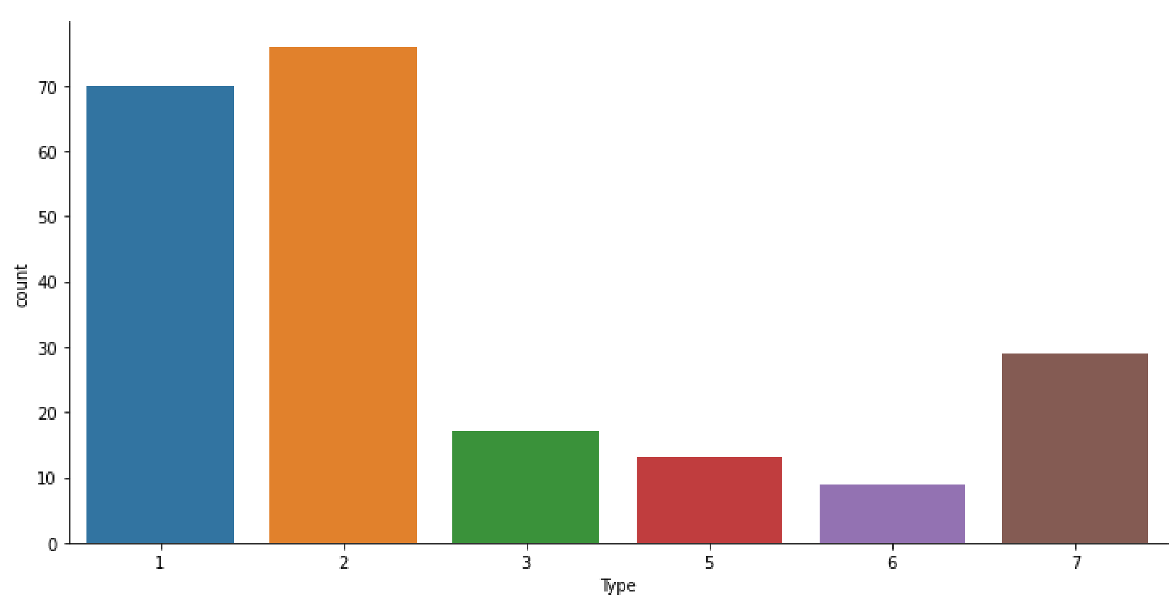
Out[6]:

	RI	Na	Mg	Al	Si	K	Ca
count	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
std	0.003037	0.816604	1.442408	0.499270	0.774546	0.652192	1.423153
min	1.511150	10.730000	0.000000	0.290000	69.810000	0.000000	5.430000
25%	1.516522	12.907500	2.115000	1.190000	72.280000	0.122500	8.240000
50%	1.517680	13.300000	3.480000	1.360000	72.790000	0.555000	8.600000
75%	1.519157	13.825000	3.600000	1.630000	73.087500	0.610000	9.172500
max	1.533930	17.380000	4.490000	3.500000	75.410000	6.210000	16.190000

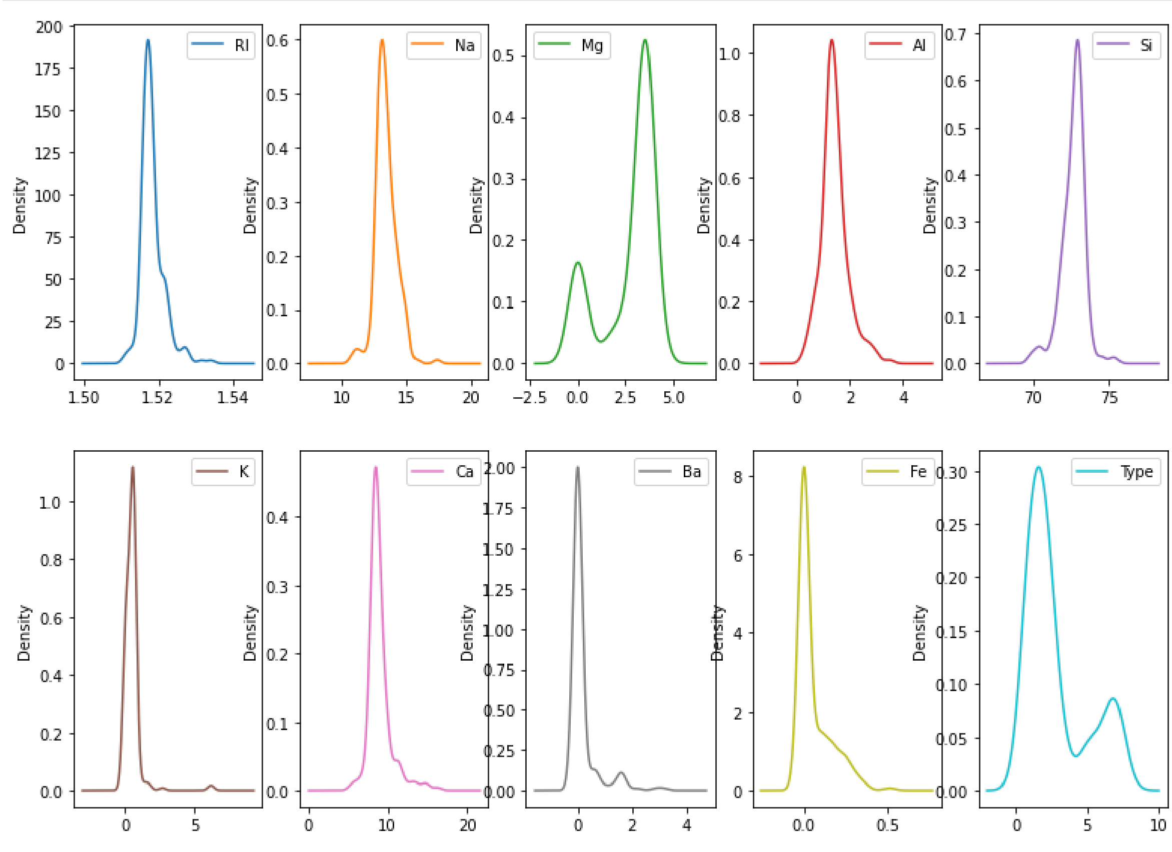
In [13]:
```python
import warnings
warnings.filterwarnings('ignore')
```

In [14]:
```python
sns.factorplot('Type', data=glassdata, kind="count",size = 5,aspect = 2)
```

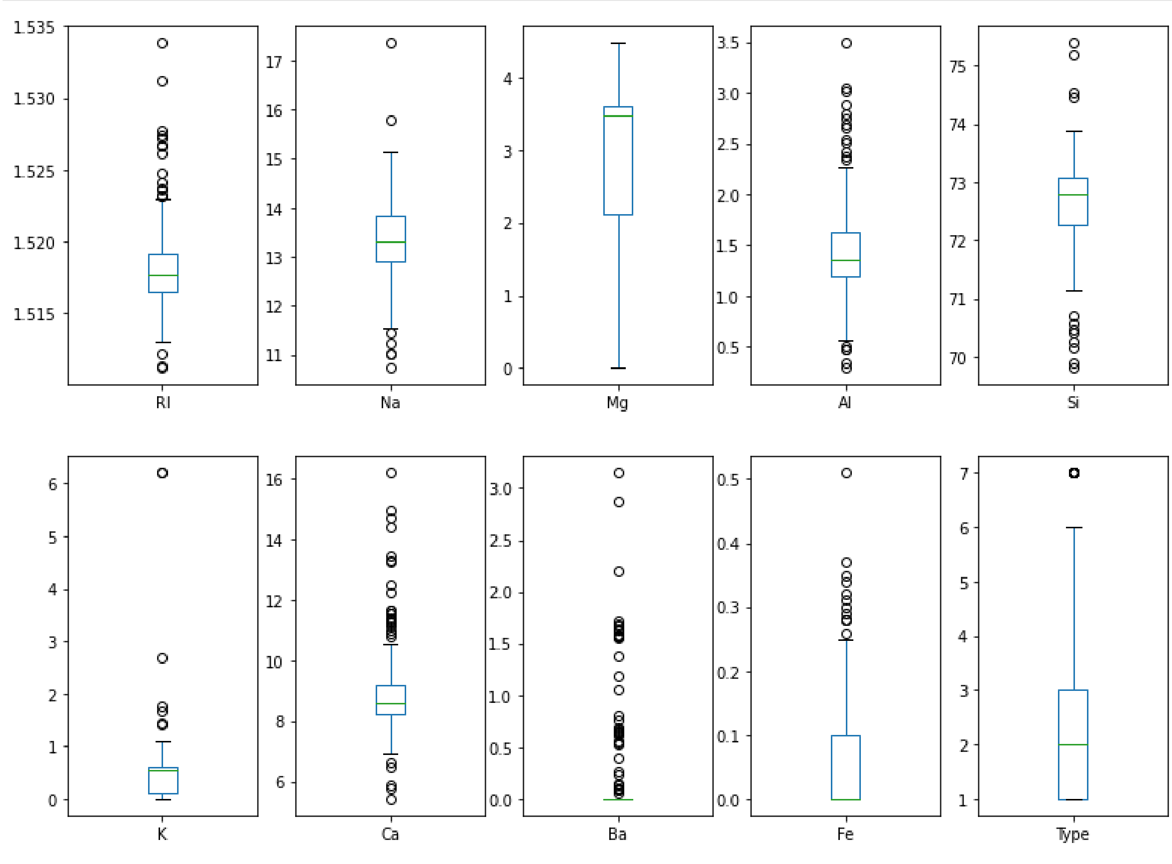
Out[14]:
```
<seaborn.axisgrid.FacetGrid at 0x20b3094a6d0>
```



In [15]:
```python
glassdata.plot(kind='density', subplots=True, layout=(4,5), figsize=(13,20
plt.show()
```



In [16]:
```python
glassdata.plot(kind='box', subplots=True, layout=(4,5), figsize=(13,20), s
plt.show()
```



Finding correlation between the variables in data

In [17]:
```python
cor = glassdata.corr(method='pearson')
```

In [18]:
```python
cor.style.background_gradient(cmap='coolwarm')
```

Out[18]:

	RI	Na	Mg	Al	Si	K	Ca	Ba
RI	1.000000	-0.191885	-0.122274	-0.407326	-0.542052	-0.289833	0.810403	-0.000386
Na	-0.191885	1.000000	-0.273732	0.156794	-0.069809	-0.266087	-0.275442	0.326603
Mg	-0.122274	-0.273732	1.000000	-0.481799	-0.165927	0.005396	-0.443750	-0.492262
Al	-0.407326	0.156794	-0.481799	1.000000	-0.005524	0.325958	-0.259592	0.479404
Si	-0.542052	-0.069809	-0.165927	-0.005524	1.000000	-0.193331	-0.208732	-0.102151
K	-0.289833	-0.266087	0.005396	0.325958	-0.193331	1.000000	-0.317836	-0.042618
Ca	0.810403	-0.275442	-0.443750	-0.259592	-0.208732	-0.317836	1.000000	-0.112841
Ba	-0.000386	0.326603	-0.492262	0.479404	-0.102151	-0.042618	-0.112841	1.000000
Fe	0.143010	-0.241346	0.083060	-0.074402	-0.094201	-0.007719	0.124968	-0.058692
Type	-0.164237	0.502898	-0.744993	0.598829	0.151565	-0.010054	0.000952	0.575161

KNN

Finding optimal number of K

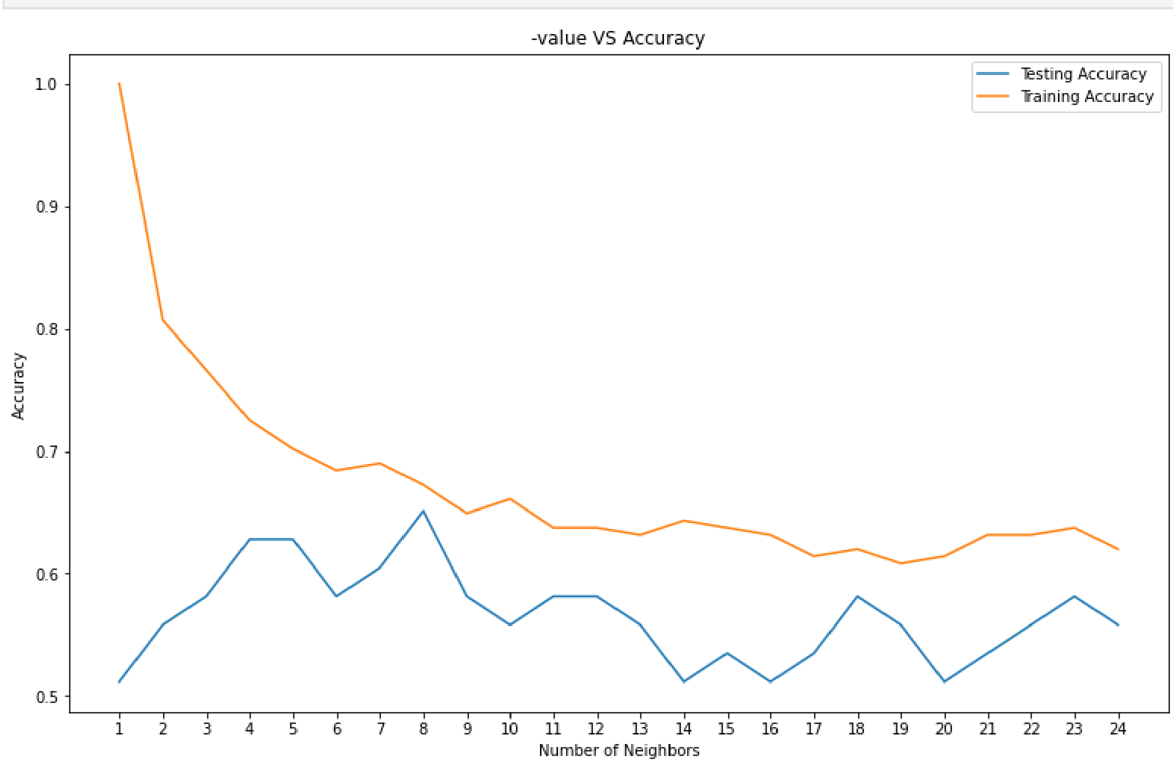
In [21]:
```python
X = np.array(glassdata.iloc[:,3:5])
y = np.array(glassdata['Type'])
```

In [24]:
```python
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, r
```

In [25]:
```python
k_values = np.arange(1,25)
train_accuracy = []
test_accuracy = []
```

In [29]:
```python
for i, k in enumerate(k_values):
    knn = KNeighborsClassifier(n_neighbors=k)
    knn.fit(X_train,y_train)
    train_accuracy.append(knn.score(X_train, y_train))
    test_accuracy.append(knn.score(X_test, y_test))
```

In [30]:
```python
plt.figure(figsize=[13,8])
plt.plot(k_values, test_accuracy, label = 'Testing Accuracy')
plt.plot(k_values, train_accuracy, label = 'Training Accuracy')
plt.legend()
plt.title('-value VS Accuracy')
plt.xlabel('Number of Neighbors')
plt.ylabel('Accuracy')
plt.xticks(k_values)
plt.show()
```



Applying Algorithm

In [47]:
```python
knn = KNeighborsClassifier(n_neighbors=4)
```

In [48]:
```python
knn.fit(X_train, y_train)
y_pred_KNeighborsClassifier = knn.predict(X_test)
```

In [49]:
```python
scores = []
cv_scores = []
```

In [50]:
```python
score = accuracy_score(y_pred_KNeighborsClassifier,y_test)
scores.append(score)
```

In [51]:
```python
score_knn=cross_val_score(knn, X,y, cv=10)
```

In [53]:
```python
score_knn.mean()
```

Out[53]:
```
0.6127705627705629
```

In [54]:
```python
score_knn.std()*2
```

Out[54]:
```
0.23547117559816877
```

In [55]:
```python
cv_score = score_knn.mean()
```

In [56]:
```python
cv_scores.append(cv_score)
```

In [57]:
```python
cv_scores
```

Out[57]:
```
[0.6127705627705629]
```