In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt,seaborn as sb
from sklearn.model_selection import  train_test_split
from sklearn.tree import DecisionTreeClassifier
```

In [2]:

```
traindf=pd.read_csv(r"C:\Users\magam\Downloads\Mobile_Price_Classification_train.csv")
traindf
```

Out[2]:

	battery_power	blue	clock_speed	dual_sim	fc	four_g	int_memory	m_dep	mobile_wt	n_cores	...	px_height	px_wi
0	842	0	2.2	0	1	0	7	0.6	188	2	...	20	
1	1021	1	0.5	1	0	1	53	0.7	136	3	...	905	1
2	563	1	0.5	1	2	1	41	0.9	145	5	...	1263	1
3	615	1	2.5	0	0	0	10	0.8	131	6	...	1216	1
4	1821	1	1.2	0	13	1	44	0.6	141	2	...	1208	1
...	...	...	...	...	...	...	...	...	...	...	...	...	
1995	794	1	0.5	1	0	1	2	0.8	106	6	...	1222	1
1996	1965	1	2.6	1	0	0	39	0.2	187	4	...	915	1
1997	1911	0	0.9	1	1	1	36	0.7	108	8	...	868	1
1998	1512	0	0.9	0	4	1	46	0.1	145	5	...	336	
1999	510	1	2.0	1	5	1	45	0.9	168	6	...	483	

2000 rows × 21 columns

In [3]:

```
testdf=pd.read_csv(r"C:\Users\magam\Downloads\Mobile_Price_Classification_test.csv")
testdf
```

Out[3]:

	id	battery_power	blue	clock_speed	dual_sim	fc	four_g	int_memory	m_dep	mobile_wt	...	pc	px_height	px_wi
0	1	1043	1	1.8	1	14	0	5	0.1	193	...	16	226	1
1	2	841	1	0.5	1	4	1	61	0.8	191	...	12	746	
2	3	1807	1	2.8	0	1	0	27	0.9	186	...	4	1270	1
3	4	1546	0	0.5	1	18	1	25	0.5	96	...	20	295	1
4	5	1434	0	1.4	0	11	1	49	0.5	108	...	18	749	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	
995	996	1700	1	1.9	0	0	1	54	0.5	170	...	17	644	
996	997	609	0	1.8	1	0	0	13	0.9	186	...	2	1152	1
997	998	1185	0	1.4	0	1	1	8	0.5	80	...	12	477	
998	999	1533	1	0.5	1	0	0	50	0.4	171	...	12	38	
999	1000	1270	1	0.5	0	4	1	35	0.1	140	...	19	457	

1000 rows × 21 columns

In [4]:

```
1 traindf.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2000 entries, 0 to 1999
Data columns (total 21 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   battery_power  2000 non-null   int64
 1   blue           2000 non-null   int64
 2   clock_speed    2000 non-null   float64
 3   dual_sim       2000 non-null   int64
 4   fc             2000 non-null   int64
 5   four_g         2000 non-null   int64
 6   int_memory     2000 non-null   int64
 7   m_dep          2000 non-null   float64
 8   mobile_wt      2000 non-null   int64
 9   n_cores        2000 non-null   int64
 10  pc             2000 non-null   int64
 11  px_height      2000 non-null   int64
 12  px_width       2000 non-null   int64
 13  ram            2000 non-null   int64
 14  sc_h           2000 non-null   int64
 15  sc_w           2000 non-null   int64
 16  talk_time      2000 non-null   int64
 17  three_g        2000 non-null   int64
 18  touch_screen   2000 non-null   int64
 19  wifi           2000 non-null   int64
 20  price_range    2000 non-null   int64
dtypes: float64(2), int64(19)
memory usage: 328.2 KB
```

In [5]:

```
1 testdf.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 21 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   id             1000 non-null   int64
 1   battery_power  1000 non-null   int64
 2   blue           1000 non-null   int64
 3   clock_speed    1000 non-null   float64
 4   dual_sim       1000 non-null   int64
 5   fc             1000 non-null   int64
 6   four_g         1000 non-null   int64
 7   int_memory     1000 non-null   int64
 8   m_dep          1000 non-null   float64
 9   mobile_wt      1000 non-null   int64
 10  n_cores        1000 non-null   int64
 11  pc             1000 non-null   int64
 12  px_height      1000 non-null   int64
 13  px_width       1000 non-null   int64
 14  ram            1000 non-null   int64
 15  sc_h           1000 non-null   int64
 16  sc_w           1000 non-null   int64
 17  talk_time      1000 non-null   int64
 18  three_g        1000 non-null   int64
 19  touch_screen   1000 non-null   int64
 20  wifi           1000 non-null   int64
dtypes: float64(2), int64(19)
memory usage: 164.2 KB
```

In [6]:

```
traindf.shape
```

Out[6]:

```
(2000, 21)
```

In [7]:

```
testdf.shape
```

Out[7]:

```
(1000, 21)
```

In [8]:

```
traindf=traindf.head(1000)
```

In [18]:

```
x=testdf
y=traindf['price_range']
x_train,x_test,y_train,y_test=train_test_split(x,y,train_size=0.7,random_state=42)
```

In [19]:

```
from sklearn.ensemble import RandomForestClassifier
rfc=RandomForestClassifier()
rfc.fit(x_train,y_train)
```

Out[19]:

```
RandomForestClassifier
RandomForestClassifier()
```

In [20]:

```
params={'max_depth':[2,3,5,10,20],'min_samples_leaf':[5,10,20,50,100,200],'n_estimators':[10,25,30,50,100,200]}
```

In [21]:

```
from sklearn.model_selection import GridSearchCV
grid_search=GridSearchCV(estimator=rfc,param_grid=params,cv=2,scoring="accuracy")
```

In [22]:

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

Out[22]:

```
GridSearchCV
estimator: RandomForestClassifier
RandomForestClassifier
```

In [23]:

```
grid_search.best_score_
```

Out[23]:

```
0.2885714285714286
```

In [24]:

```
rf_best=grid_search.best_estimator_
rf_best
```

Out[24]:

```
RandomForestClassifier(max_depth=20, min_samples_leaf=20, n_estimators=10)
```

In [25]:

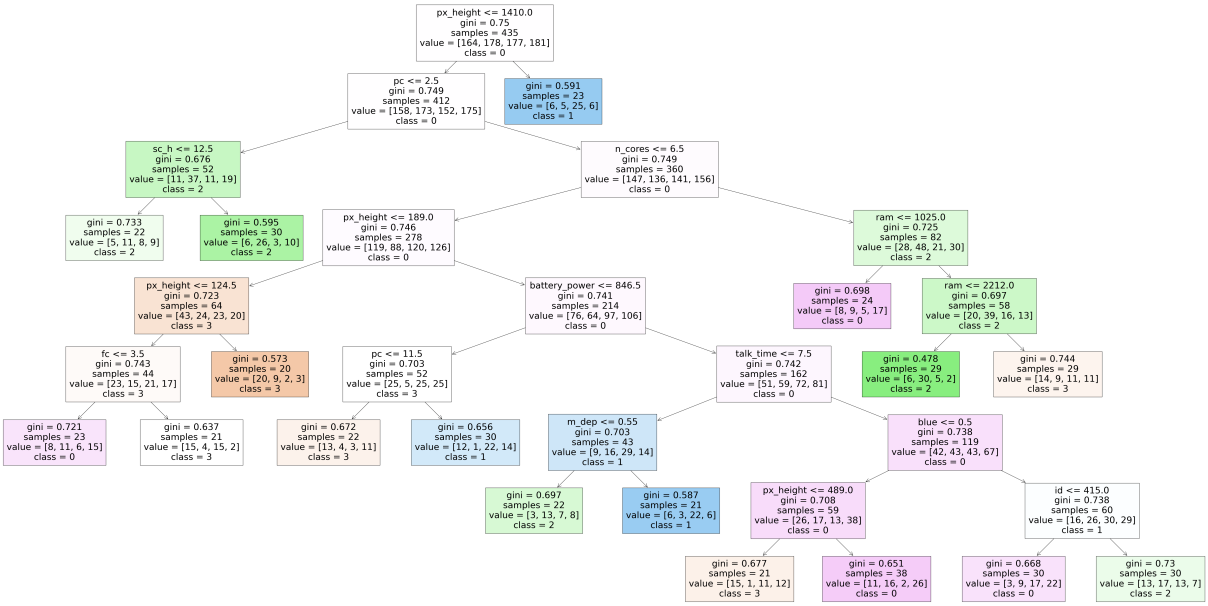
```
traindf['price_range'].value_counts()
```

Out[25]:

```
price_range
3    276
2    248
0    242
1    234
Name: count, dtype: int64
```

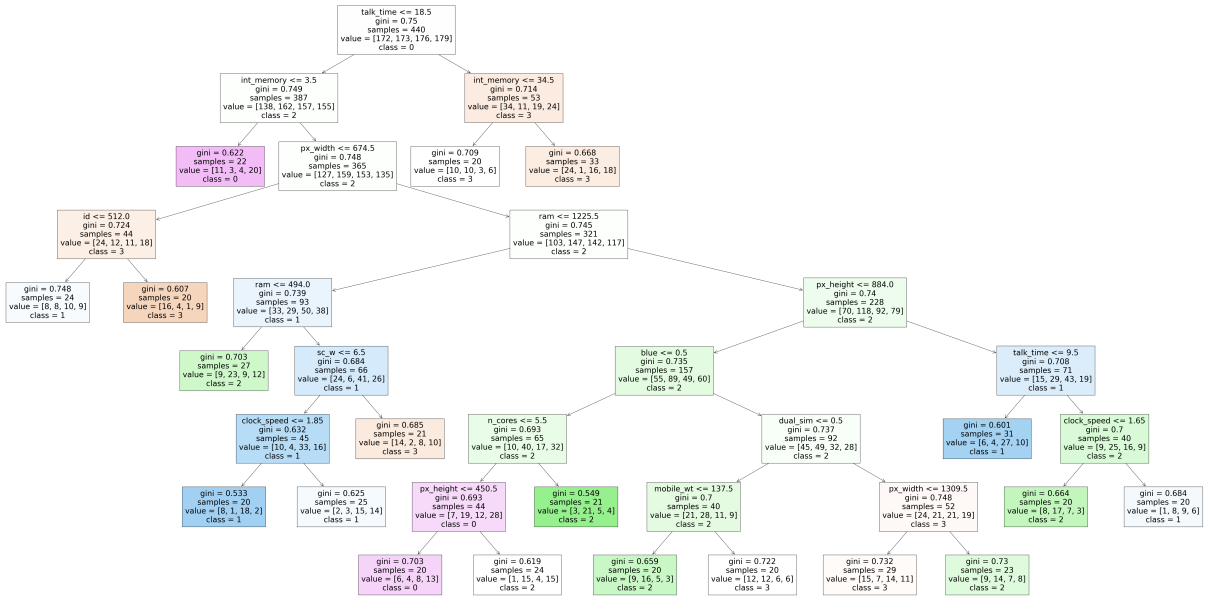
In [27]:

```
from sklearn.tree import plot_tree
plt.figure(figsize=(80,40))
plot_tree(rf_best.estimators_[4],feature_names=x.columns,class_names=['3','2','1','0'],filled=True);
```



In [29]:

```
from sklearn.tree import plot_tree
plt.figure(figsize=(80,40))
plot_tree(rf_best.estimators_[5],feature_names=x.columns,class_names=['3','2','1','0'],filled=True);
```



In [30]:

```
rf_best.feature_importances_
```

Out[30]:

```
array([0.07270562, 0.05216245, 0.01970191, 0.01964258, 0.01827917,
       0.01970525, 0.00435999, 0.07418107, 0.04931824, 0.07133815,
       0.07048471, 0.07348234, 0.11411824, 0.06122906, 0.10886214,
       0.02680924, 0.06651904, 0.0488326 , 0.00514388, 0.00557765,
       0.01754668])
```

In [32]:

```
imp_df=pd.DataFrame({"Varname":x_train.columns,"Imp":rf_best.feature_importances_})
```

In [33]:

```
imp_df.sort_values(by="Imp",ascending=False)
```

Out[33]:

	Varname	Imp
12	px_height	0.114118
14	ram	0.108862
7	int_memory	0.074181
11	pc	0.073482
0	id	0.072706
9	mobile_wt	0.071338
10	n_cores	0.070485
16	sc_w	0.066519
13	px_width	0.061229
1	battery_power	0.052162
8	m_dep	0.049318
17	talk_time	0.048833
15	sc_h	0.026809
5	fc	0.019705
2	blue	0.019702
3	clock_speed	0.019643
4	dual_sim	0.018279
20	wifi	0.017547
19	touch_screen	0.005578
18	three_g	0.005144
6	four_g	0.004360

In [ ]:

```

```