In [1]:

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

In [3]:

```
traindf=pd.read_csv(r"C:\Users\G S R  KARTHIK\Downloads\Mobile_Price_Classification_train.csv")
traindf
```

Out[3]:

l_sim	fc	four_g	int_memory	m_dep	mobile_wt	n_cores	...	px_height	px_width	ram	sc_h	sc_w	talk_time	three_
0	1	0	7	0.6	188	2	...	20	756	2549	9	7	19	
1	0	1	53	0.7	136	3	...	905	1988	2631	17	3	7	
1	2	1	41	0.9	145	5	...	1263	1716	2603	11	2	9	
0	0	0	10	0.8	131	6	...	1216	1786	2769	16	8	11	
0	13	1	44	0.6	141	2	...	1208	1212	1411	8	2	15	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1	0	1	2	0.8	106	6	...	1222	1890	668	13	4	19	
1	0	0	39	0.2	187	4	...	915	1965	2032	11	10	16	
1	1	1	36	0.7	108	8	...	868	1632	3057	9	1	5	
0	4	1	46	0.1	145	5	...	336	670	869	18	10	19	
1	5	1	45	0.9	168	6	...	483	754	3919	19	4	2	

In [4]:

```
testdf=pd.read_csv(r"C:\Users\G S R  KARTHIK\Downloads\Mobile_Price_Classification_test.csv")
testdf
```

Out[4]:

	id	battery_power	blue	clock_speed	dual_sim	fc	four_g	int_memory	m_dep	mobile_wt	...	pc	px_height
0	1	1043	1	1.8	1	14	0	5	0.1	193	...	16	226
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
3	4	1546	0	0.5	1	18	1	25	0.5	96	...	20	295
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
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 [6]:

```
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 [7]:

```
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 [11]:

```
traindf.shape,testdf.shape
```

Out[11]:

```
((2000, 21), (1000, 21))
```

In [17]:

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

Out[17]:

l_sim	fc	four_g	int_memory	m_dep	mobile_wt	n_cores	...	px_height	px_width	ram	sc_h	sc_w	talk_time	three_g
0	1	0	7	0.6	188	2	...	20	756	2549	9	7	19	0
1	0	1	53	0.7	136	3	...	905	1988	2631	17	3	7	1
1	2	1	41	0.9	145	5	...	1263	1716	2603	11	2	9	1
0	0	0	10	0.8	131	6	...	1216	1786	2769	16	8	11	1
0	13	1	44	0.6	141	2	...	1208	1212	1411	8	2	15	1
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1	5	0	49	0.2	193	3	...	1285	1427	3624	12	11	16	1
1	2	1	10	0.5	188	2	...	1480	1731	2944	8	6	2	1
1	0	1	19	0.9	197	8	...	322	875	1209	19	12	12	1
1	1	1	29	0.9	141	6	...	1220	1348	2752	15	2	7	1
0	3	0	20	0.6	188	6	...	511	616	3868	5	1	7	0

In [18]:

```
traindf.shape,testdf.shape
```

Out[18]:

```
((1000, 21), (1000, 21))
```

In [21]:

```
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 [22]:

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

Out[22]:

RandomForestClassifier

RandomForestClassifier()

In [23]:

```
rf=RandomForestClassifier()
```

In [24]:

```
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 [25]:

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

In [26]:

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

Out[26]:

GridSearchCV
estimator: RandomForestClassifier
RandomForestClassifier

In [27]:

```
grid_search.best_score_
```

Out[27]:

```
0.28714285714285714
```

In [28]:

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

Out[28]:

RandomForestClassifier
RandomForestClassifier(max_depth=20, min_samples_leaf=5, n_estimators=25)

In [37]:

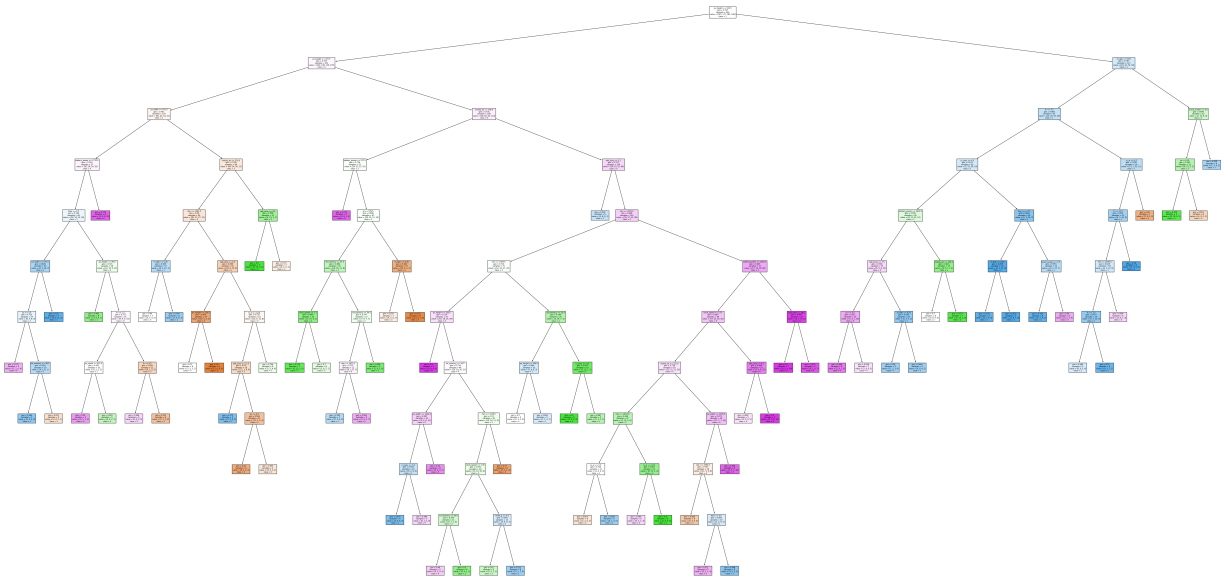
```
traindf['price_range'].value_counts()
```

Out[37]:

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

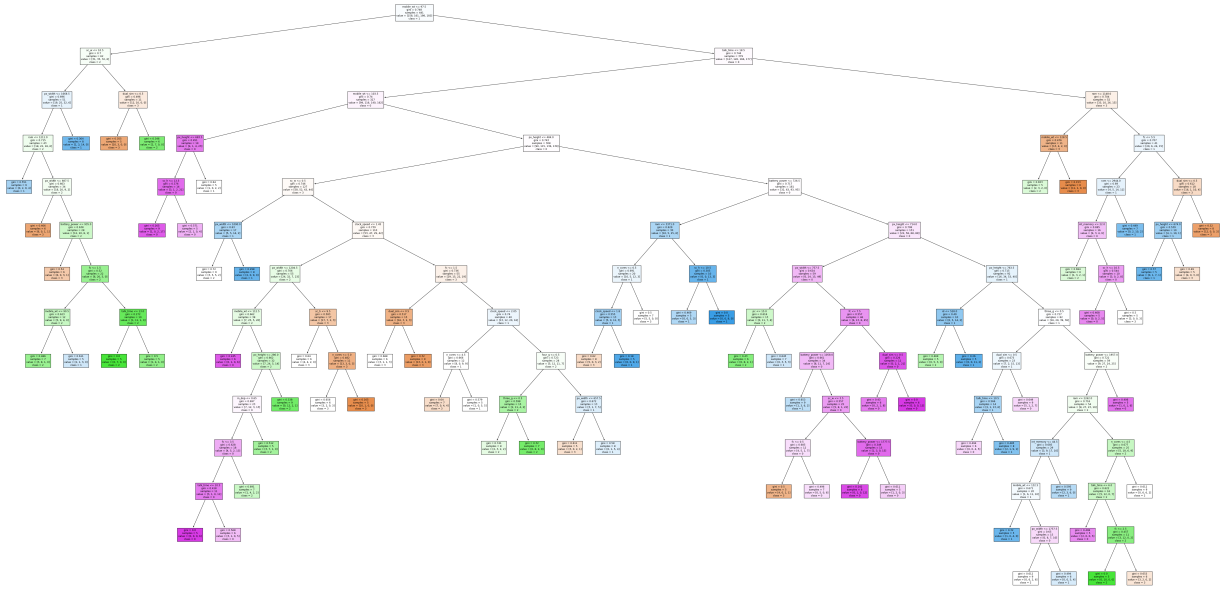
In [38]:

```
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 [41]:

```
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 [42]:

```
rf_best.feature_importances_
```

Out[42]:

```
array([0.07452831, 0.0840681 , 0.01058722, 0.0487497 , 0.01410742,
       0.05441149, 0.0093944 , 0.05685027, 0.03936693, 0.07051028,
       0.05329185, 0.05874796, 0.0899535 , 0.06566282, 0.07999385,
       0.04863076, 0.04819872, 0.05349038, 0.00852583, 0.01442232,
       0.01650787])
```

In [43]:

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

In [44]:

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

Out[44]:

	Varname	Imp
12	px_height	0.089954
1	battery_power	0.084068
14	ram	0.079994
0	id	0.074528
9	mobile_wt	0.070510
13	px_width	0.065663
11	pc	0.058748
7	int_memory	0.056850
5	fc	0.054411
17	talk_time	0.053490
10	n_cores	0.053292
3	clock_speed	0.048750
15	sc_h	0.048631
16	sc_w	0.048199
8	m_dep	0.039367
20	wifi	0.016508
19	touch_screen	0.014422
4	dual_sim	0.014107
2	blue	0.010587
6	four_g	0.009394
18	three_g	0.008526

In [ ]:

```

```