Import Modul

In [1]:

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score
from sklearn.tree import DecisionTreeClassifier
from sklearn.neighbors import KNeighborsClassifier
from sklearn.naive_bayes import GaussianNB
from sklearn.preprocessing import LabelEncoder
from sklearn import tree
```

EDA

Read Data

In [2]:

```
df = pd.read_csv("students_adaptability_level_online_education.csv")
```

Head and Tail Data

In [3]:

```
df.head()
```

Out[3]:

	Gender	Age	Education Level	Institution Type	IT Student	Location	Load-shedding	Financial Condition	Internet Type	Net
0	Boy	21-25	University	Non Government	No	Yes	Low	Mid	Wifi	
1	Girl	21-25	University	Non Government	No	Yes	High	Mid	Mobile Data	
2	Girl	16-20	College	Government	No	Yes	Low	Mid	Wifi	
3	Girl	11-15	School	Non Government	No	Yes	Low	Mid	Mobile Data	
4	Girl	16-20	School	Non Government	No	Yes	Low	Poor	Mobile Data	

In [4]:

```
df.tail()
```

Out[4]:

	Gender	Age	Education Level	Institution Type	IT Student	Location	Load-shedding	Financial Condition	Internet Type	I
1200	Girl	16-20	College	Non Government	No	Yes	Low	Mid	Wifi	
1201	Girl	16-20	College	Non Government	No	No	High	Mid	Wifi	
1202	Boy	11-15	School	Non Government	No	Yes	Low	Mid	Mobile Data	
1203	Girl	16-20	College	Non Government	No	No	Low	Mid	Wifi	
1204	Girl	11-15	School	Non Government	No	Yes	Low	Poor	Mobile Data	

Bentuk Dataset

In [5]:

```
df.shape
```

Out[5]:

```
(1205, 14)
```

Cek Tipe Data

In [6]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1205 entries, 0 to 1204
Data columns (total 14 columns):
 #   Column               Non-Null Count  Dtype 
---  ------               --------------  ----- 
 0   Gender               1205 non-null   object
 1   Age                  1205 non-null   object
 2   Education Level      1205 non-null   object
 3   Institution Type     1205 non-null   object
 4   IT Student           1205 non-null   object
 5   Location             1205 non-null   object
 6   Load-shedding        1205 non-null   object
 7   Financial Condition  1205 non-null   object
 8   Internet Type        1205 non-null   object
 9   Network Type         1205 non-null   object
 10  Class Duration       1205 non-null   object
 11  Self Lms             1205 non-null   object
 12  Device               1205 non-null   object
 13  Adaptivity Level     1205 non-null   object
dtypes: object(14)
memory usage: 131.9+ KB
```

Missing Value

In [7]:

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

Out[7]:

```
Gender                 0
Age                    0
Education Level        0
Institution Type       0
IT Student             0
Location               0
Load-shedding          0
Financial Condition    0
Internet Type          0
Network Type           0
Class Duration         0
Self Lms               0
Device                 0
Adaptivity Level       0
dtype: int64
```

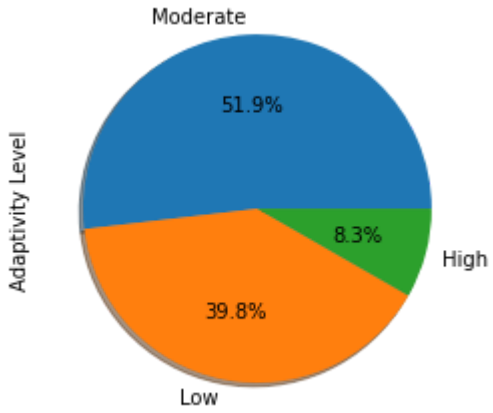
Visualisasi

In [8]:

```
df['Adaptivity Level'].value_counts().plot.pie(autopct='%1.1f%%',shadow=True)
```

Out[8]:

```
<AxesSubplot:ylabel='Adaptivity Level'>
```

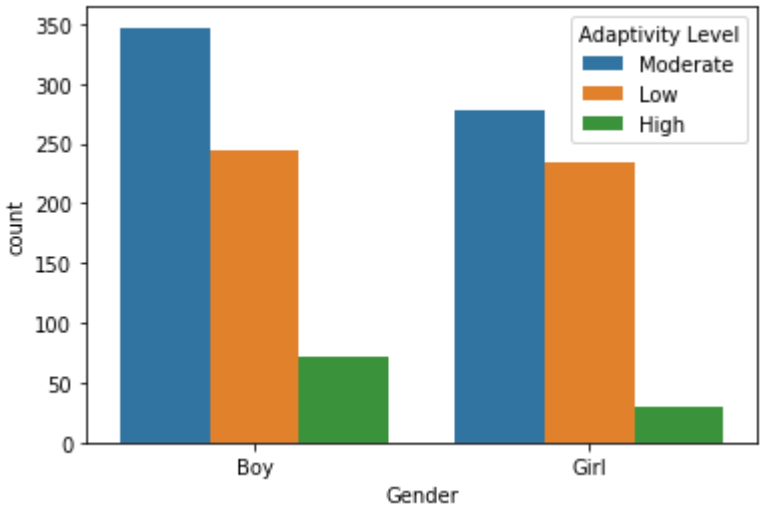


In [9]:

```
sns.countplot(x=df['Gender'],hue=df['Adaptivity Level'])
```

Out[9]:

```
<AxesSubplot:xlabel='Gender', ylabel='count'>
```

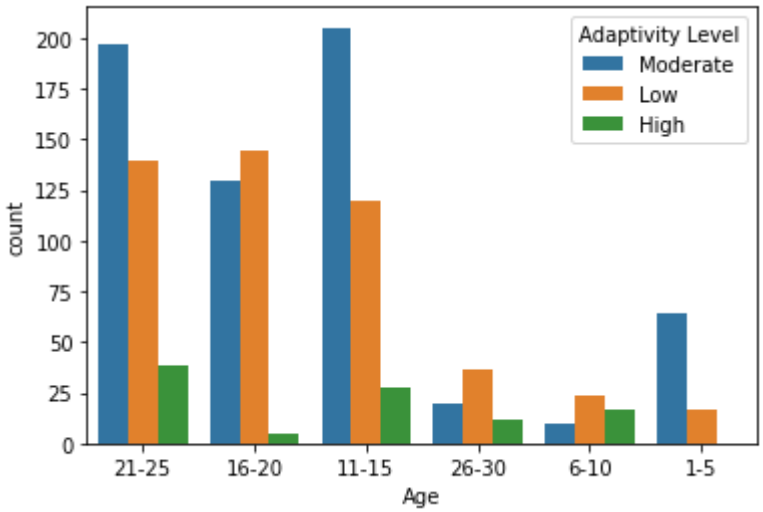


In [10]:

```
sns.countplot(x=df['Age'],hue=df['Adaptivity Level'])
```

Out[10]:

```
<AxesSubplot:xlabel='Age', ylabel='count'>
```

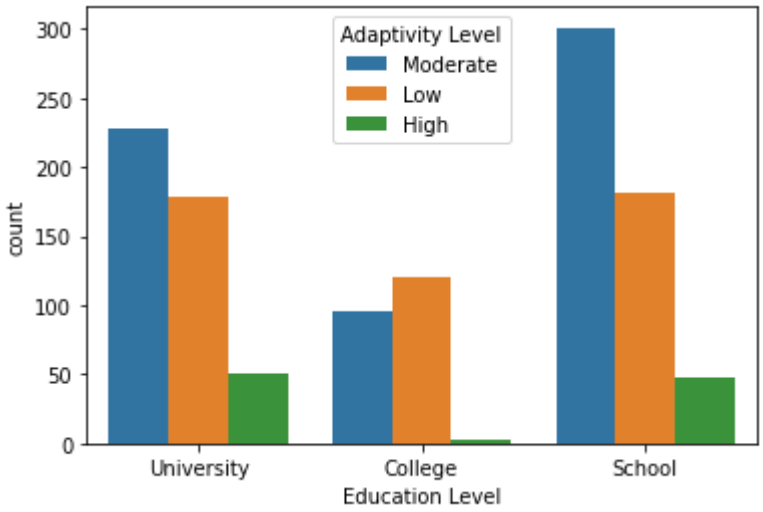


In [11]:

```
sns.countplot(x=df['Education Level'],hue=df['Adaptivity Level'])
```

Out[11]:

```
<AxesSubplot:xlabel='Education Level', ylabel='count'>
```

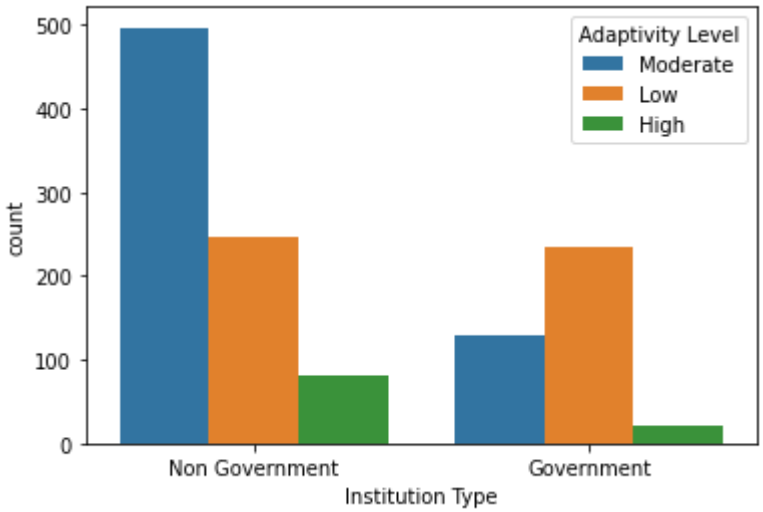


In [12]:

```
sns.countplot(x=df['Institution Type'],hue=df['Adaptivity Level'])
```

Out[12]:

```
<AxesSubplot:xlabel='Institution Type', ylabel='count'>
```

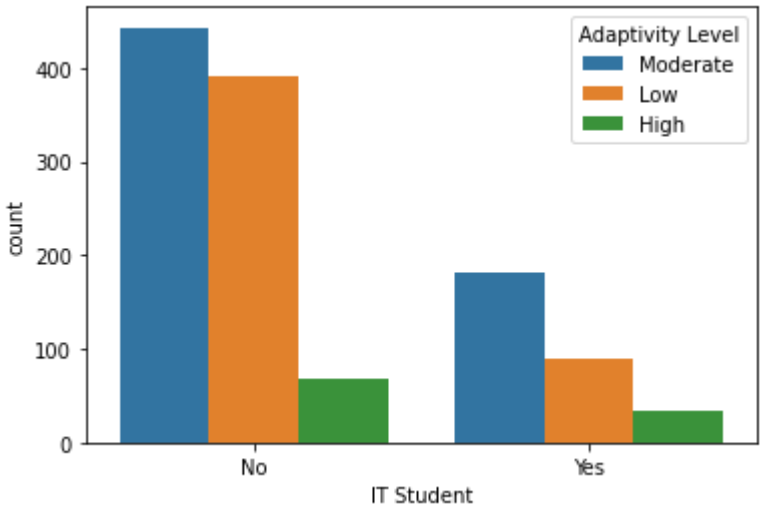


In [13]:

```
sns.countplot(x=df['IT Student'],hue=df['Adaptivity Level'])
```

Out[13]:

```
<AxesSubplot:xlabel='IT Student', ylabel='count'>
```

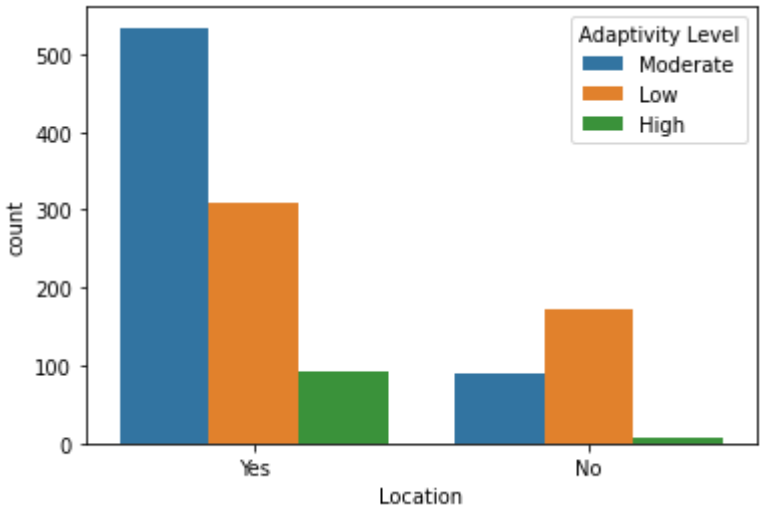


In [14]:

```
sns.countplot(x=df['Location'],hue=df['Adaptivity Level'])
```

Out[14]:

```
<AxesSubplot:xlabel='Location', ylabel='count'>
```

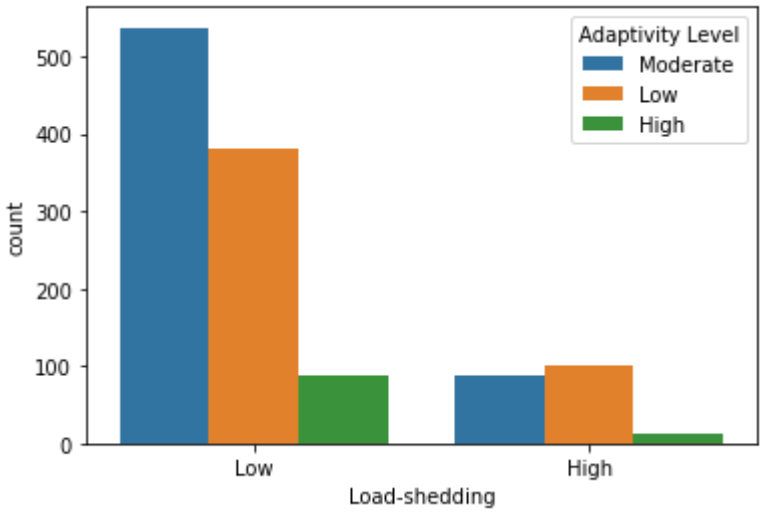


In [15]:

```
sns.countplot(x=df['Load-shedding'],hue=df['Adaptivity Level'])
```

Out[15]:

```
<AxesSubplot:xlabel='Load-shedding', ylabel='count'>
```

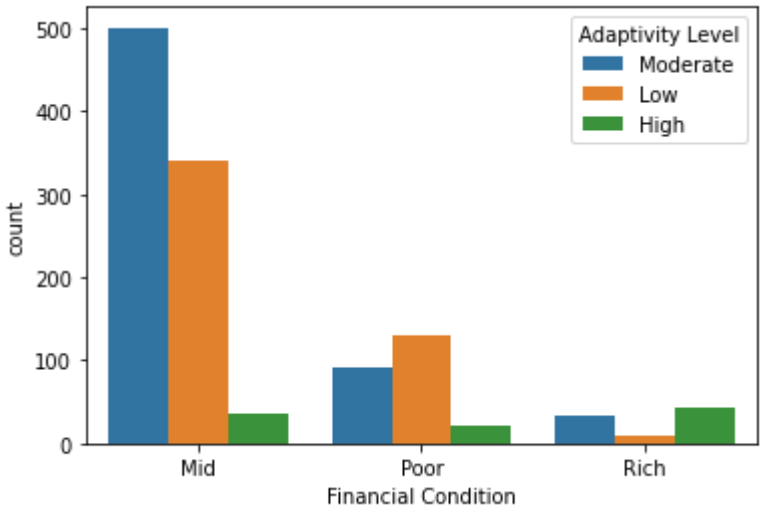


In [16]:

```
sns.countplot(x=df['Financial Condition'],hue=df['Adaptivity Level'])
```

Out[16]:

```
<AxesSubplot:xlabel='Financial Condition', ylabel='count'>
```

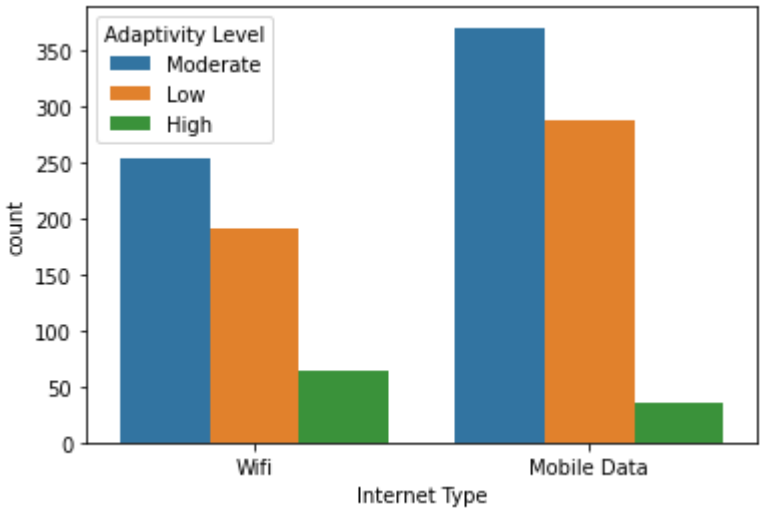


In [17]:

```
sns.countplot(x=df['Internet Type'],hue=df['Adaptivity Level'])
```

Out[17]:

```
<AxesSubplot:xlabel='Internet Type', ylabel='count'>
```

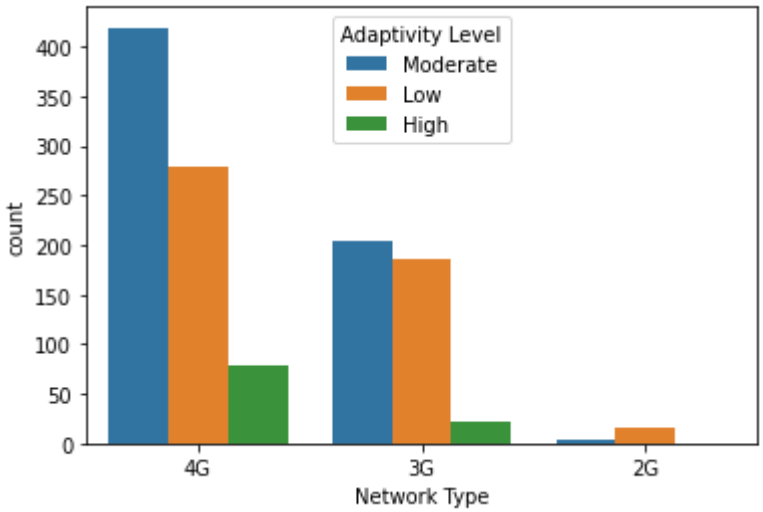


In [18]:

```
sns.countplot(x=df['Network Type'],hue=df['Adaptivity Level'])
```

Out[18]:

```
<AxesSubplot:xlabel='Network Type', ylabel='count'>
```

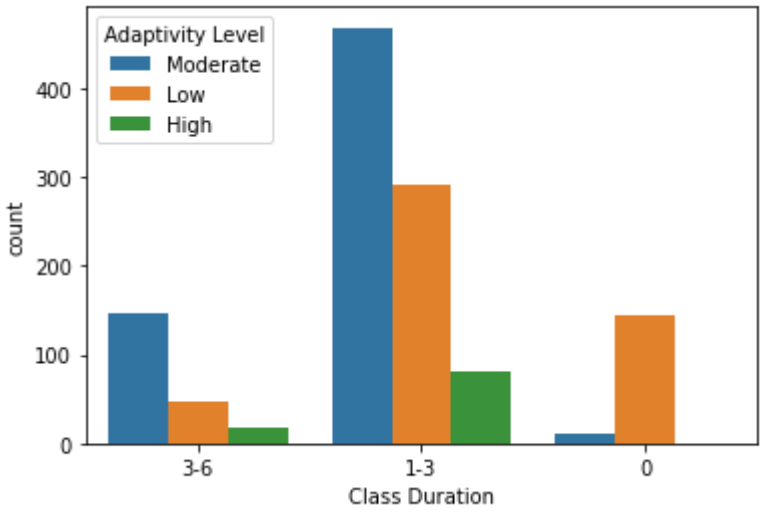


In [19]:

```
sns.countplot(x=df['Class Duration'],hue=df['Adaptivity Level'])
```

Out[19]:

```
<AxesSubplot:xlabel='Class Duration', ylabel='count'>
```

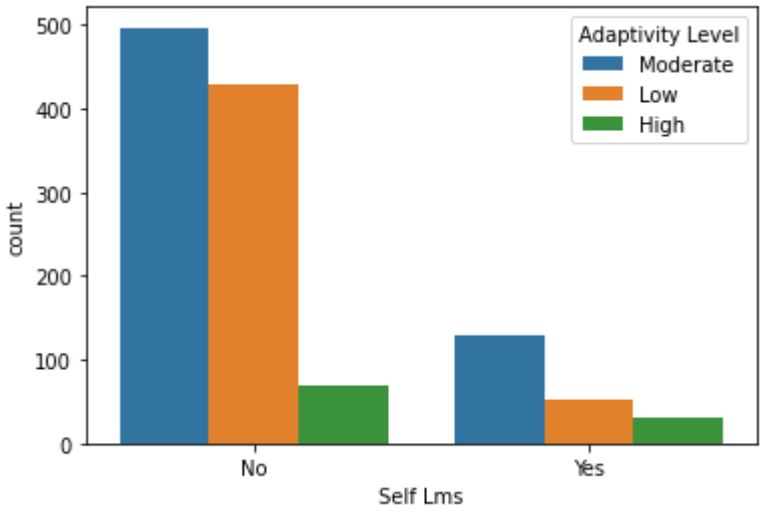


In [20]:

```
sns.countplot(x=df['Self Lms'],hue=df['Adaptivity Level'])
```

Out[20]:

```
<AxesSubplot:xlabel='Self Lms', ylabel='count'>
```

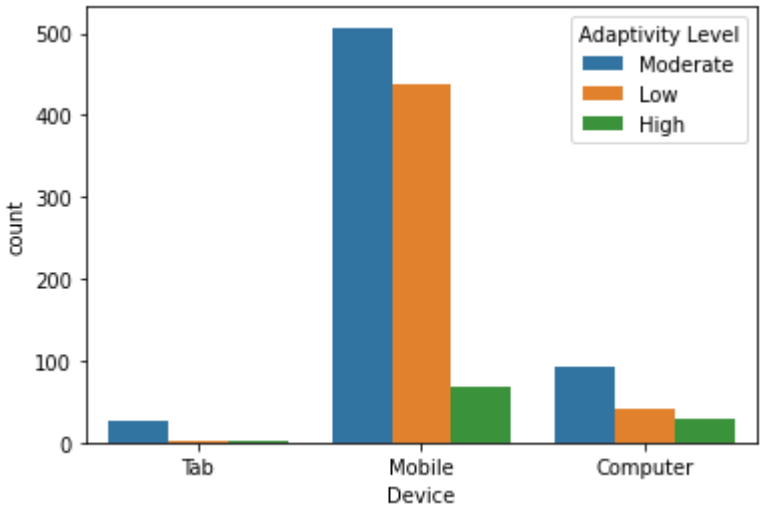


In [21]:

```
sns.countplot(x=df['Device'],hue=df['Adaptivity Level'])
```

Out[21]:

```
<AxesSubplot:xlabel='Device', ylabel='count'>
```



Deskripsi Dataframe

In [22]:

```
df.describe()
```

Out[22]:

	Gender	Age	Education Level	Institution Type	IT Student	Location	Load-shedding	Financial Condition	Inter T
count	1205	1205	1205	1205	1205	1205	1205	1205	1
unique	2	6	3	2	2	2	2	3	
top	Boy	21-25	School	Non Government	No	Yes	Low	Mid	Mo D
freq	663	374	530	823	901	935	1004	878	

Change Data Type

In [23]:

```
# change all data type using LabelEncode
data=df

label_encoders = {}
categorical_columns = data.columns

for column in categorical_columns:
    label_encoders[column] = LabelEncoder()
    data[column] = label_encoders[column].fit_transform(data[column])
```

Lihat Perubahan Data

In [24]:

```
data.head()
```

Out[24]:

	Gender	Age	Education Level	Institution Type	IT Student	Location	Load-shedding	Financial Condition	Internet Type	Netw Ty
0	0	3	2	1	0	1	1	0	1	
1	1	3	2	1	0	1	0	0	0	
2	1	2	0	0	0	1	1	0	1	
3	1	1	1	1	0	1	1	0	0	
4	1	2	1	1	0	1	1	1	0	

KORELASI

In [25]:

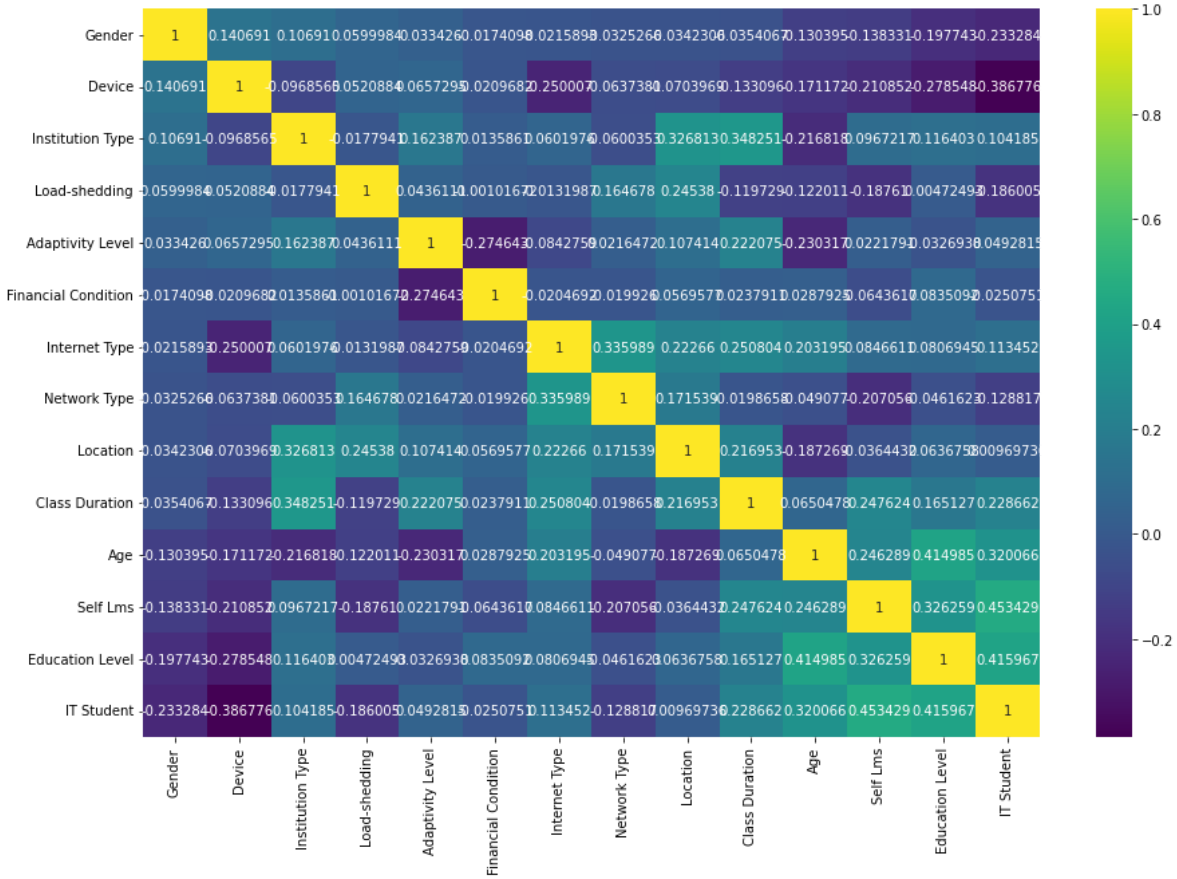
```
cols = df.corr()
cols
```

Out[25]:

	Gender	Age	Education Level	Institution Type	IT Student	Location	Load-shedding	Financi Conditic
Gender	1.000000	-0.130395	-0.197743	0.106910	-0.233284	-0.034231	0.059998	-0.0174
Age	-0.130395	1.000000	0.414985	-0.216818	0.320066	-0.187269	-0.122011	0.0287
Education Level	-0.197743	0.414985	1.000000	0.116403	0.415967	0.063676	0.004725	0.0835
Institution Type	0.106910	-0.216818	0.116403	1.000000	0.104185	0.326813	-0.017794	0.0135
IT Student	-0.233284	0.320066	0.415967	0.104185	1.000000	0.009697	-0.186005	-0.0250
Location	-0.034231	-0.187269	0.063676	0.326813	0.009697	1.000000	0.245380	0.0569
Load-shedding	0.059998	-0.122011	0.004725	-0.017794	-0.186005	0.245380	1.000000	-0.0010
Financial Condition	-0.017410	0.028792	0.083509	0.013586	-0.025075	0.056958	-0.001017	1.0000
Internet Type	-0.021589	0.203195	0.080694	0.060198	0.113452	0.222660	-0.013199	-0.0204
Network Type	-0.032527	-0.049077	-0.046162	-0.060035	-0.128817	0.171539	0.164678	-0.0199
Class Duration	-0.035407	0.065048	0.165127	0.348251	0.228662	0.216953	-0.119729	0.0237
Self Lms	-0.138331	0.246289	0.326259	0.096722	0.453429	-0.036443	-0.187610	-0.0643
Device	0.140691	-0.171172	-0.278548	-0.096857	-0.386776	-0.070397	0.052088	-0.0209
Adaptivity Level	0.033426	-0.230317	-0.032694	0.162387	0.049282	0.107414	0.043611	-0.2746

In [26]:

```
k = 14 #Jumlah variabel
cols = df.corr().nlargest(k, 'Gender')['Gender'].index
cm = df[cols].corr()
plt.figure(figsize=(15,10))
sns.heatmap(cm, annot=True, cmap='viridis', fmt='g')
plt.show()
```



Train and Test Data

In [27]:

```
#Defined X value and y value , and split the data train
X = data.drop(columns="Adaptivity Level")
y = data["Adaptivity Level"]    # y = quality

# split the data train and test
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.25, random_state=42)

print("X Train : ", X_train.shape)
print("X Test  : ", X_test.shape)
print("Y Train : ", y_train.shape)
print("Y Test  : ", y_test.shape)
```

```
X Train :  (903, 13)
X Test  :  (302, 13)
Y Train :  (903,)
Y Test  :  (302,)
```

Decision Tree

In [28]:

```
DTC = DecisionTreeClassifier()
```

In [29]:

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

Out[29]:

```
DecisionTreeClassifier()
```

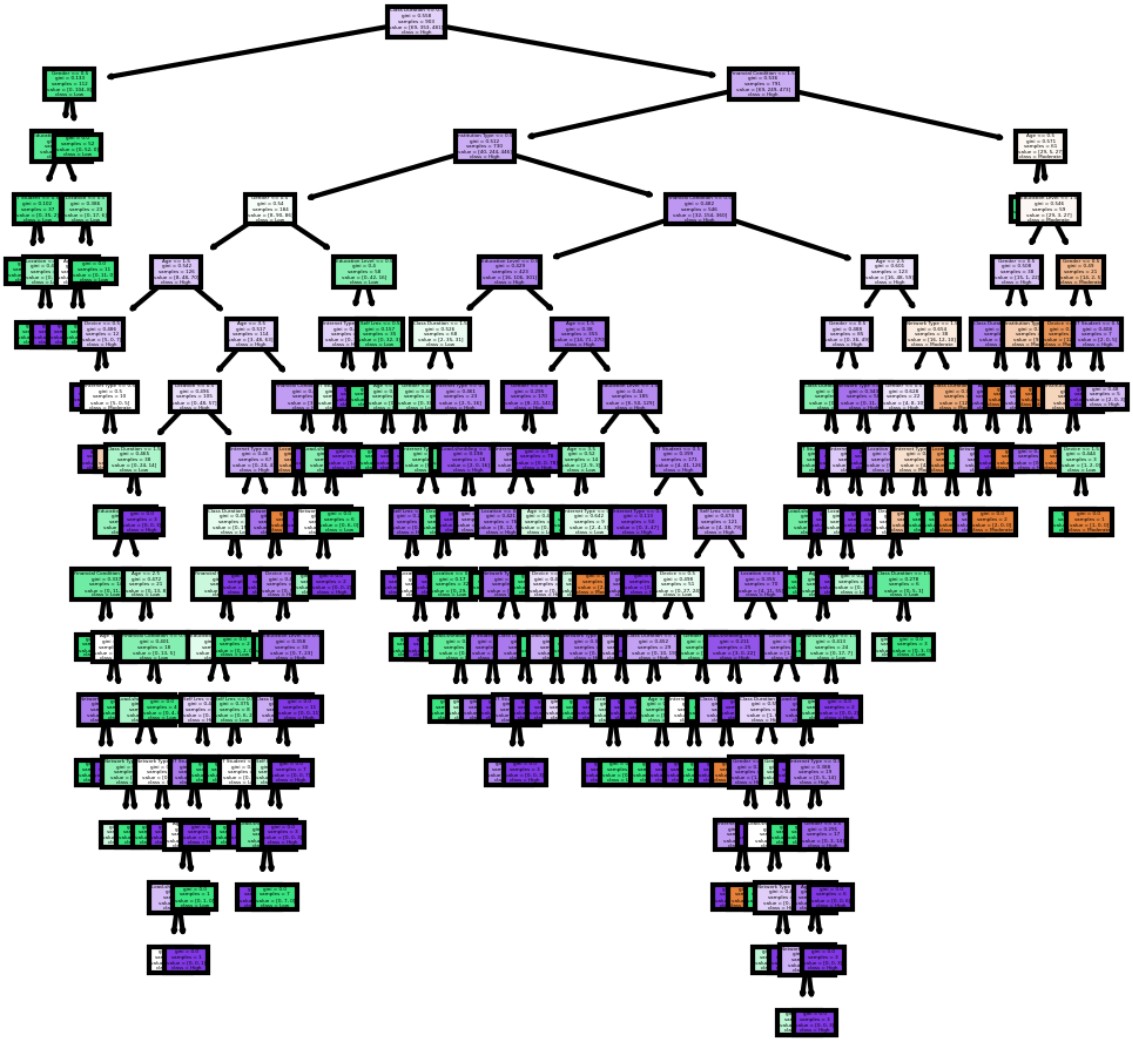
In [30]:

```
ypred = DTC.predict(X_test)
print(DTC,":",accuracy_score(y_test,ypred)*100)
```

```
DecisionTreeClassifier() : 89.40397350993378
```

In [31]:

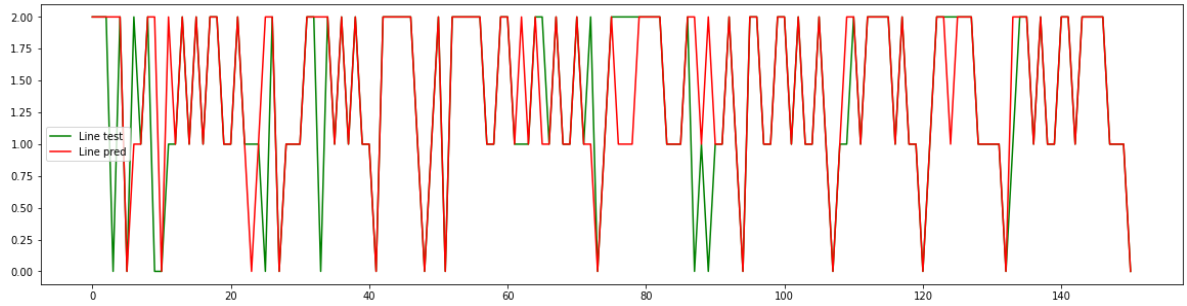
```
fn = ['Gender', 'Age', 'Education Level', 'Institution Type', 'IT Student',
       'Location', 'Load-shedding', 'Financial Condition', 'Internet Type',
       'Network Type', 'Class Duration', 'Self Lms', 'Device']
cn = ["Moderate","Low","High"]
fig, axes = plt.subplots(nrows = 1,ncols = 1,figsize = (4,4), dpi=300)
tree.plot_tree(DTC,
               feature_names = fn,
               class_names=cn,
               filled = True);
fig.savefig('imagename.png')
```



Grafik Akurasi

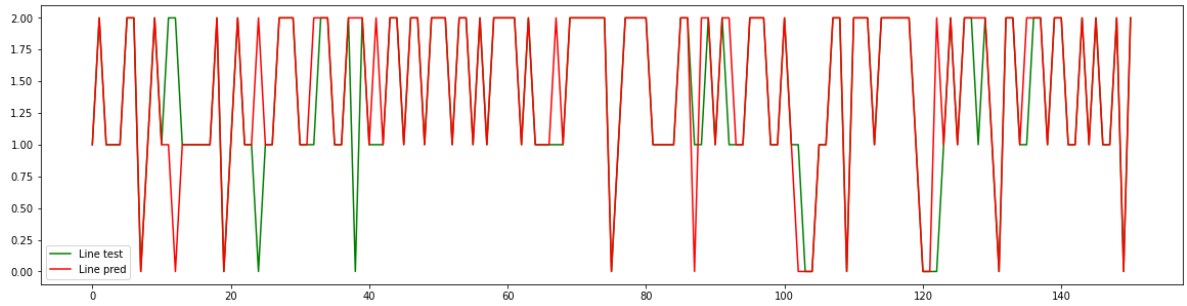
In [32]:

```
x = df.index[:151]

plt.figure(figsize=(20, 5))
plt.plot(x, y_test[:151], 'g', label='Line test')
plt.plot(x, ypred[:151], 'r', label='Line pred')

plt.legend()
plt.show()
```



In [33]:

```
plt.figure(figsize=(20, 5))
plt.plot(x, y_test[151:], 'g', label='Line test')
plt.plot(x, ypred[151:], 'r', label='Line pred')

plt.legend()
plt.show()
```



K-NN

In [34]:

```
KNN = KNeighborsClassifier(n_neighbors=3)
```

In [35]:

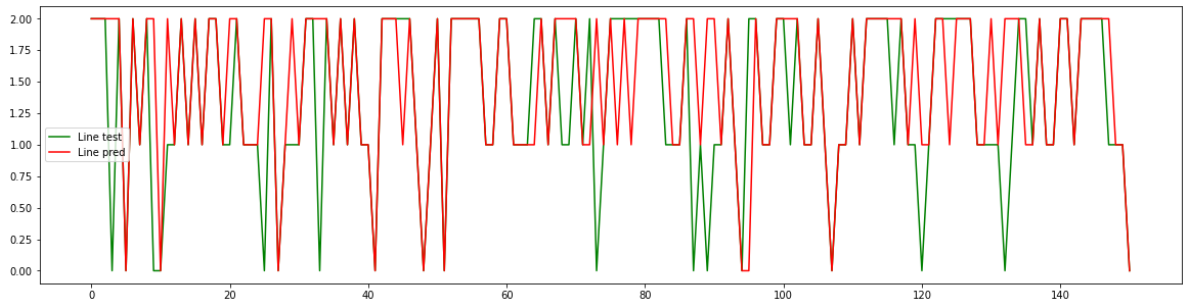
```
KNN.fit(X_train,y_train)
ypred = KNN.predict(X_test)
print(KNN,":",accuracy_score(y_test,ypred)*100)
```

```
KNeighborsClassifier(n_neighbors=3) : 82.11920529801324
```

Grafik Akurasi

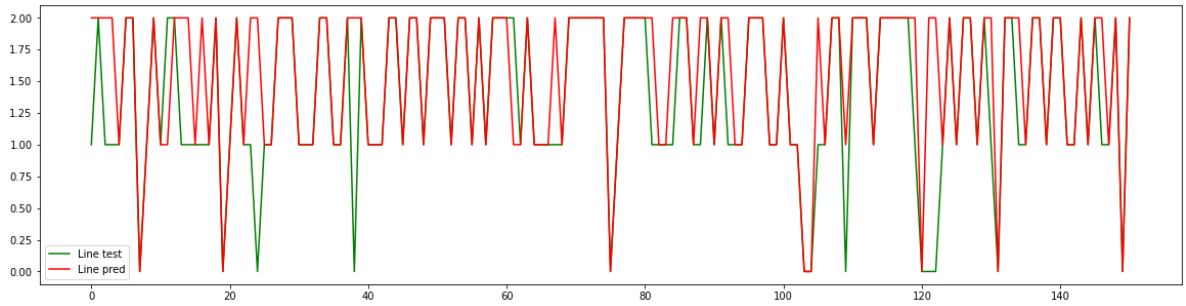
In [36]:

```
x = df.index[:151]

plt.figure(figsize=(20, 5))
plt.plot(x, y_test[:151], 'g', label='Line test')
plt.plot(x, ypred[:151], 'r', label='Line pred')

plt.legend()
plt.show()
```



In [37]:

```
plt.figure(figsize=(20, 5))
plt.plot(x, y_test[151:], 'g', label='Line test')
plt.plot(x, ypred[151:], 'r', label='Line pred')

plt.legend()
plt.show()
```



Naive Bayes

In [38]:

```
naive = GaussianNB()
```

In [39]:

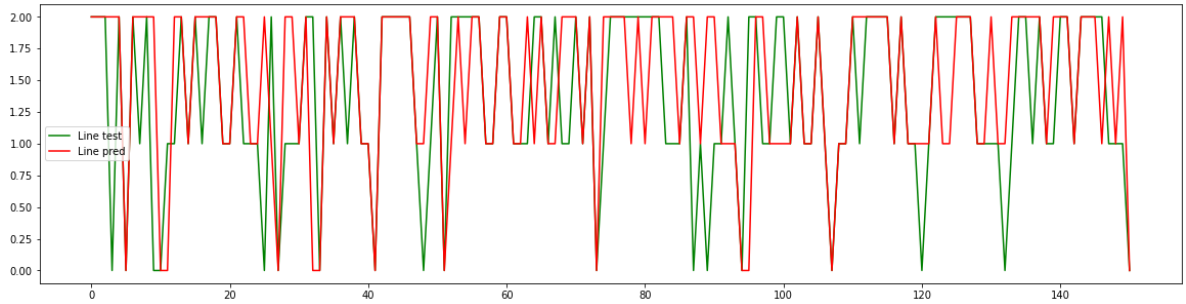
```
naive.fit(X_train,y_train)
ypred = naive.predict(X_test)
print(naive,":",accuracy_score(y_test,ypred)*100)
```

```
GaussianNB() : 69.5364238410596
```

Grafik Akurasi

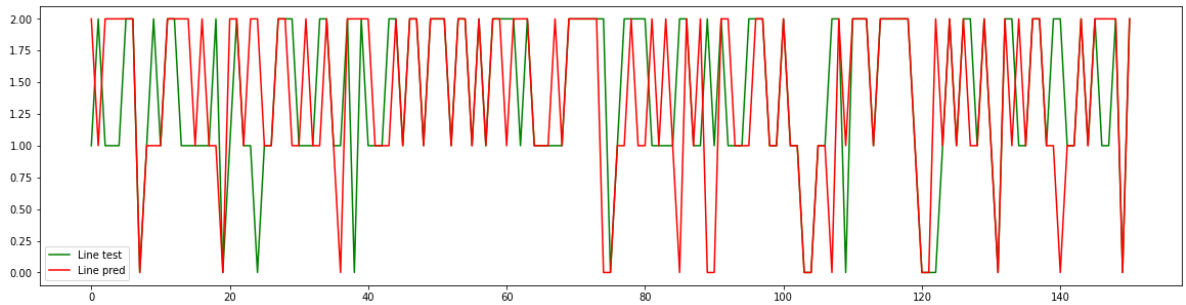
In [40]:

```
x = df.index[:151]

plt.figure(figsize=(20, 5))
plt.plot(x, y_test[:151], 'g', label='Line test')
plt.plot(x, ypred[:151], 'r', label='Line pred')

plt.legend()
plt.show()
```



In [41]:

```
plt.figure(figsize=(20, 5))
plt.plot(x, y_test[151:], 'g', label='Line test')
plt.plot(x, ypred[151:], 'r', label='Line pred')

plt.legend()
plt.show()
```



In [ ]: