Examen Practique

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Exercice 3 : Classification arbre de décision [30 pts]

In [6]:
```
import pandas as pd
import matplotlib.pyplot as plt
import statistics
import numpy as np
import scipy.stats
import seaborn as sns

data = pd.read_excel("ExamenDATA.xlsx")
pd.set_option('display.max_rows', None)
display(data)
```

	ID	AgeRange	Occupation	Gender	Happy
0	1	Young	Tutor	F	Yes
1	2	Middle-aged	Professor	F	No
2	3	Old	Tutor	M	Yes
3	4	Middle-aged	Professor	M	Yes
4	5	Old	Tutor	F	Yes
5	6	Young	Lecturer	M	No
6	7	Middle-aged	Lecturer	F	No
7	8	Old	Tutor	F	No

1. Development de model

In [15]:
```
data.loc[data['AgeRange'] == 'Young', 'AgeRangeNumber'] = 1
data.loc[data['AgeRange'] == 'Middle-aged', 'AgeRangeNumber'] = 2
data.loc[data['AgeRange'] == 'Old', 'AgeRangeNumber'] = 3


data.loc[data['Occupation'] == 'Tutor', 'OccupationNumber'] = 1
data.loc[data['Occupation'] == 'Professor', 'OccupationNumber'] = 2
data.loc[data['Occupation'] == 'Lecturer', 'OccupationNumber'] = 3


data.loc[data['Gender'] == 'M', 'GenderNumber'] = 0
data.loc[data['Gender'] == 'F', 'GenderNumber'] = 1


data.loc[data['Happy'] == 'Yes', 'HappyNumber'] = 1
data.loc[data['Happy'] == 'No', 'HappyNumber'] = 0


data.head(5)
```

Out[15]:

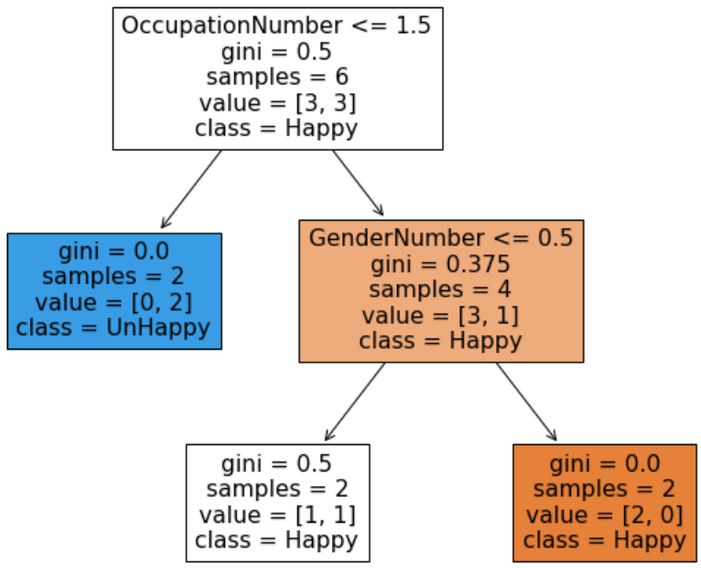
	ID	AgeRange	Occupation	Gender	Happy	AgeRangeNumber	OccupationNumber	GenderNumber	HappyNumber
0	1	Young	Tutor	F	Yes	1.0	1.0	1.0	1.0
1	2	Middle-aged	Professor	F	No	2.0	2.0	1.0	0.0
2	3	Old	Tutor	M	Yes	3.0	1.0	0.0	1.0
3	4	Middle-aged	Professor	M	Yes	2.0	2.0	0.0	1.0
4	5	Old	Tutor	F	Yes	3.0	1.0	1.0	1.0

In [16]:
```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(data[['AgeRangeNumber', 'OccupationNumber', 'GenderNumber']],
data['HappyNumber'], test_size=0.20, random_state=4)
```

In [17]:
```
from sklearn import tree
from sklearn.tree import DecisionTreeClassifier, plot_tree

desicionTree = tree.DecisionTreeClassifier(max_depth =3, criterion='gini', random_state=44, min_samples_leaf=2)
desicionTree.fit(X_train, y_train)
plt.figure(figsize = (10,8))
plot_tree(desicionTree, feature_names = ['AgeRangeNumber', 'OccupationNumber', 'GenderNumber'], class_names = ['Ha
ppy', 'UnHappy'], filled = True)
```

Out[17]:
```
[Text(223.2, 362.4, 'OccupationNumber <= 1.5\ngini = 0.5\nsamples = 6\nvalue = [3, 3]\nclass = Happy'),
 Text(111.6, 217.44, 'gini = 0.0\nsamples = 2\nvalue = [0, 2]\nclass = UnHappy'),
 Text(334.79999999999995, 217.44, 'GenderNumber <= 0.5\ngini = 0.375\nsamples = 4\nvalue = [3, 1]\nclass = Happ
y'),
 Text(223.2, 72.47999999999996, 'gini = 0.5\nsamples = 2\nvalue = [1, 1]\nclass = Happy'),
 Text(446.4, 72.47999999999996, 'gini = 0.0\nsamples = 2\nvalue = [2, 0]\nclass = Happy')]
```



In [22]:
```
print("Accuracy:", metrics.accuracy_score(y_test, y_pred))
```

```
Accuracy: 0.5
```

2. Prediction

In [18]:
```
#AgeRangeNumber = young = 1
#OccupationNumber = profeseur = 2
#GenderNumber = F = 1
X_prediction = [[1, 2, 1]]
Y_prediction = desicionTree.predict(X_prediction)
print(Y_prediction)
```

```
[0.]
```

Prediction = 0 = UNHAPPY

In [19]:
```
#classes prédites, utilisation de echantillon test
y_pred = desicionTree.predict(X_test)

#Obtention de la matrice de confusion
from sklearn import metrics
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(y_test, y_pred)
print (cm)
```

```
[[0 1]
 [0 1]]
```

From 2 donnes de test, une a ete bien predite et pas l'autre.

On a besoin de plus de donnes pour evaluer mieux le model.

Excercise 1: Validation avec Naive Bayes

On est utilise les conversions suivants pour le transformation a numerique de donnes categoriques. TEMP 0-10 1 10-20 2 20-30 3 30-40 4 40-50 5
COMPLEXITE: Simple: 0 Moyenne: 1 Eleve: 2 QUALITE RESPONSE: Bonne: 0 Moyenne: 1 Excellent: 2

In [27]:
```
data2 = pd.read_excel("ExamenDATA2.xlsx")
pd.set_option('display.max_rows', None)
display(data2)
```

	Temps de réflexion(min)	Complexité de la question	Qualité de la réponse	TN	CN	QN
0	10	simple	Excellente	1	0	2
1	10	élevé	Moyenne	1	2	1
2	20	moyenne	Bonne	2	1	0
3	30	simple	Bonne	3	0	0
4	40	moyenne	Excellente	4	1	3
5	40	moyenne	Bonne	4	1	0
6	50	élevé	Bonne	5	2	0

In [33]:
```
features = ['TN', 'CN']
target = ['QN']
X=data2[features]
y=data2[target]
```

In [34]:
```
#Import Gaussian Naive Bayes model
from sklearn.naive_bayes import GaussianNB

#Create a Gaussian Classifier
gnb = GaussianNB()

#Train the model using the training sets
gnb.fit(X, y)
```

```
C:\Users\valm044\Anaconda3\lib\site-packages\sklearn\naive_bayes.py:206: DataConversionWarning: A column-vector y
was passed when a 1d array was expected. Please change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
```

Out[34]:
```
GaussianNB(priors=None, var_smoothing=1e-09)
```

In [37]:
```
# Prediction:

# temps de réflexion de 20 min   et une complexité = élevé

Xpred = [[2, 2]]
ypredicted = gnb.predict(Xpred)
print(ypredicted)
```

```
[0]
```

La prediction est qualite de response bonne = 0

In [ ]:
```

```