In [1]:
```
import numpy as np
import pandas as pd

import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))
```

```
/kaggle/input/playground-series-s4e2/sample_submission.csv
/kaggle/input/playground-series-s4e2/train.csv
/kaggle/input/playground-series-s4e2/test.csv
```

In [2]:
```
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.linear_model import LogisticRegression
from sklearn.preprocessing import LabelEncoder
from sklearn.metrics import accuracy_score, precision_score, recall_score,
from sklearn.metrics import confusion_matrix, classification_report
from sklearn.metrics import mean_squared_error, mean_absolute_error, r2_sco
```

In [3]:
```
train_data=pd.read_csv("/kaggle/input/playground-series-s4e2/train.csv")
```

In [4]:
```
train_data
```

Out[4]:

	id	Gender	Age	Height	Weight	family_history_with_overweight	FAV
0	0	Male	24.443011	1.699998	81.669950	yes	ye
1	1	Female	18.000000	1.560000	57.000000	yes	ye
2	2	Female	18.000000	1.711460	50.165754	yes	ye
3	3	Female	20.952737	1.710730	131.274851	yes	ye
4	4	Male	31.641081	1.914186	93.798055	yes	ye
...	...	...	...	...	...	...	.
20753	20753	Male	25.137087	1.766626	114.187096	yes	ye
20754	20754	Male	18.000000	1.710000	50.000000	no	ye
20755	20755	Male	20.101026	1.819557	105.580491	yes	ye
20756	20756	Male	33.852953	1.700000	83.520113	yes	ye
20757	20757	Male	26.680376	1.816547	118.134898	yes	ye

20758 rows × 18 columns

In [5]:
```
train_data.head()
```

Out[5]:

	id	Gender	Age	Height	Weight	family_history_with_overweight	FAVC	FC
0	0	Male	24.443011	1.699998	81.669950	yes	yes	2.000
1	1	Female	18.000000	1.560000	57.000000	yes	yes	2.000
2	2	Female	18.000000	1.711460	50.165754	yes	yes	1.880
3	3	Female	20.952737	1.710730	131.274851	yes	yes	3.000
4	4	Male	31.641081	1.914186	93.798055	yes	yes	2.679

In [6]:
```
train_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 20758 entries, 0 to 20757
Data columns (total 18 columns):
 #   Column                          Non-Null Count  Dtype  
---  ------                          --------------  -----  
 0   id                              20758 non-null  int64  
 1   Gender                          20758 non-null  object 
 2   Age                             20758 non-null  float64
 3   Height                          20758 non-null  float64
 4   Weight                          20758 non-null  float64
 5   family_history_with_overweight  20758 non-null  object 
 6   FAVC                            20758 non-null  object 
 7   FCVC                            20758 non-null  float64
 8   NCP                             20758 non-null  float64
 9   CAEC                            20758 non-null  object 
 10  SMOKE                           20758 non-null  object 
 11  CH2O                            20758 non-null  float64
 12  SCC                             20758 non-null  object 
 13  FAF                             20758 non-null  float64
 14  TUE                             20758 non-null  float64
 15  CALC                            20758 non-null  object 
 16  MTRANS                          20758 non-null  object 
 17  NObeyesdad                      20758 non-null  object 
dtypes: float64(8), int64(1), object(9)
memory usage: 2.9+ MB
```

In [7]:
```
train_data.shape
```

Out[7]:
```
(20758, 18)
```

In [8]:
```
train_data.columns
```

Out[8]:
```
Index(['id', 'Gender', 'Age', 'Height', 'Weight',
       'family_history_with_overweight', 'FAVC', 'FCVC', 'NCP', 'CAEC',
       'SMOKE', 'CH2O', 'SCC', 'FAF', 'TUE', 'CALC', 'MTRANS', 'NObeyesda
d'],
      dtype='object')
```

In [9]:
```
train_data.describe()
```

Out[9]:

	id	Age	Height	Weight	FCVC	NCP
count	20758.00000	20758.000000	20758.000000	20758.000000	20758.000000	20758.000000
mean	10378.50000	23.841804	1.700245	87.887768	2.445908	2.761332
std	5992.46278	5.688072	0.087312	26.379443	0.533218	0.705375
min	0.00000	14.000000	1.450000	39.000000	1.000000	1.000000
25%	5189.25000	20.000000	1.631856	66.000000	2.000000	3.000000
50%	10378.50000	22.815416	1.700000	84.064875	2.393837	3.000000
75%	15567.75000	26.000000	1.762887	111.600553	3.000000	3.000000
max	20757.00000	61.000000	1.975663	165.057269	3.000000	4.000000

In [10]:
```
train_data.isnull().sum()
```

Out[10]:
```
id                                0
Gender                            0
Age                               0
Height                            0
Weight                            0
family_history_with_overweight    0
FAVC                              0
FCVC                              0
NCP                               0
CAEC                              0
SMOKE                             0
CH2O                              0
SCC                               0
FAF                               0
TUE                               0
CALC                              0
MTRANS                            0
NObeyesdad                        0
dtype: int64
```

In [11]:
```
features=['Age', 'Height', 'Weight', 'FCVC', 'NCP', 'CH2O', 'FAF', 'TUE']
```

In [12]:
```
ytrain_data=train_data['NObeyesdad']
```

In [13]:
```
ytrain_data
```

Out[13]:
```
0        Overweight_Level_II
1              Normal_Weight
2        Insufficient_Weight
3           Obesity_Type_III
4        Overweight_Level_II
                 ...
20753        Obesity_Type_II
20754    Insufficient_Weight
20755        Obesity_Type_II
20756    Overweight_Level_II
20757        Obesity_Type_II
Name: NObeyesdad, Length: 20758, dtype: object
```

In [14]:
```
train_df=train_data[features]
```

In [15]:
```
train_df.shape
```

Out[15]:
```
(20758, 8)
```

In [16]:
```
ytrain_data.shape
```

Out[16]:
```
(20758,)
```

In [17]:
```
xtrain,xval,ytrain,yval=train_test_split(train_df,ytrain_data,test_size=0.2
```

In [18]:
```
print(xtrain.shape)
print(xval.shape)
print(ytrain.shape)
print(yval.shape)
```

```
(16606, 8)
(4152, 8)
(16606,)
(4152,)
```

In [19]:
```
model=RandomForestClassifier(n_estimators=100, random_state=42)
model1=DecisionTreeClassifier(max_depth=3, random_state=1)
model2=LogisticRegression()
```

In [20]:
```
model
```

Out[20]:
```
RandomForestClassifier(random_state=42)
```

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [21]:
```
model1
```

Out[21]:
```
DecisionTreeClassifier(max_depth=3, random_state=1)
```
In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [22]:
```
model2
```

Out[22]:
```
LogisticRegression()
```
In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [23]:
```
xtrain=pd.get_dummies(xtrain)
xval=pd.get_dummies(xval)
```

In [24]:
```
rfmodel=model.fit(xtrain,ytrain)
dmodel=model1.fit(xtrain,ytrain)
lgmodel=model2.fit(xtrain,ytrain)
```

```
/opt/conda/lib/python3.10/site-packages/sklearn/linear_model/_logistic.py:
458: ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown i
n:
    https://scikit-learn.org/stable/modules/preprocessing.html (https://sc
ikit-learn.org/stable/modules/preprocessing.html)
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-reg
ression (https://scikit-learn.org/stable/modules/linear_model.html#logisti
c-regression)
  n_iter_i = _check_optimize_result(
```

In [25]:
```
rfpred=rfmodel.predict(xval)
dpred=model1.predict(xval)
lgpred=model2.predict(xval)
```

In [26]:
```
rfpred
```

Out[26]:
```
array(['Obesity_Type_II', 'Insufficient_Weight', 'Overweight_Level_I',
       ..., 'Obesity_Type_III', 'Obesity_Type_III', 'Obesity_Type_III'],
      dtype=object)
```

In [27]:
```
dpred
```

Out[27]:
```
array(['Obesity_Type_II', 'Insufficient_Weight', 'Normal_Weight', ...,
       'Obesity_Type_III', 'Obesity_Type_III', 'Obesity_Type_III'],
      dtype=object)
```

In [28]:
```
lgpred
```

Out[28]:
```
array(['Obesity_Type_II', 'Insufficient_Weight', 'Overweight_Level_I',
       ..., 'Obesity_Type_III', 'Obesity_Type_III', 'Obesity_Type_III'],
      dtype=object)
```

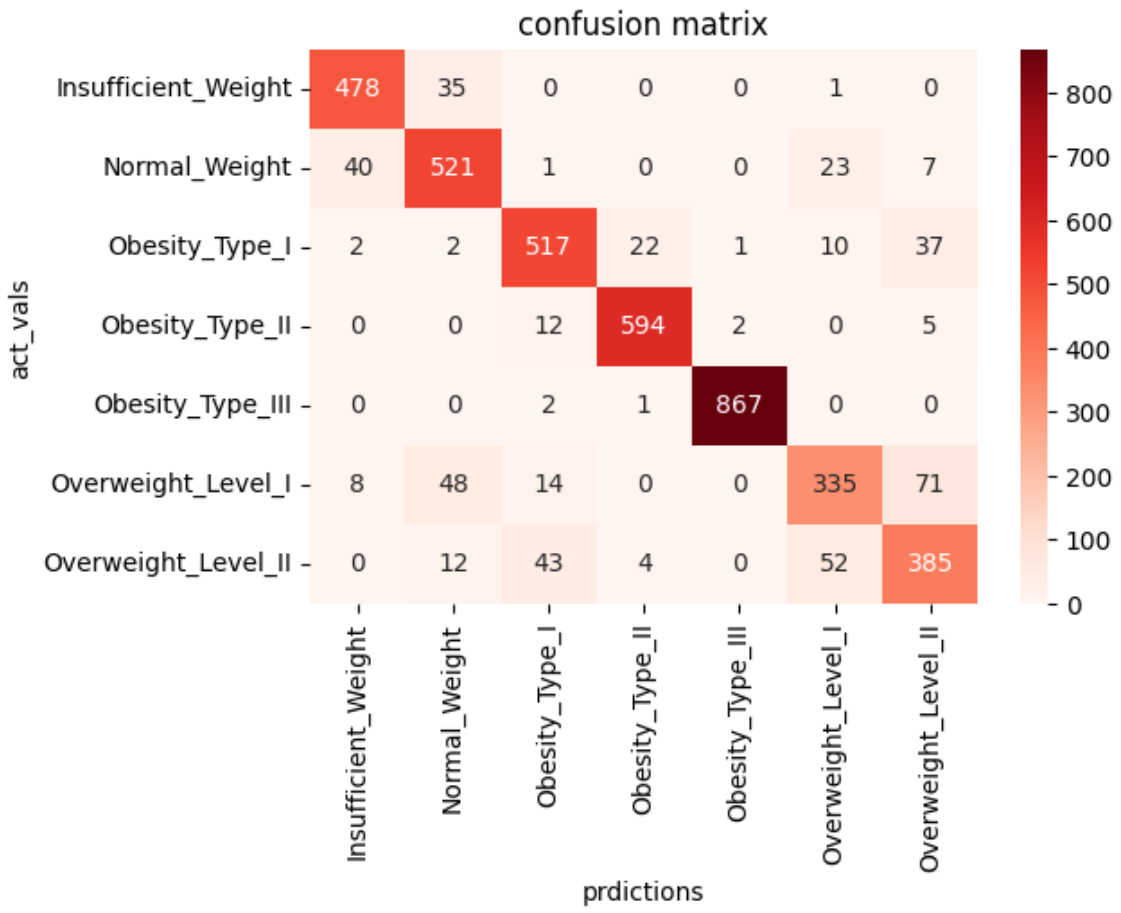
In [29]:
```
yval
```

Out[29]:
```
17392        Obesity_Type_II
14299    Insufficient_Weight
14753     Overweight_Level_I
15306     Overweight_Level_I
16482     Overweight_Level_I
                 ...
13289    Overweight_Level_II
11555          Normal_Weight
10644       Obesity_Type_III
49          Obesity_Type_III
13704       Obesity_Type_III
Name: NObeyesdad, Length: 4152, dtype: object
```

In [30]:
```
val_accuracy=accuracy_score(yval,rfpred)
val_accuracy1=accuracy_score(yval,dpred)
val_accuracy2=accuracy_score(yval,lgpred)
print(f'validation accuracy is:{val_accuracy}')
print(f'validation accuracy is:{val_accuracy1}')
print(f'validation accuracy is:{val_accuracy2}')
```

```
validation accuracy is:0.8904142581888247
validation accuracy is:0.7155587668593449
validation accuracy is:0.6129576107899807
```

In [31]:
```
confusion_matrix=pd.crosstab(yval, rfpred, rownames=['act_vals'], colnames=
plt.figure(figsize=(6,4))
sns.heatmap(confusion_matrix, annot=True, fmt='d', cmap='Reds')
plt.title('confusion matrix')
plt.show()
```



In [32]:
```
test_data=pd.read_csv("/kaggle/input/playground-series-s4e2/test.csv")
```

In [33]:
```
test_data
```

Out[33]:

	id	Gender	Age	Height	Weight	family_history_with_overweight	FAV
0	20758	Male	26.899886	1.848294	120.644178	yes	ye
1	20759	Female	21.000000	1.600000	66.000000	yes	ye
2	20760	Female	26.000000	1.643355	111.600553	yes	ye
3	20761	Male	20.979254	1.553127	103.669116	yes	ye
4	20762	Female	26.000000	1.627396	104.835346	yes	ye
...	...	...	...	...	...	...	.
13835	34593	Male	23.327836	1.721384	78.030383	yes	n
13836	34594	Female	29.000000	1.590000	62.000000	no	ye
13837	34595	Female	22.935612	1.585547	44.376637	no	ye
13838	34596	Male	21.000000	1.620000	53.000000	yes	ye
13839	34597	Male	26.490926	1.812259	120.980508	yes	ye

13840 rows × 17 columns

In [34]:
```
test_df=test_data[features]
```

In [35]:
```
test_df
```

Out[35]:

	Age	Height	Weight	FCVC	NCP	CH2O	FAF	TUE
0	26.899886	1.848294	120.644178	2.938616	3.000000	2.825629	0.855400	0.000000
1	21.000000	1.600000	66.000000	2.000000	1.000000	3.000000	1.000000	0.000000
2	26.000000	1.643355	111.600553	3.000000	3.000000	2.621877	0.000000	0.250502
3	20.979254	1.553127	103.669116	2.000000	2.977909	2.786417	0.094851	0.000000
4	26.000000	1.627396	104.835346	3.000000	3.000000	2.653531	0.000000	0.741069
...	...	...	...	...	...	...	...	...
13835	23.327836	1.721384	78.030383	2.813234	3.000000	1.000000	0.807076	0.778632
13836	29.000000	1.590000	62.000000	3.000000	3.000000	2.000000	0.000000	0.000000
13837	22.935612	1.585547	44.376637	3.000000	2.273740	2.000000	1.949840	1.000000
13838	21.000000	1.620000	53.000000	2.000000	3.000000	2.000000	3.000000	2.000000
13839	26.490926	1.812259	120.980508	2.744994	3.000000	2.205977	1.304291	0.630866

13840 rows × 8 columns

In [36]:
```
test_df=pd.get_dummies(test_df)
```

In [37]:
```
xtrain.shape
```

Out[37]:
```
(16606, 8)
```

In [38]:
```
test_df.shape
```

Out[38]:
```
(13840, 8)
```

In [39]:
```
if 'CALC_Always' in test_df.columns:
    test_df.drop('CALC_Always', axis=1, inplace=True)
test_pred = model.predict(test_df)
```

In [40]:
```
prediction=rfmodel.predict(test_df)
```

In [41]:
```
prediction
```

Out[41]:
```
array(['Obesity_Type_II', 'Overweight_Level_I', 'Obesity_Type_III', ...,
       'Insufficient_Weight', 'Normal_Weight', 'Obesity_Type_II'],
      dtype=object)
```

In [42]:
```
result=pd.DataFrame({'id': test_data['id'], 'NObeyesdad': prediction})
```

In [43]:
```
result.to_csv('mysubmission_rf1.csv', index=False)
```

In [44]:
```
result
```

Out[44]:

	id	NObeyesdad
0	20758	Obesity_Type_II
1	20759	Overweight_Level_I
2	20760	Obesity_Type_III
3	20761	Obesity_Type_I
4	20762	Obesity_Type_III
...	...	...
13835	34593	Overweight_Level_II
13836	34594	Overweight_Level_I
13837	34595	Insufficient_Weight
13838	34596	Normal_Weight
13839	34597	Obesity_Type_II

13840 rows × 2 columns

In [ ]:
```

```