In [1]:

```
import pandas as pd
import numpy as np
import warnings
warnings.filterwarnings('ignore')
import seaborn as sns

import matplotlib.pyplot as plt

from sklearn.preprocessing import StandardScaler,OrdinalEncoder

from sklearn.metrics import r2_score

from sklearn.model_selection import cross_val_score

from sklearn.model_selection import KFold

from sklearn.pipeline import Pipeline

from sklearn.compose import ColumnTransformer

from sklearn.model_selection import train_test_split

from sklearn.linear_model import LinearRegression

from sklearn.ensemble import RandomForestRegressor

from xgboost import XGBRegressor
```

In [2]:

```
# 1. Reading data from CSV
def read_csv(file_path):
    """
    Read data from a CSV file and return a pandas DataFrame.

    Parameters:
    - file_path: str, the path to the CSV file.

    Returns:
    - pd.DataFrame, the loaded DataFrame.
    """
    return pd.read_csv(file_path)
#2. Getting information and statistics about over dataset
def dataset_info_statistics(data):
    """
    Display information and basic statistics about the dataset.

    Parameters:
    - data: pandas DataFrame, input data.

    Returns:
    - None
    """
    # Display general information about the dataset
    print("Dataset Information:")
    print(data.info())
```

```python
    print("\n")

    # Display basic statistics for numerical columns
    print("Basic Statistics for Numerical Columns:")
    print(data.describe())
    print("\n")

#3.check for the null values in the dataset
def check_null(data):
    """
    Check for null values in the dataset.

    Parameters:
    - data: pandas DataFrame, input data.

    Returns:
    - pd.Series, the count of null values for each column.
    """
    null_counts = data.isnull().sum()
    print("Null Values in the Dataset:")
    return null_counts

#4.check for duplicated rows in the dataset
def check_duplicates(data):
    """
    Check for duplicated rows in the dataset.

    Parameters:
    - data: pandas DataFrame, input data.

    Returns:
    - bool, True if any duplicated rows exist, False otherwise.
    """
    return data.duplicated().any()

#5. getting basic analysis for numerical and categorical columns
def plot_graph(data):
    """
    Plot graphs for numerical and categorical data in a dataframe.

    Parameters:
    - data: Pandas Dataframe, input data.

    Returns:
    - None

    """
    numerical_columns = data.select_dtypes(include=np.number).columns

    for column in numerical_columns:
        plt.figure(figsize=(5,3))
        sns.distplot(data[column],kde=True)
        plt.title(f"Histogram for {column}")
        plt.xlabel(column)
        plt.ylabel("Frequency")
        plt.show()
    categorical_columns = data.select_dtypes(include='object').columns
    for column in categorical_columns:
        plt.figure(figsize=(5, 3))
        sns.countplot(data[column])
        plt.title(f'Countplot for {column}')
        plt.xlabel(column)
        plt.ylabel('Count')
        plt.xticks(rotation=45)
        plt.show()

#6. Seperate feature and target
def seperate_features_target(data,target_column):
    """
    Separate features and target variable

    Parameters:
    - data: pandas DataFrame, input data.
    - target_column: str, the column representing the target varible.

    Returns:
    - X: pandas DataFrame, features.
    - y: pandas Series, target variable.

    """

    X = data.drop(columns=[target_column],axis=1)
    y = data[target_column]

    return X,y
#7. Train test split
def perform_train_test_split(X, y, test_size=0.20, random_state=42):
    """
    Perform train-test split on the dataset.

    Parameters:
    - X: pandas DataFrame, features.
    - y: pandas Series, target variable.
    - test_size: float, optional, the proportion of the dataset to include i
    - random_state: int or None, optional, seed for random number generatior

    Returns:
    - X_train: pandas DataFrame, features for training.
    - X_test: pandas DataFrame, features for testing.
    - y_train: pandas Series, target variable for training.
    - y_test: pandas Series, target variable for testing.
    """
    X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=test

    return X_train, X_test, y_train, y_test
```

In [3]:

```
calories = read_csv('calories.csv')
exercise = read_csv('exercise.csv')
```

In [4]:

```
data = pd.merge(calories, exercise, on='User_ID')
```

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

Out[5]:

	User_ID	Calories	Gender	Age	Height	Weight	Duration	Heart_Rate	Bo
0	14733363	231.0	male	68	190.0	94.0	29.0	105.0	
1	14861698	66.0	female	20	166.0	60.0	14.0	94.0	
2	11179863	26.0	male	69	179.0	79.0	5.0	88.0	
3	16180408	71.0	female	34	179.0	71.0	13.0	100.0	
4	17771927	35.0	female	27	154.0	58.0	10.0	81.0	

In [6]:
```
dataset_info_statistics(data)
```

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```
Dataset Information:
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 15000 entries, 0 to 14999
Data columns (total 9 columns):
 #   Column      Non-Null Count  Dtype  
---  ------      --------------  -----  
 0   User_ID     15000 non-null  int64  
 1   Calories    15000 non-null  float64
 2   Gender      15000 non-null  object 
 3   Age         15000 non-null  int64  
 4   Height      15000 non-null  float64
 5   Weight      15000 non-null  float64
 6   Duration    15000 non-null  float64
 7   Heart_Rate  15000 non-null  float64
 8   Body_Temp   15000 non-null  float64
dtypes: float64(6), int64(2), object(1)
memory usage: 1.0+ MB
None


Basic Statistics for Numerical Columns:
            User_ID      Calories           Age        Height        Weight  \
count  1.500000e+04  15000.000000  15000.000000  15000.000000  15000.000000   
mean   1.497736e+07     89.539533     42.789800    174.465133     74.966867   
std    2.872851e+06     62.456978     16.980264     14.258114     15.035657   
min    1.000116e+07      1.000000     20.000000    123.000000     36.000000   
25%    1.247419e+07     35.000000     28.000000    164.000000     63.000000   
50%    1.499728e+07     79.000000     39.000000    175.000000     74.000000   
75%    1.744928e+07    138.000000     56.000000    185.000000     87.000000   
max    1.999965e+07    314.000000     79.000000    222.000000    132.000000   

           Duration    Heart_Rate     Body_Temp  
count  15000.000000  15000.000000  15000.000000  
mean      15.530600     95.518533     40.025453  
std        8.319203      9.583328      0.779230  
min        1.000000     67.000000     37.100000  
25%        8.000000     88.000000     39.600000  
50%       16.000000     96.000000     40.200000  
75%       23.000000    103.000000     40.600000  
max       30.000000    128.000000     41.500000  
```

In [13]:

```
check_null(data)
```

```
Null Values in the Dataset:
```

```
Out[13]: User_ID       0
         Calories      0
         Gender        0
         Age           0
         Height        0
         Weight        0
         Duration      0
         Heart_Rate    0
         Body_Temp     0
         dtype: int64
```

```
In [15]: #plot_graph(data)
```

```
In [17]: data.columns
```

```
Out[17]: Index(['User_ID', 'Calories', 'Gender', 'Age', 'Height', 'Weight', 'Duratio
         n',
                'Heart_Rate', 'Body_Temp'],
               dtype='object')
```

```
In [19]: X,y = seperate_features_target(data,'Calories')
```

```
In [21]: X = X.drop(columns=['User_ID'])
```

```
In [25]: X_train,X_test,y_train,y_test = perform_train_test_split(X, y, test_size=0.2
```

Column Transformer and Pipeline

```
In [28]: preprocessor = ColumnTransformer(transformers=[
             ('ordinal',OrdinalEncoder(),['Gender']),
             ('num',StandardScaler(),['Age',
                                     'Height',
                                     'Weight',
                                     'Duration',
                                     'Heart_Rate',
                                     'Body_Temp']),
         ],remainder='passthrough')
```

```
In [30]: pipeline = Pipeline([("preprocessor",preprocessor),
                               ("model",LinearRegression())
                              ])
```

```
In [32]: from sklearn import set_config
```

```
In [34]: set_config(display='diagram')
```

```
In [36]: pipeline
```

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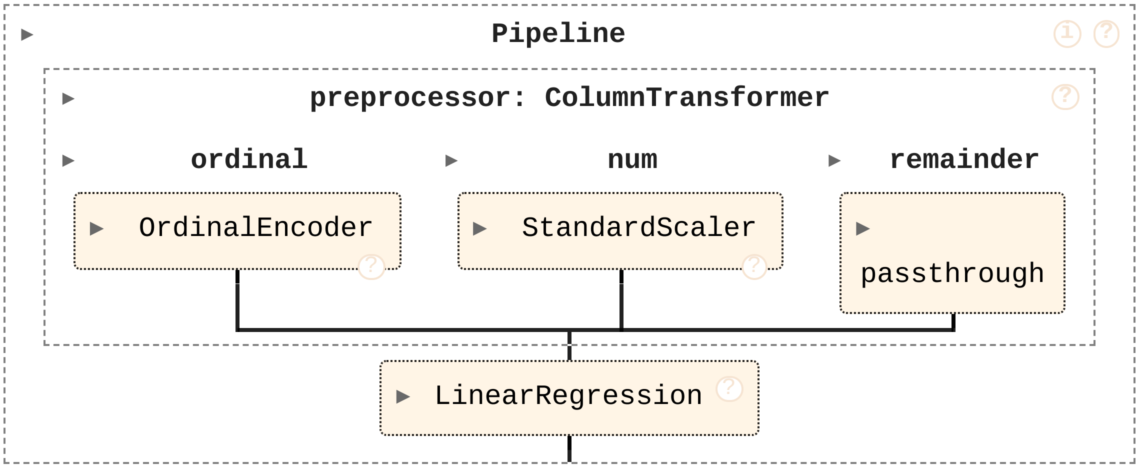
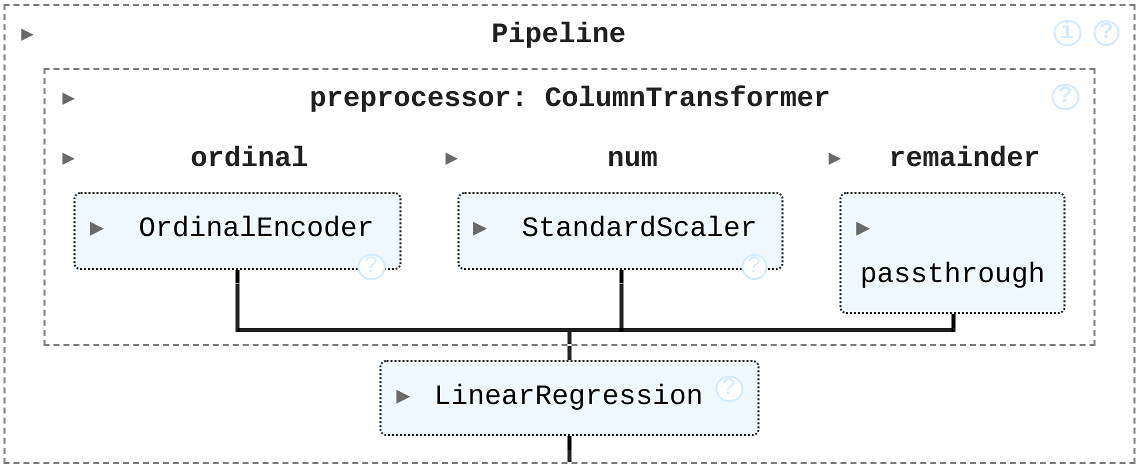
Out[36]:



```
In [38]: pipeline.fit(X_train,y_train)
```

Out[38]:



```
In [40]: y_pred = pipeline.predict(X_test)
```

```
In [42]: from sklearn.metrics import r2_score
```

```
In [44]: r2_score(y_test,y_pred)
```

```
Out[44]: 0.9672937151257295
```

```
In [46]: from sklearn.model_selection import KFold
```

```
In [48]: kfold = KFold(n_splits=5, shuffle=True, random_state=42)
```

```
In [50]: from sklearn.model_selection import cross_val_score
```

```
In [52]: cv_results = cross_val_score(pipeline, X, y, cv=kfold, scoring='r2')
```

```
In [54]: cv_results.mean()
```

```
Out[54]: 0.9671402283675841
```

```
In [56]: from sklearn.metrics import mean_absolute_error
```

In [58]:
```
mean_absolute_error(y_test,y_pred)
```

Out[58]:
```
8.441513553849703
```

In [60]:
```
def model_scorer(model_name,model):

    output=[]


    output.append(model_name)

    pipeline = Pipeline([
    ('preprocessor',preprocessor),
    ('model',model)])

    X_train,X_test,y_train,y_test = train_test_split(X,y,test_size=0.20,ranc

    pipeline.fit(X_train,y_train)

    y_pred = pipeline.predict(X_test)

    output.append(r2_score(y_test,y_pred))
    output.append(mean_absolute_error(y_test,y_pred))

    kfold = KFold(n_splits=5, shuffle=True, random_state=42)
    cv_results = cross_val_score(pipeline, X, y, cv=kfold, scoring='r2')
    output.append(cv_results.mean())

    return output
```

In [62]:
```
model_dict={
    'log':LinearRegression(),
    'RF':RandomForestRegressor(),
    'XGBR':XGBRegressor(),
}
```

In [72]:
```
model_output=[]
for model_name,model in model_dict.items():
    model_output.append(model_scorer(model_name,model))
```

In [73]:
```
model_output
```

Out[73]:
```
[['log', 0.9672937151257295, 8.441513553849703, 0.9671402283675841],
 ['RF', 0.9982430320694653, 1.6949333333333334, 0.9979168864625398],
 ['XGBR', 0.9988678909361673, 1.4981198125282924, 0.9988510864545181]]
```

In [74]:
```
preprocessor = ColumnTransformer(transformers=[
    ('ordinal',OrdinalEncoder(),['Gender']),
    ('num',StandardScaler(),['Age',
                             'Height',
                             'Weight',
                             'Duration',
                             'Heart_Rate',
                             'Body_Temp']),
],remainder='passthrough')
```

In [75]:

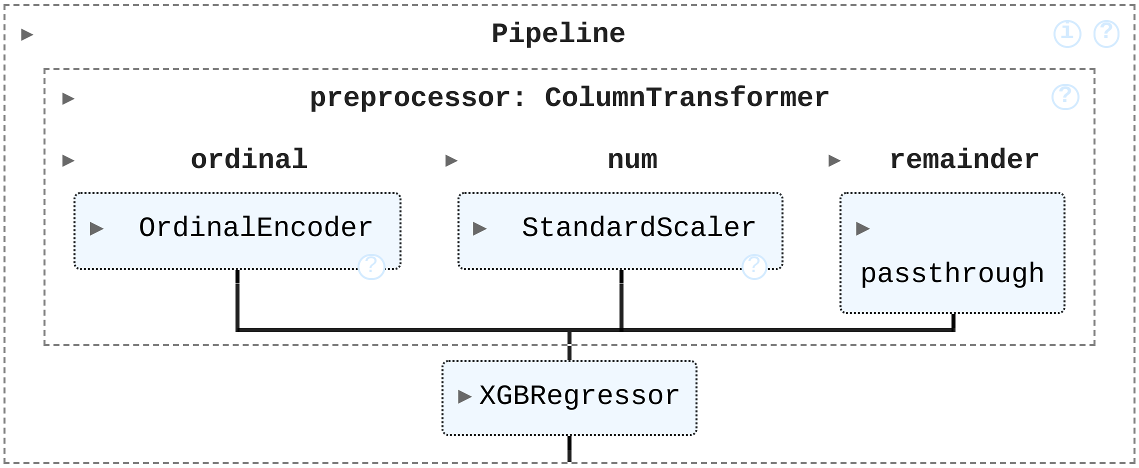
```
pipeline = Pipeline([
    ('preprocessor',preprocessor),
    ('model',XGBRegressor())

])
```

In [76]:

```
pipeline.fit(X,y)
```

Out[76]:



In [77]:

```
sample = pd.DataFrame({
   'Gender':'male',
    'Age':68,
    'Height':190.0,
    'Weight':94.0,
    'Duration':29.0,
    'Heart_Rate':105.0,
    'Body_Temp':40.8,
},index=[0])
```

In [78]:

```
pipeline.predict(sample)
```

Out[78]:

```
array([231.0721], dtype=float32)
```

Save The Model

In [80]:

```
import pickle
```

In [81]:

```
with open('pipeline.pkl','wb') as f:
    pickle.dump(pipeline,f)
```

In [82]:

```
with open('pipeline.pkl','rb') as f:
    pipeline_saved = pickle.load(f)
```

In [83]:

```
result = pipeline_saved.predict(sample)
```

In [84]:

```
result
```

Out[84]:

```
array([231.0721], dtype=float32)
```

GUI

In [103…

```
import pickle
import pandas as pd
from tkinter import *

def show_entry():

    with open('pipeline.pkl','rb') as f:
        pipeline = pickle.load(f)

    p1 = str(clicked.get())
    p2 = float(e2.get())
    p3 = float(e3.get())
    p4 = float(e4.get())
    p5 = float(e5.get())
    p6 = float(e6.get())
    p7 = float(e7.get())

    sample = pd.DataFrame({
    'Gender':[p1],
    'Age':[p2],
    'Height':[p3],
    'Weight':[p4],
    'Duration':[p5],
    'Heart_Rate':[p6],
    'Body_Temp':[p7],
},index=[0])

    result = pipeline.predict(sample)
    print(result)
    Label(master, text="Amount of Calories Burnt").grid(row=13)
    Label(master, text=result[0]).grid(row=14)


master =Tk()
master.title("Calories Burnt Prediction using Machine Learning")
label = Label(master,text = "Calories Burnt Prediction",bg = "black",
               fg = "white").grid(row=0,columnspan=2)

Label(master,text = "Select Gender").grid(row=1)
Label(master,text = "Enter Your Age").grid(row=2)
Label(master,text = "Enter Your Height").grid(row=3)
Label(master,text = "Enter Your Weight").grid(row=4)
Label(master,text = "Duration").grid(row=5)
Label(master,text = "Heart Rate").grid(row=6)
Label(master,text = "Body Temp").grid(row=7)

clicked = StringVar()
options = ['male', 'female']
```

```python

e1 = OptionMenu(master , clicked , *options )
e1.configure(width=15)
e2 = Entry(master)
e3 = Entry(master)
e4 = Entry(master)
e5 = Entry(master)
e6 = Entry(master)
e7 = Entry(master)


e1.grid(row=1,column=1)
e2.grid(row=2,column=1)
e3.grid(row=3,column=1)
e4.grid(row=4,column=1)
e5.grid(row=5,column=1)
e6.grid(row=6,column=1)
e7.grid(row=7,column=1)



Button(master,text="Predict",command=show_entry).grid()

mainloop()
```

In [ ]: