```
import pandas as pd
```

```
from google.colab import drive
drive.mount('/content/drive')

# Replace with your actual file path
file_path = '/content/drive/My Drive/Python/data.xlsx'

# Read the Excel file
data = pd.read_excel(file_path)

# Now we drop Referance column
data=data.drop(columns=['Reference'])

# Show the content
display(data.head())
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
```

	Density (Kg/m3)	Time (hr)	Surface temperature (oC)	Fluid temperature (oC)	Fluid velocity (m/s)	Equivalent diameter (m)	Dissolved oxygen (ppmw)	Fouling factor (m2 K/kW)
0	797.762	3.333333	202.67	87.0	0.56	0.0147	322.100741	0.0023
1	797.762	3.666667	202.67	87.0	0.56	0.0147	322.100741	0.0020
2	797.762	4.000000	203.00	85.5	0.56	0.0147	322.100741	0.0120
3	797.762	4.333333	204.33	85.0	0.56	0.0147	322.100741	0.0149
4	797.762	4.666667	205.00	85.0	0.56	0.0147	322.100741	0.0171

```
# First We remove our Result Data
X=data.drop(columns=['Fouling factor (m2 K/kW)'])
```

```
# and put into another array
y=data['Fouling factor (m2 K/kW)']
```

```
import numpy as np
```

```
from sklearn.preprocessing import StandardScaler
stand=StandardScaler()
X=stand.fit_transform(X)

# X is now standardized meaning each feature will have a mean of 0 and a standard deviation of 1.
```

```
from sklearn.model_selection import train_test_split
tx,vx,ty,vy=train_test_split(X,y,test_size=0.2,random_state=666,shuffle=True)

# traning_X , Test_X , Traning_y , Test_y

# This means that the sequence of random numbers generated will be the same every time you run the code with that same value.
```

```
from sklearn.ensemble import RandomForestRegressor
from sklearn.ensemble import StackingRegressor
from sklearn.svm import LinearSVR
from sklearn.ensemble import BaggingRegressor
from xgboost import XGBRegressor as XGBR
```

```
df1=pd.DataFrame(columns=['yp'])

# Creat an empty pandas DataFrame and single column named 'yp'.
```

```
estimators = [
 ('rf', RandomForestRegressor(n_estimators=100,n_jobs=-1,random_state=666,oob_score=True)),
 ('bag', BaggingRegressor(n_estimators=10,oob_score=True,n_jobs=-1,random_state=666)),
 ('gbm',XGBR(n_estimators=100,gamma=0.6,n_jobs=-1,max_depth=6,learning_rate=0.01,subsample=1))
]
```

```
reg = StackingRegressor(estimators=estimators,final_estimator=LinearSVR(),cv=5)
```

```
# this code sets up a stacking model where the predictions from a Random Forest, Bagging Regressor,
#                        and XGBoost model are combined by a Linear SVR to produce the final output.
```

```
reg.fit(tx, ty)
yp=reg.predict(vx)
df1['yp']=yp

# train your stacking model using the training data and then use that trained model to generate predictions on your unseen test data,
#                         storing those predictions in a DataFrame.
```

```
/usr/local/lib/python3.11/dist-packages/sklearn/ensemble/_bagging.py:1315: UserWarning: Some inputs do not have OOB scores. This probabl
  warn(
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  warn(
/usr/local/lib/python3.11/dist-packages/sklearn/svm/_base.py:1249: ConvergenceWarning: Liblinear failed to converge, increase the number
  warnings.warn(
```

```
m=[]
mae=[]
mse=[]
r2=[]
rae=[]
mape=[]
p25=[]
p05=[]
p75=[]
p2=[]
p4=[]
plog=[]
pexp=[]
psin=[]
ptan=[]
```

```
Start coding or generate with AI.
```

```
from sklearn.metrics import mean_absolute_error,mean_squared_error,r2_score,mean_absolute_percentage_error
MAE=mean_absolute_error(vy,yp)

MSE=mean_squared_error(vy,yp)

R2=r2_score(vy,yp)

errors = np.abs(vy - yp)
mean_true = np.mean(vy)
RAE= np.mean(errors) / mean_true

MAPE= mean_absolute_percentage_error(vy,yp)

mae.append(MAE)
mse.append(MSE)
r2.append(R2)
rae.append(RAE)
mape.append(MAPE)
```

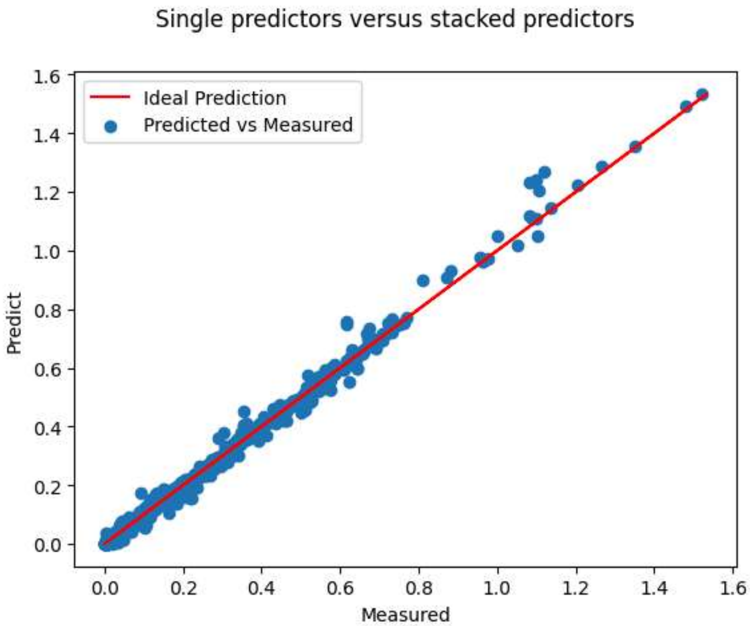
```
df2=pd.DataFrame({'MAE':mae,'MSE':mse,'R2':r2,'RAE':rae,'MAPE':mape})
```

```
df2
```

	MAE	MSE	R2	RAE	MAPE
0	0.00447	0.000138	0.996073	0.029196	0.148836

```
import matplotlib.pyplot as plt
```

```
plt.plot(vy,vy,'r', label='Ideal Prediction')
plt.scatter(yp,vy, label='Predicted vs Measured')
plt.xlabel('Measured')
plt.ylabel('Predict')
plt.suptitle('Single predictors versus stacked predictors')
plt.legend()
plt.show()
```




```
# X-axis ('Measured'): This represents the actual, measured values of the 'Fouling factor (m2 K/kW)' from our test dataset (vy).

# Y-axis ('Predict'): This represents the values of the 'Fouling factor' that your stacking regression model predicted for the corresponding
#      data points in the test set (yp).

# Red Line ('Ideal Prediction'): This diagonal red line represents the ideal scenario where the predicted value is exactly equal to the
#      measured value. If all your predicted points fell on this line, it would indicatea perfect model.

# Blue Dots ('Predicted vs Measured'): Each blue dot on the plot represents a single data point from your test set. Its position is determined
#       by its actual measured value on the x-axis and the model's predicted value forthat point on the y-axis.
```