In [ ]:

```
import pandas as pd
import numpy as np
from sklearn.model_selection import train_test_split

from sklearn.ensemble import RandomForestClassifier

import shap

import matplotlib.pyplot as plt
import seaborn as sns
```

In [ ]:

```
data = pd.read_csv("https://raw.githubusercontent.com/SMAMHTN/Fina
```

In [ ]:

```
data = data.drop(columns=['tanggal','stasiun','max','critical'],a
```

In [ ]:

```
data
```

Out[ ]:

	pm10	pm25	so2	co	o3	no2	categori
0	38.0	53.0	29.0	6.0	31.0	13.0	SEDANG
1	27.0	46.0	27.0	7.0	47.0	7.0	BAIK
2	44.0	58.0	25.0	7.0	40.0	13.0	SEDANG
3	30.0	48.0	24.0	4.0	32.0	7.0	BAIK
4	38.0	53.0	24.0	6.0	31.0	9.0	SEDANG
...	...	...	...	...	...	...	...
1055	64.0	110.0	32.0	13.0	29.0	35.0	TIDAK SEHAT
1056	70.0	130.0	33.0	17.0	28.0	45.0	TIDAK SEHAT
1057	78.0	140.0	32.0	18.0	29.0	39.0	TIDAK SEHAT
1058	75.0	121.0	37.0	12.0	50.0	21.0	TIDAK SEHAT
1059	53.0	80.0	29.0	6.0	34.0	13.0	SEDANG

902 rows × 7 columns

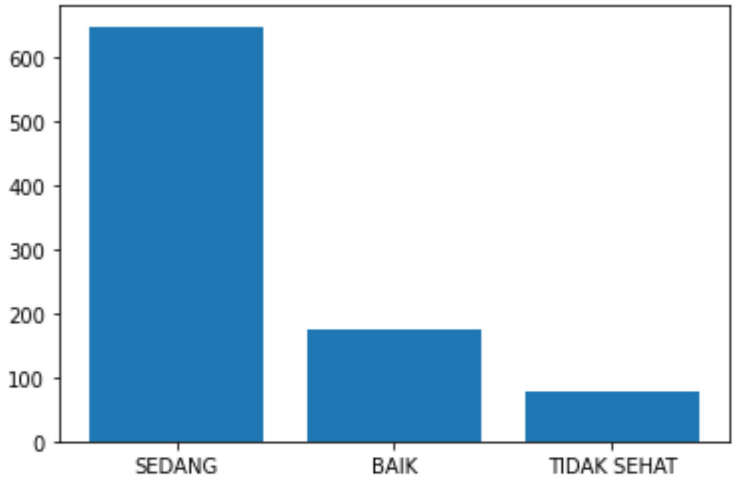
In [ ]:

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 902 entries, 0 to 1059
Data columns (total 7 columns):
 #   Column    Non-Null Count  Dtype  
---  ------    --------------  -----  
 0   pm10      902 non-null    float64
 1   pm25      902 non-null    float64
 2   so2       902 non-null    float64
 3   co        902 non-null    float64
 4   o3        902 non-null    float64
 5   no2       902 non-null    float64
 6   categori  902 non-null    object 
dtypes: float64(6), object(1)
memory usage: 56.4+ KB
```

```
In [ ]:  plt.bar(data.categori.unique(),height=data.categori.value_counts(
```

```
Out[ ]: <BarContainer object of 3 artists>
```



```
In [ ]:  data.isnull().sum()
```

```
Out[ ]: pm10        0
        pm25        0
        so2         0
        co          0
        o3          0
        no2         0
        categori    0
        dtype: int64
```

```
In [ ]:  data = data.dropna()
```

```
In [ ]:  data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 902 entries, 0 to 1059
Data columns (total 7 columns):
 #   Column    Non-Null Count  Dtype  
---  ------    --------------  -----  
 0   pm10      902 non-null    float64
 1   pm25      902 non-null    float64
 2   so2       902 non-null    float64
 3   co        902 non-null    float64
 4   o3        902 non-null    float64
 5   no2       902 non-null    float64
 6   categori  902 non-null    object 
dtypes: float64(6), object(1)
memory usage: 56.4+ KB
```

Preprocessing

In [ ]:

```
def preprocessing_inputs(df):
  df = df.copy()
  #split train test
  y = df['categori']
  X = df.drop('categori',axis=1)
  #train test split
  X_train,X_test, y_train,y_test = train_test_split(X,y,train_size
  return X_train,X_test,y_train,y_test
```

In [ ]:

```
X_train,X_test,y_train,y_test = preprocessing_inputs(data)
```

Training

In [ ]:

```
model = RandomForestClassifier(random_state=1)
model.fit(X_train,y_train)
```

Out[ ]:

```
RandomForestClassifier(random_state=1)
```

In [ ]:

```
acc = model.score(X_test,y_test)
print('Accuracy: {:.2f}%'.format(acc*100))
```

```
Accuracy: 99.26%
```

Predicting

In [ ]:

```
predicting= np.reshape((120,99,34,55,19,55),(1,-1))
predicting
```

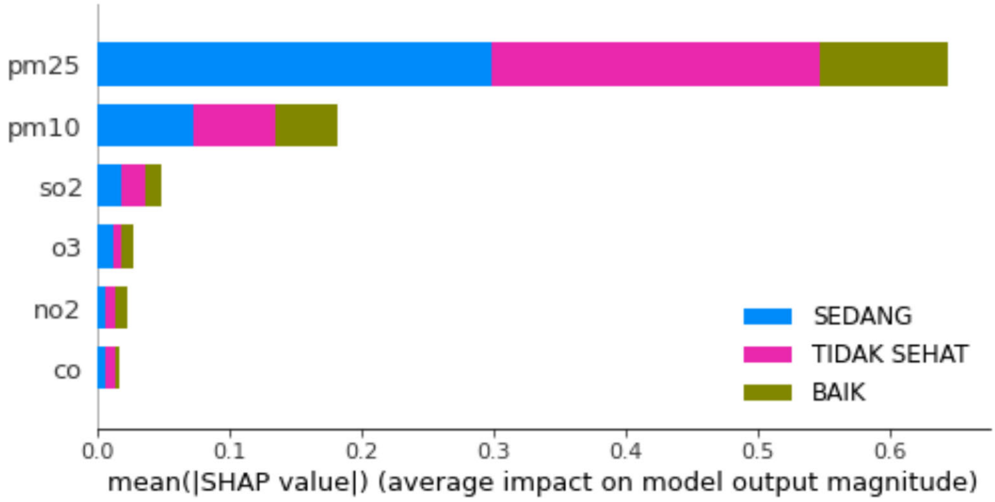
Out[ ]:

```
array([[120,  99,  34,  55,  19,  55]])
```

Feature Impact

In [ ]:

```
explainer = shap.TreeExplainer(model)
explainer_values = explainer.shap_values(X_test)
shap.summary_plot(explainer_values,X_test,class_names=model.classe
```



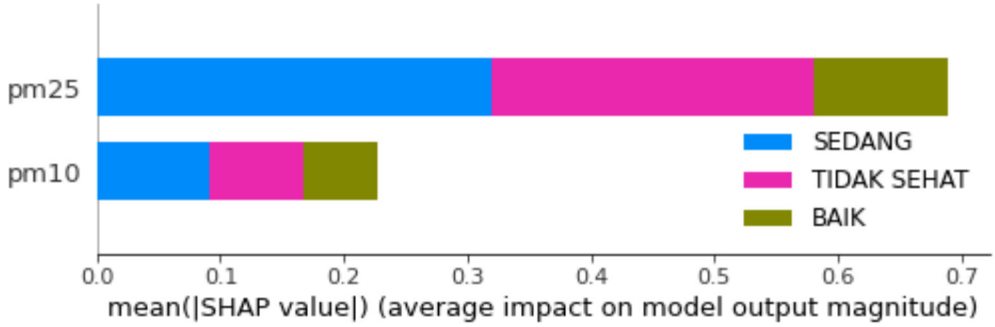
In [ ]:

```
model = RandomForestClassifier(random_state=1)
model.fit(X_train.drop(columns=['so2','o3','no2','co'],axis=1),y_
acc = model.score(X_test.drop(columns=['so2','o3','no2','co'],axi
print('Accuracy: {:.2f}%'.format(acc*100))
```

```
Accuracy: 98.15%
```

In [ ]:

```
explainer = shap.TreeExplainer(model)
explainer_values = explainer.shap_values(X_test.drop(columns=['so
shap.summary_plot(explainer_values,X_test.drop(columns=['so2','o3
```


pm25
pm10
SEDANG
TIDAK SEHAT
BAIK
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
mean(|SHAP value|) (average impact on model output magnitude)