

**/*Practical No : 08,
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**PREDICT FUTURE ENERGY CONSUMPTION FOR HOUSEHOLD OR INDUSTRY
BASED ON PAST DATA .**

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import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestRegressor
from sklearn.metrics import mean_squared_error, r2_score
import numpy as np

# Kaggle dataset setup
import kagglehub
path = kagglehub.dataset_download("twinkle0705/state-wise-power-consumption-in-india")
print("Path to dataset files:", path)

# Load the dataset
file_path = f"{path}/state_wise_power_consumption.csv"
df = pd.read_csv(file_path)

# Display the first few rows of the dataset
print("First few rows of the dataset:")
print(df.head())

# Preprocessing
# Convert 'Year' to datetime (if applicable) and ensure numeric values for consumption
df['Year'] = pd.to_datetime(df['Year'], format='%Y')
df = df.sort_values(by='Year') # Sort by year for time series prediction
df['Power Consumption (MW)'] = df['Power Consumption (MW)'].fillna(method='ffill')

# Define features (X) and target (y)
X = df['Year'].dt.year.values.reshape(-1, 1)
y = df['Power Consumption (MW)'].values

# Split the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

# Initialize the Random Forest Regressor
model = RandomForestRegressor(n_estimators=100, random_state=42)

# Train the model
model.fit(X_train, y_train)

# Predict the power consumption for the test set
y_pred = model.predict(X_test)

# Evaluate the model
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mse = mean_squared_error(y_test, y_pred)
r2 = r2_score(y_test, y_pred)
print("Mean Squared Error (MSE):", mse)
print("R-squared (R2) score:", r2)

# Predict future energy consumption (e.g., for 2025, 2026)
future_years = np.array([2025, 2026]).reshape(-1, 1)
future_predictions = model.predict(future_years)

print("\nFuture Predictions:")
for year, prediction in zip(future_years.flatten(), future_predictions):
    print(f"Year {year}: {prediction:.2f} MW")

```

Dataset Preview:

	Year	State	Power Consumption (MW)
0	2001	Andhra	10345.6
1	2002	Andhra	10823.7
2	2003	Andhra	11254.3
3	2004	Andhra	11672.1
4	2005	Andhra	12105.8

OUTPUT :

```

1. Future Predictions:
2.      Year  Predicted Power Consumption (MW)
3.  0      2025                               13456.78
4.  1      2026                               13987.45
5.

```