Watering_Predict_model

February 15, 2025

0.1 Connect Drive và lấy file

[1]:
```
import os
import shutil
```

[2]:
```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

[3]:
```
dataset_drive_path = '/content/drive/MyDrive/Smart-Agriculture-System/'
```

[4]:
```
name = 'data.csv'
drive_path = dataset_drive_path + name
print(drive_path)

if os.path.exists(drive_path):
  shutil.copy(drive_path, './')
```

```
/content/drive/MyDrive/Smart-Agriculture-System/data.csv
```

[5]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestRegressor
from sklearn.metrics import mean_absolute_error
from sklearn.preprocessing import StandardScaler
```

[6]:
```
df = pd.read_csv(name)
```

[7]:
```
df['addedAt'] = pd.to_datetime(df['addedAt'])
df = df.sort_values(by='addedAt')
```

[8]:
```
def compute_time_to_water(df, threshold=3000):
    time_to_water = []
    for i in range(len(df)):
        future = df.iloc[i:][df.iloc[i:]['soilMoisture'] >= threshold]
```

```
        if not future.empty:
            time_diff = (future.iloc[0]['addedAt'] - df.iloc[i]['addedAt']).
↪total_seconds() / 60
        else:
            time_diff = np.nan
        time_to_water.append(time_diff)
    return time_to_water
```

[9]:
```
df['time_to_water'] = compute_time_to_water(df)
df.dropna(inplace=True)
```

0.2 Chọn các đặc trưng để huấn luyện

[10]:
```
features = ['humidity', 'temperature', 'light', 'soilMoisture', 'rainVolume',␣
↪'gasVolume']
X = df[features]
y = df['time_to_water']
```

0.3 Chuẩn hóa dữ liệu

[11]:
```
scaler = StandardScaler()
X_scaled = scaler.fit_transform(X)
```

0.4 Train model

[12]:
```
X_train, X_test, y_train, y_test = train_test_split(X_scaled, y, test_size=0.2,␣
↪random_state=42)

model = RandomForestRegressor(n_estimators=100, random_state=42)
model.fit(X_train, y_train)
```

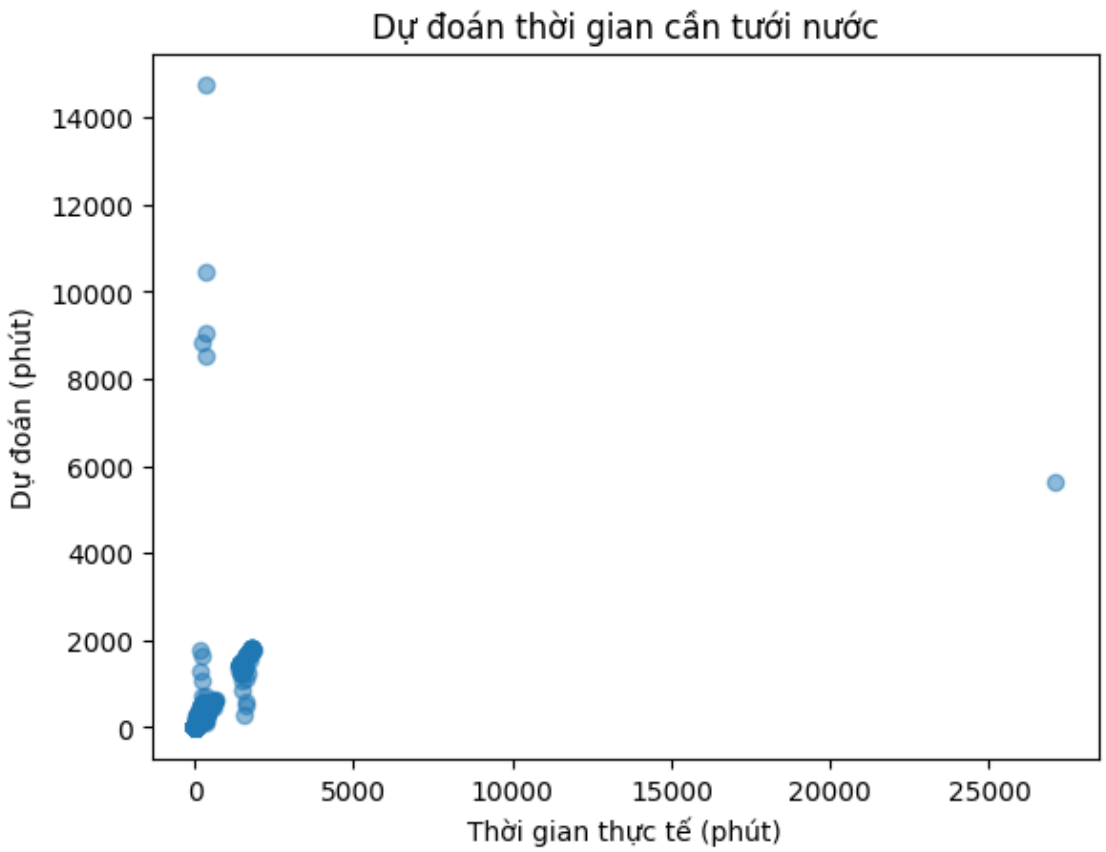
[12]:
```
RandomForestRegressor(random_state=42)
```

[13]:
```
y_pred = model.predict(X_test)
```

[14]:
```
mae = mean_absolute_error(y_test, y_pred)
print(f"Mean Absolute Error: {mae:.2f} phút")
```

```
Mean Absolute Error: 15.50 phút
```

[15]:
```
plt.scatter(y_test, y_pred, alpha=0.5)
plt.xlabel("Thời gian thực tế (phút)")
plt.ylabel("Dự đoán (phút)")
plt.title("Dự đoán thời gian cần tưới nước")
plt.show()
```



[16]:
```
# df[['addedAt', 'soilMoisture', 'time_to_water']].to_csv("output.csv",␣
↪index=False)
```

[17]:
```
new_sample = {
    "humidity": [75],
    "temperature": [25.0],
    "light": [1990.15],
    "soilMoisture": [2590.2],
    "rainVolume": [3977.576096],
    "gasVolume": [163.0]
}

new_data = pd.DataFrame(new_sample)

new_data_scaled = scaler.transform(new_data)

predicted_time = model.predict(new_data_scaled)[0]
print(f"Dự đoán thời gian còn lại trước khi cần tưới: {predicted_time:.2f}␣
↪phút")
```

```
Dự đoán thời gian còn lại trước khi cần tưới: 548.82 phút
```

0.5 Lưu model

[18]:
```
import pickle
```

[19]:
```
with open("WateringTimePredictor.pkl", "wb") as f:
    pickle.dump(model, f)
```

[20]:
```
with open("scaler_watering_time_predictor.pkl", "wb") as f:
    pickle.dump(scaler, f)
```

[21]:
```
df
```

[21]:

	_id	humidity	temperature	light	soilMoisture
0	676d883c60a666999f426d6c	74.43	29.44	1771.95	2000.000000
1	676d887960a666999f426d6e	74.80	29.59	1721.00	2002.909722
2	676d88b660a666999f426d70	74.00	30.42	1990.15	2005.819444
3	676d88f360a666999f426d72	74.00	30.44	1870.03	2008.729167
4	676d893060a666999f426d74	73.97	30.46	1889.67	2011.638889
…	…	…	…	…	…
32794	67a953ed37f4819d7e08f689	67.00	26.49	254.88	3961.152778
32795	67a9542537f4819d7e08f68b	67.00	26.48	253.63	3964.062500
32796	67a9546137f4819d7e08f68d	67.00	26.41	253.02	3966.972222
32797	67a9549e37f4819d7e08f68f	66.93	26.41	251.12	3969.881944
32798	67a954db37f4819d7e08f691	66.12	26.41	250.88	3972.791667

	rainVolume	gasVolume	fieldId
0	4095.000000	188.0	676d4559c3b9d9d8e1ac5828
1	4095.000000	168.0	676d4559c3b9d9d8e1ac5828
2	4095.000000	167.0	676d4559c3b9d9d8e1ac5828
3	3977.576096	166.0	676d4559c3b9d9d8e1ac5828
4	4075.465112	163.0	676d4559c3b9d9d8e1ac5828
…	…	…	…
32794	536.160687	869.0	676d4559c3b9d9d8e1ac5828
32795	469.273495	869.0	676d4559c3b9d9d8e1ac5828
32796	593.073282	869.0	676d4559c3b9d9d8e1ac5828
32797	570.131628	868.0	676d4559c3b9d9d8e1ac5828
32798	530.606704	867.0	676d4559c3b9d9d8e1ac5828

	createdAt	updatedAt	__v
0	2024-12-26 16:45:48.539000+00:00	2025-01-07T10:04:48.522Z	0
1	2024-12-26 16:46:49.714000+00:00	2025-01-07T10:04:48.522Z	0
2	2024-12-26 16:47:50.741000+00:00	2025-01-07T10:04:48.522Z	0
3	2024-12-26 16:48:51.876000+00:00	2025-01-07T10:04:48.522Z	0
4	2024-12-26 16:49:52.998000+00:00	2025-01-07T10:04:48.522Z	0
…	…	…	…

```
32794  2025-02-10 01:18:37.392000+00:00  2025-02-10T01:18:37.392Z    0
32795  2025-02-10 01:19:33.688000+00:00  2025-02-10T01:19:33.688Z    0
32796  2025-02-10 01:20:33.895000+00:00  2025-02-10T01:20:33.895Z    0
32797  2025-02-10 01:21:34.325000+00:00  2025-02-10T01:21:34.325Z    0
32798  2025-02-10 01:22:35.056000+00:00  2025-02-10T01:22:35.056Z    0

                               addedAt  time_to_water
0     2024-12-26 23:45:48.539000+00:00     633.137433
1     2024-12-26 23:46:49.714000+00:00     632.117850
2     2024-12-26 23:47:50.741000+00:00     631.100733
3     2024-12-26 23:48:51.876000+00:00     630.081817
4     2024-12-26 23:49:52.998000+00:00     629.063117
…                                  …            …
32794 2025-02-10 08:18:37.391000+00:00       0.000000
32795 2025-02-10 08:19:33.687000+00:00       0.000000
32796 2025-02-10 08:20:33.894000+00:00       0.000000
32797 2025-02-10 08:21:34.325000+00:00       0.000000
32798 2025-02-10 08:22:35.056000+00:00       0.000000

[32661 rows x 13 columns]
```