% 加载数据

combined\_data = readtable('C:\Users\CC\Desktop\A题第二小问\Combined\_Station\_Data.xlsx');

% 假设清洗成本为每次清洗的固定成本

cleaning\_cost\_per\_cleaning = 500; % 假设清洗一次的成本为500元

% 选择输入特征和输出变量

features = {'Humidity', 'Irradiance\_w\_m2', 'CurrentTemperature', 'PR', 'ActualEnergy\_kWh', 'TheoreticalEnergy\_kWh'};

target = 'ActualEnergy\_kWh';

% 数据预处理：去除缺失值

combined\_data = rmmissing(combined\_data, 'DataVariables', [features, target]);

% 特征标准化

scaler = @(x) (x - mean(x)) / std(x); % 标准化函数

for i = 1:length(features)

combined\_data.(features{i}) = scaler(combined\_data.(features{i}));

end

% 清洗频率（单位：天）

cleaning\_frequencies = [1, 2, 3, 5, 7]; % 1天，2天，3天，5天，7天清洗频率

% 模拟清洗成本和发电量的平衡

total\_costs = zeros(1, length(cleaning\_frequencies));

total\_energy = zeros(1, length(cleaning\_frequencies));

% 设定权重

w1 = 0.5; % 清洗成本权重

w2 = 0.5; % 发电损失成本权重

% 循环处理清洗频率

for cleaning\_idx = 1:length(cleaning\_frequencies)

cleaning\_freq = cleaning\_frequencies(cleaning\_idx);

total\_loss\_cost = 0;

total\_cleaning\_cost = 0;

total\_generation = 0;

% 循环遍历每一行数据，计算发电量和成本

for i = 1:height(combined\_data)

theoretical\_energy = combined\_data.TheoreticalEnergy\_kWh(i);

actual\_energy = combined\_data.ActualEnergy\_kWh(i);

% 判断是否清洗，基于积灰影响

energy\_loss = (theoretical\_energy - actual\_energy); % 发电损失

total\_loss\_cost = total\_loss\_cost + energy\_loss;

% 每隔指定天数进行清洗

if mod(i, cleaning\_freq) == 0

total\_cleaning\_cost = total\_cleaning\_cost + cleaning\_cost\_per\_cleaning; % 累计清洗成本

end

% 累加发电量

total\_generation = total\_generation + actual\_energy;

end

% 计算综合成本：清洗成本和发电损失成本

total\_cost = w1 \* total\_cleaning\_cost + w2 \* total\_loss\_cost;

total\_costs(cleaning\_idx) = total\_cost;

total\_energy(cleaning\_idx) = total\_generation;

end

% 绘制图表：不同清洗频率下的总成本与发电量变化

figure;

[ax1, h1] = plotyy(cleaning\_frequencies, total\_costs, cleaning\_frequencies, total\_energy);

set(h1, 'LineStyle', '--', 'Color', 'g');

xlabel('Cleaning Frequency (days)');

ylabel(ax1(1), 'Total Cost (Yuan)', 'Color', 'b');

ylabel(ax1(2), 'Total Energy (kWh)', 'Color', 'g');

title('Effect of Cleaning Frequency on Total Cost and Energy Production');

% 输出结果：最优清洗频率

[~, optimal\_idx] = min(total\_costs);

optimal\_cleaning\_frequency = cleaning\_frequencies(optimal\_idx);

disp(['The optimal cleaning frequency is every ', num2str(optimal\_cleaning\_frequency), ' days.']);