1. Visualize correlation between temperature and humidity

```matlab
% Read temperature and humidity from a ThingSpeak channel and visualize the
% relationship between them using the SCATTER plot


% Channel ID to read data from
readChannelID = 2951490;
% Temperature Field ID
TemperatureFieldID = 1;
% Humidity Field ID
HumidityFieldID = 3;


% Channel Read API Key
% If your channel is private, then enter the read API
% Key between the '' below:
readAPIKey = '6ZMGRTY74LNN1RKM';


% Read Temperature and Humidity Data. Learn more about the THINGSPEAKREAD
function by
% going to the Documentation tab on the right side pane of this page.


data = thingSpeakRead(readChannelID,'Fields',[TemperatureFieldID
HumidityFieldID], ...
                                          'NumPoints',57, ...
                                          'ReadKey',readAPIKey);


temperatureData = data(:,1);


% Read Humidity Data
humidityData = data(:,2);


% Visualize the data
scatter(temperatureData,humidityData);
xlabel('Temperature');
ylabel('Humidity');
```
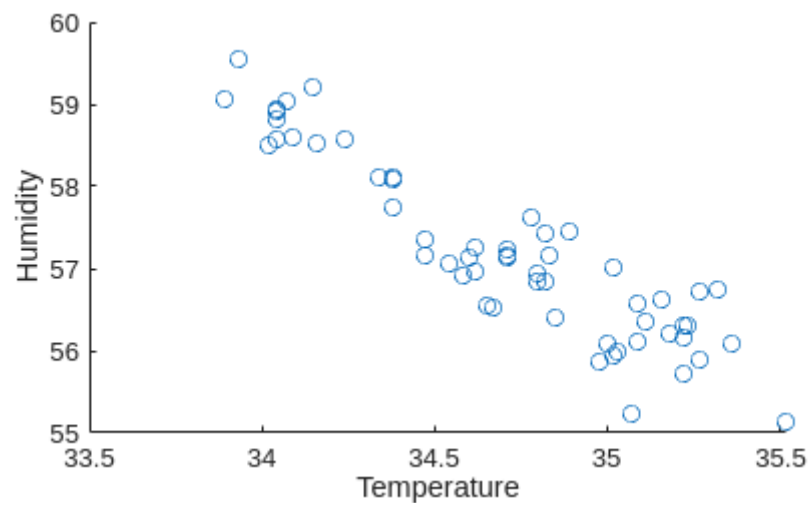
2. Histogram for Temperature

```matlab
% ThingSpeak Channel Info
readChannelID = 2951490;
readAPIKey = '6ZMGRTY74LNN1RKM';


% Number of data points to read (adjust as needed)
numPoints = 57;


% Read all 3 fields: Temperature (Field1), Pressure (Field2), Humidity
(Field3)
[data, time] = thingSpeakRead(readChannelID, ...
    'Fields', [1 2 3], ...
    'NumPoints', numPoints, ...
    'ReadKey', readAPIKey);


% Check if data is available
if isempty(data)
    error('No data retrieved. Check channel ID or API key.');
end


% Plot Histograms
figure;


% Histogram for Temperature
histogram(data(:,1));
xlabel('Temperature (°C)');
ylabel('Frequency');
title('Histogram of Temperature Variation');
```
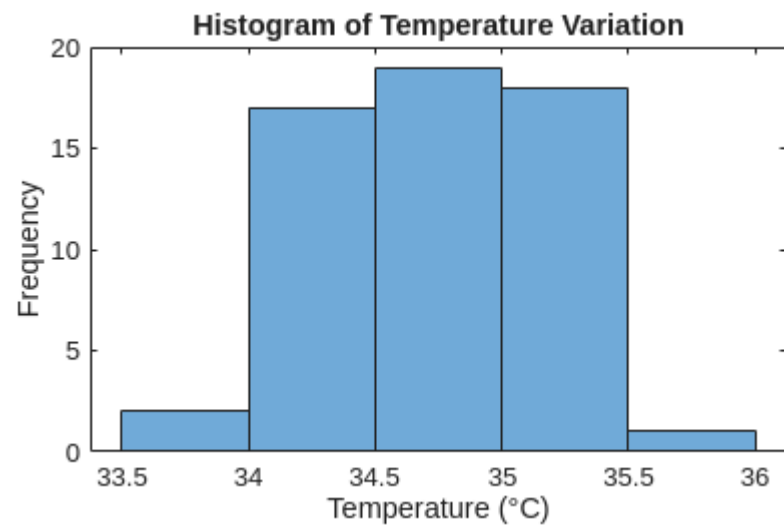
Histogram of Temperature Variation

3. Histogram for Humidity

```matlab
% ThingSpeak Channel Info
readChannelID = 2951490;
readAPIKey = '6ZMGRTY74LNN1RKM';


% Number of data points to read (adjust as needed)
numPoints = 57;


% Read all 3 fields: Temperature (Field1), Pressure (Field2), Humidity
(Field3)
[data, time] = thingSpeakRead(readChannelID, ...
    'Fields', [1 2 3], ...
    'NumPoints', numPoints, ...
    'ReadKey', readAPIKey);


% Check if data is available
if isempty(data)
    error('No data retrieved. Check channel ID or API key.');
end


% Plot Histograms
figure;


% Histogram for Humidity
histogram(data(:,3));
xlabel('Humidity (%)');
ylabel('Frequency');
title('Histogram of Humidity Variation');
```
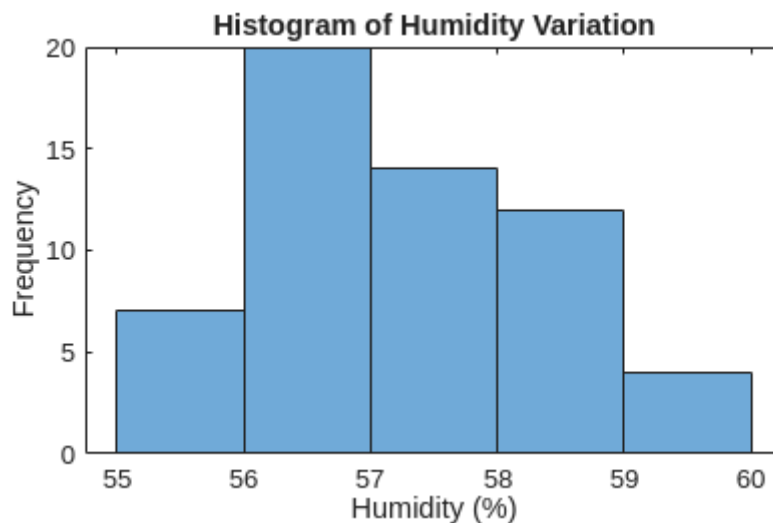
4. Line plot of Temperature

```matlab
% ThingSpeak Channel Info
readChannelID = 2951490;
readAPIKey = '6ZMGRTY74LNN1RKM';


% Number of data points to read (adjust as needed)
numPoints = 57;


% Read temperature data (Field 1) with timestamps
[tempData, time] = thingSpeakRead(readChannelID, ...
    'Fields', 1, ...
    'NumPoints', numPoints, ...
    'ReadKey', readAPIKey);


% Check if data is available
if isempty(tempData)
    error('No temperature data retrieved. Check channel ID or API key.');
end


% Plot Temperature Line Plot
figure;
plot(time, tempData, '-o', 'LineWidth', 1.5);
xlabel('Time');
ylabel('Temperature (°C)');
title('Temperature Over Time');
grid on;
```
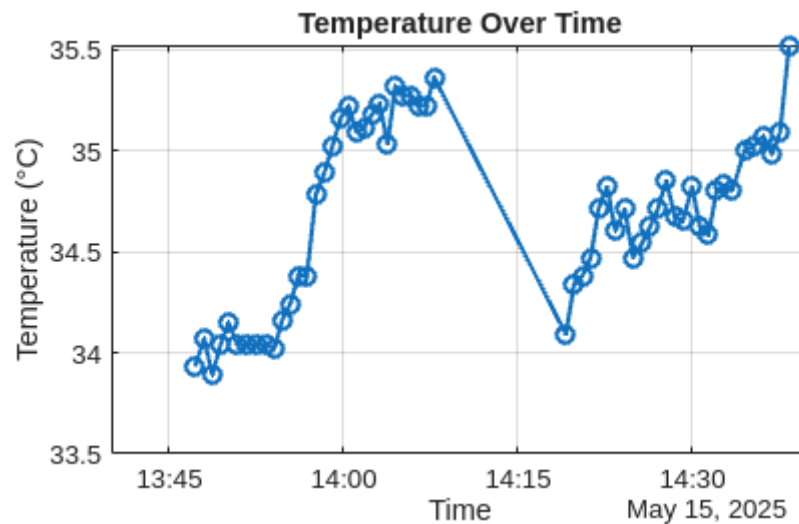
5. Linear Regression of Temperature

```matlab
% ThingSpeak Channel Info
readChannelID = 2951490;
readAPIKey = '6ZMGRTY74LNN1RKM';


% Number of data points to read
numPoints = 57;


% Read temperature data and timestamps
[tempData, time] = thingSpeakRead(readChannelID, ...
    'Fields', 1, ...
    'NumPoints', numPoints, ...
    'ReadKey', readAPIKey);


% Check if data is available
if isempty(tempData)
    error('No temperature data retrieved.');
end


% Convert datetime to numeric time (e.g., minutes since first timestamp)
timeNum = minutes(time - time(1));  % time since first reading


% Linear regression: Fit line temp = a*time + b
coeffs = polyfit(timeNum, tempData, 1);  % Linear fit (1st degree polynomial)


% Predict values using the model
predictedTemp = polyval(coeffs, timeNum);


% Plot actual vs predicted
figure;
plot(time, tempData, 'bo-', 'DisplayName', 'Actual Temperature');
hold on;
plot(time, predictedTemp, 'r--', 'LineWidth', 2, 'DisplayName', 'Predicted (Linear Fit)');
xlabel('Time');
ylabel('Temperature (°C)');
title('Linear Regression Model for Temperature');
legend;
grid on;


% Display the model
fprintf('Linear Model: Temperature = %.4f * Time + %.4f\n', coeffs(1), coeffs(2));
```
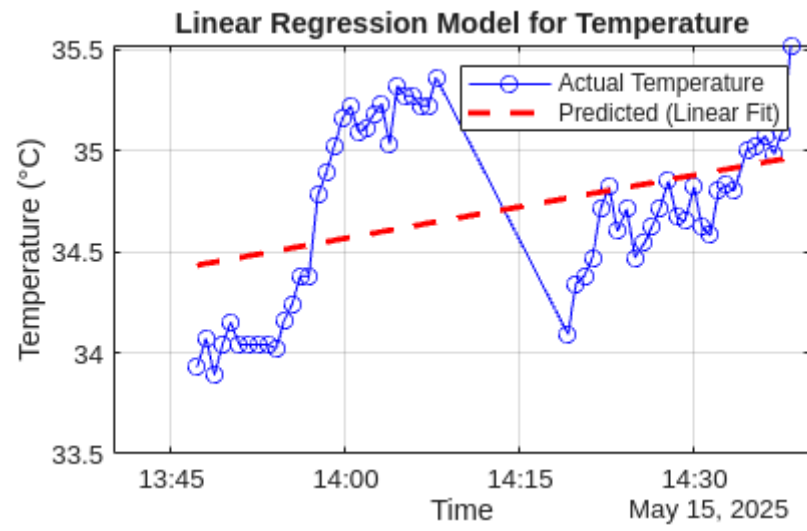
Linear Regression Model for Temperature

Legend: Actual Temperature, Predicted (Linear Fit)

X-axis: Time — May 15, 2025

Y-axis: Temperature (°C)

6. Polynomial Regression on temperature

```matlab
% ThingSpeak Channel Info
readChannelID = 2951490;
readAPIKey = '6ZMGRTY74LNN1RKM';
numPoints = 57;


% Read temperature data and timestamps
[tempData, time] = thingSpeakRead(readChannelID, ...
    'Fields', 1, ...
    'NumPoints', numPoints, ...
    'ReadKey', readAPIKey);


if isempty(tempData)
    error('No temperature data retrieved.');
end


% Convert time to numeric minutes from the start
timeNum = minutes(time - time(1));


% Degree of polynomial (2 = quadratic, 3 = cubic, etc.)
degree = 2;


% Fit polynomial coefficients: temp = a*t^2 + b*t + c
coeffs = polyfit(timeNum, tempData, degree);


% Predict temperature using the polynomial model
predictedTemp = polyval(coeffs, timeNum);


% Plot original vs predicted
figure;
plot(time, tempData, 'bo-', 'DisplayName', 'Actual Temperature');
hold on;
plot(time, predictedTemp, 'r--', 'LineWidth', 2, 'DisplayName',
sprintf('Polynomial Fit (degree %d)', degree));
xlabel('Time');
ylabel('Temperature (°C)');
title('Polynomial Regression Without Toolboxes');
legend;
grid on;


% Optional: Display coefficients
disp('Polynomial coefficients:');
disp(coeffs);
```

Polynomial Regression Without Toolboxes