

Team Name: Bachelors
Team Number: 7
Date: September 16, 2022

1 Objective:-

To build an intelligent system where the objective of the problem is to control the percentage of water supply in the farm using humidity and temperature sensor data.

2 Hardware Required:-

- **Raspberry Pi:** It functions as a mini computer that links IOT devices and sensors.
- **Digital temperature and humidity sensor (DHT11):** This device measures the temperature and humidity of the immediate environment.
- **Jumping wires :** These are electrical cables that link two locations in a circuit. They are typically used to link breadboard circuits and other types of circuits.
- **JHD204A Display:** This device is used to show output.
- **Memory card:** It is used to store the Raspberry Pi's operating system and other data.

3 Procedure:

1. First, we build the ML model using provided data set of temperature and humidity
2. Then we set up the Raspberry Pi by first installing the Operating system on Raspberry Pi and then connecting the Raspberry pi with our System.
3. Then we connected the DHT11(temperature and humidity) sensor to Raspberry Pi board to sense the surrounding temperature and humidity.
4. Prepared the python script for MQTT connection between Raspberry Pi and the system.
5. Then we make the Raspberry Pi as a broker and publisher by installing broker and publisher script of python on Raspberry Pi.
6. The detected sensor values are published by Raspberry Pi on broker on a specific topic i.e "bachelors/sensor_values".
7. System is subscribed on broker with same topic "bachelors/sensor_values" to get the sensor values and printing it on the terminal.
8. System is predicting water flow percentage using test data value publishing those values on broker with the topic "bachelors/prediction".

9. Raspberry Pi is subscribing on broker with the same topic “bachelors/prediction” and displaying the prediction on the display.

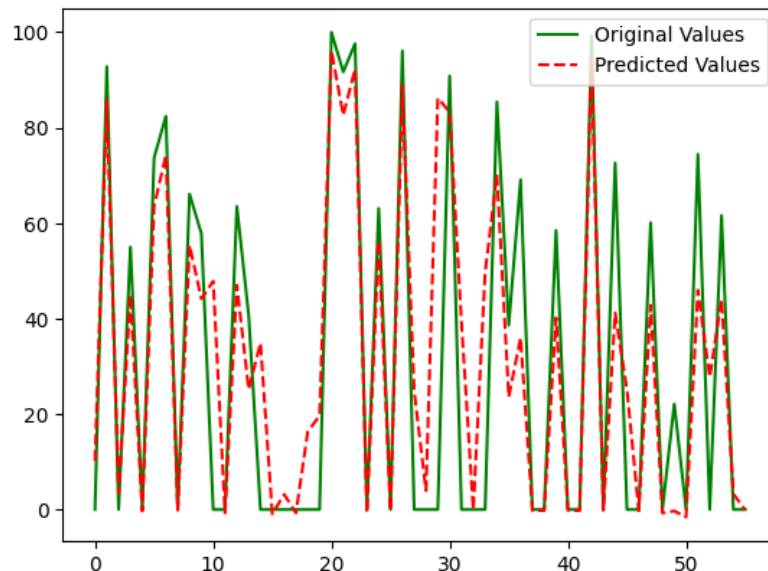
4 ML Model:-

The ML model used here for predicting the water flow percentage based on temperature and humidity values is neural network. We have divided the provided dataset as 70% for training and 30% for testing. The test data is saved in the filesystem which will be used later for predicting and publishing those prediction values on raspberry pi.

The neural network used here is prepared for regression using the **Tensorflow** library of python. The architecture of the neural network is given below:

- The model of neural network is Sequential.
- First layer is the input layer having shape of (2,) i.e. it will accept 1D-array of size 2. This layer is dense layer having 64 neurons.
- Two hidden dense layers having 128 neurons.
- Last layer is the input layer having one neuron as we are doing regression here.
- Activation function used on every layer is **ReLU** activation function.
- The optimizer used here is the **adam** optimizer.
- The neural network is trained on training data with **epochs = 10** and **batch size = 10**.

The accuracy of the ML model can be visualised by the following graph. In the following graph, solid green line represents the original values and the red dashed line represents the prediction on the corresponding data points.



5 Contribution:-

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