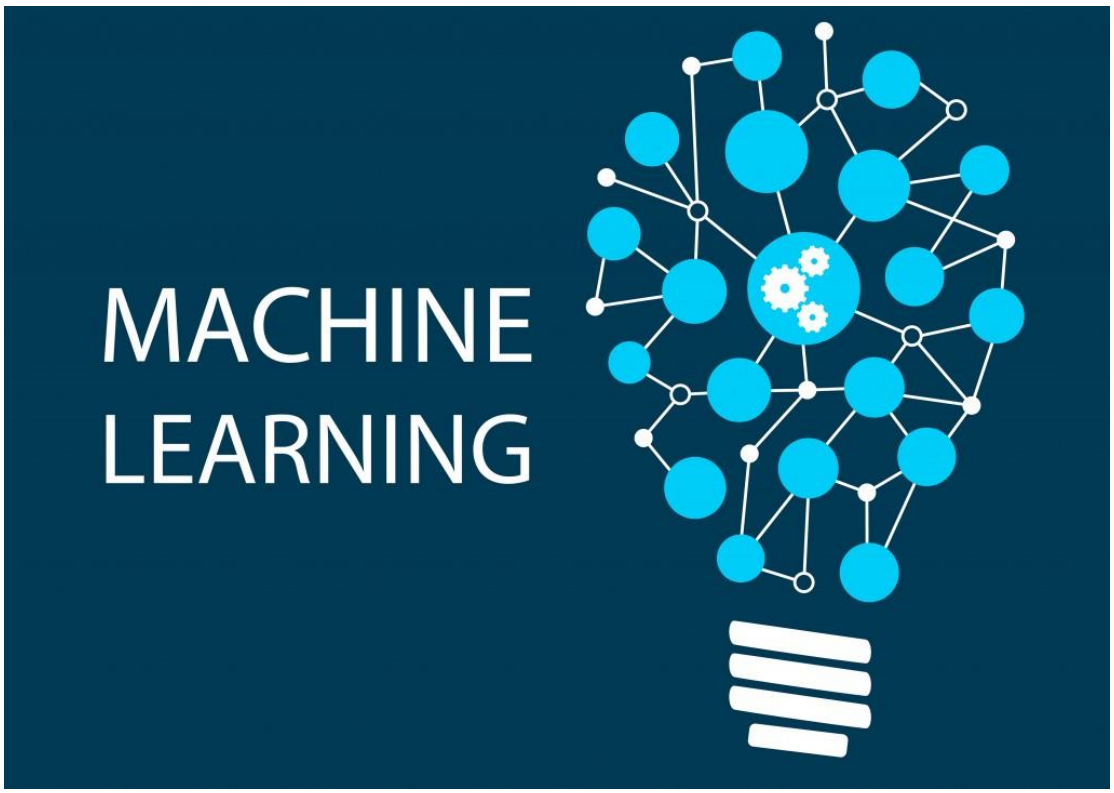
Machine Learning Weather Forecast



Semester 4 DA & ML

Orientation Challenge

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Course: Smart Industry

Introduction

Machine learning is a part of artificial intelligence in which data and algorithm are used to imitate human machine learning. In this module, we are going to learn how data from a sensor can be used for machine learning. The assignment requires us to make a weather forecast in which it informs us if the weather is reasonable. The sensor for this assignment is a DHT22 which captures temperature and humidity values. These values will then be transferred to Node-Red to start processing the machine learning. In the following section will be a procedure of how the assignment has been approached.

Procedure

During the IOT workshop, we learned how to install Node-Red and connect ESP32 to transfer data. The learning outcome of this workshop will be used in this assignment. Docker is also installed to open Node-Red, and it already has machine learning properties in it. The assignment already provided us with a workspace for the machine learning that we can use, and we already created a code on how to transfer data from ESP32 to Node-Red. In the figure 1, you can see how the data is transmitted through the MQTT block and then parsed into json string. After parsing, it enters the csv node where it implements the separator and then writes the data into a csv file. (Figure 2)

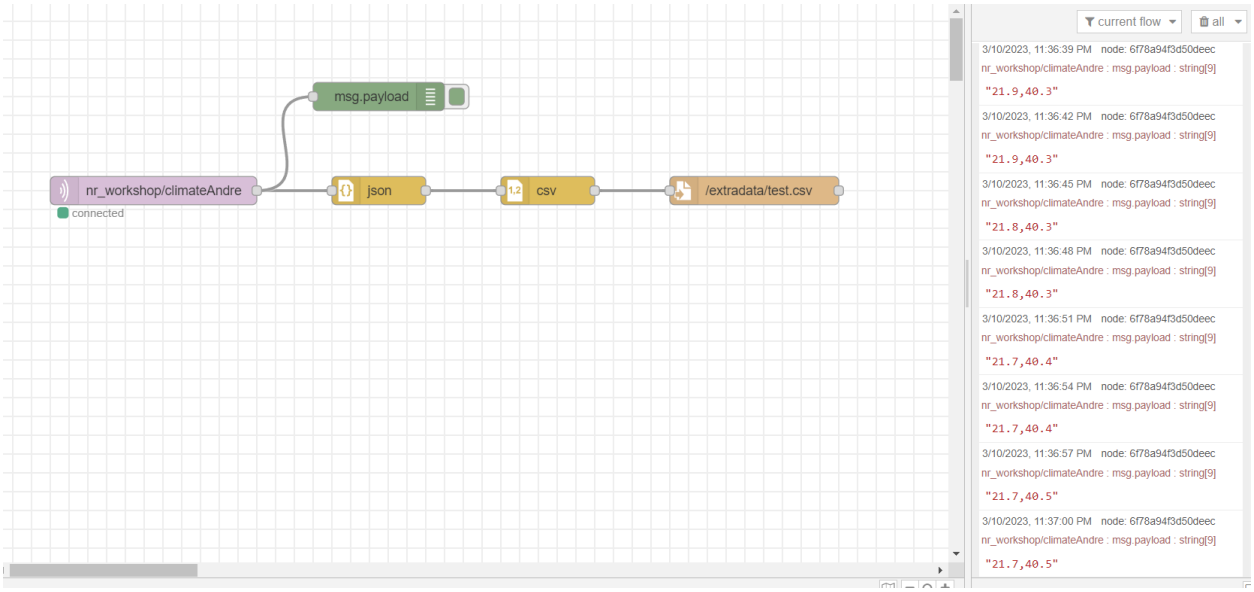


Figure 1 Node-red flow using docker

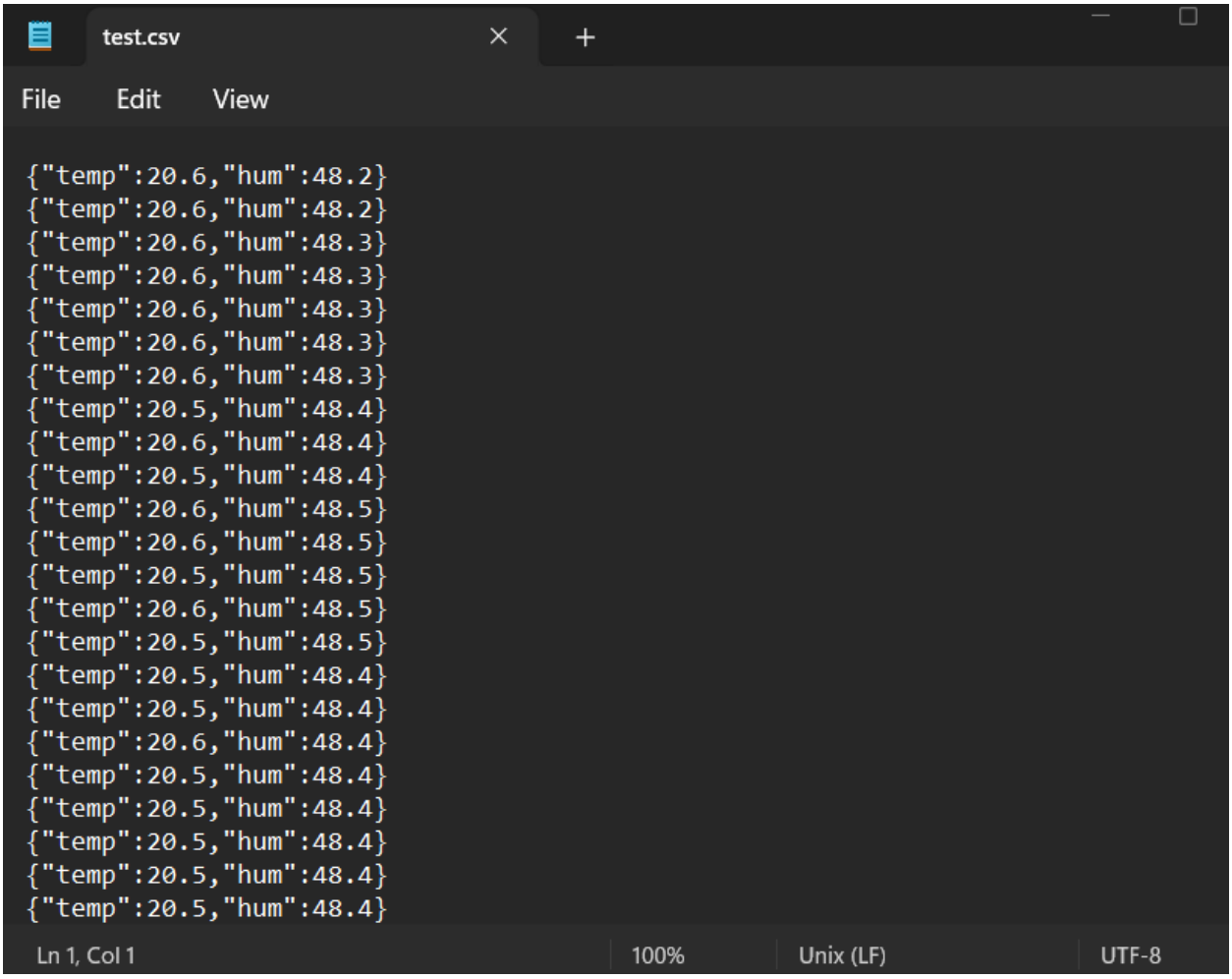


Figure 2 data stored in csv file

After getting data, the file should be pasted into the docker image but unfortunately this won't be shown because I have having trouble finding the right command for it and it gives me error. But if somehow it works, then you should be able to print the contents of it using 'cat' command. And with that, you can use the provided machine learning workspace and be able to calculate if the weather is good or bad.

Conclusion

To conclude this report, using the different knowledge taken from the other modules and implementing it here in this assignment was good. I learned so much about docker and how it can be used for future Node-Red assignment. Unfortunately, I couldn't finish the assignment, but I think if I was able to solve the error then it could have been easier. All in all it was a good to learn how to store data to a csv file and it can be used for future projects where we store data and display it in a graph for insights.

Feedback repair

In Figure 3, you can see that the accuracy is 100% and there are few reasons for this:

- Possible reason is that that the model is overfitting the data and it fits perfectly to the training data.
- In some cases that the data gathered for the dataset is too small meaning that it will always have 100% accuracy if there is not enough data for prediction.
- Lastly, the data is high quality with no noise or errors.

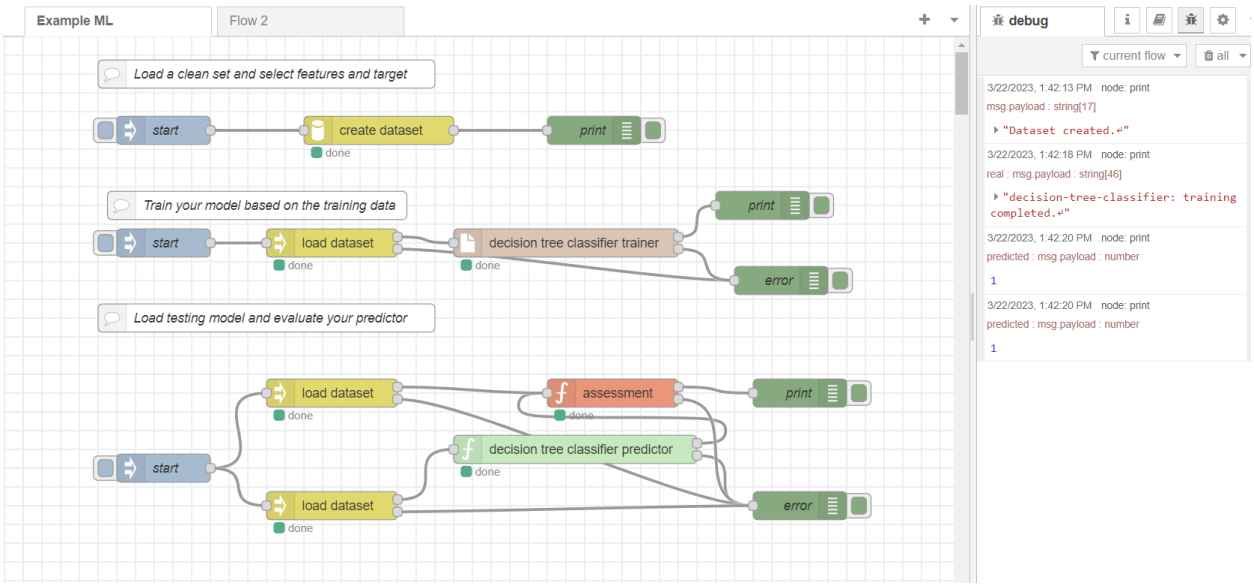
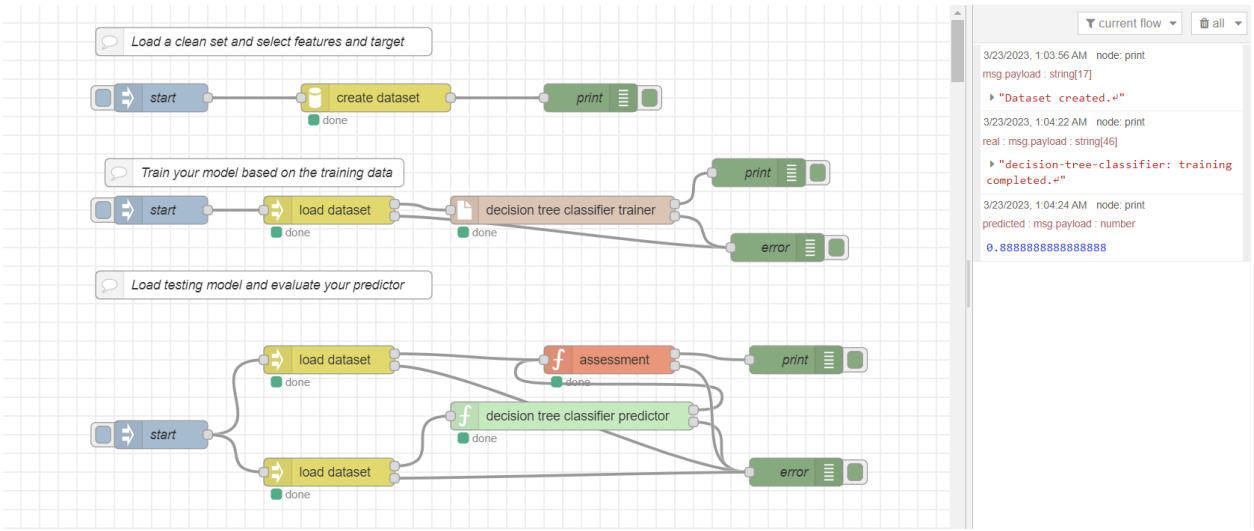


Figure 3 machine learning accuracy

In figure 4, I have added random to the values for the DHT22 to mimic system noise so it can represent that real-world scenario accurately.



For output I used numbers because machine learning does not know values in string variables, so I created a function where if the output is 1 then it is “Normal and if the output is 2 then it is “Bad”.

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