

- Main Code: https://github.com/vasanza/Matlab_Code/tree/Weather-Monitoring-Station
- DataPort: <https://dx.doi.org/10.21227/mdfs-ya42>
- More Matlab Examples: https://github.com/vasanza/Matlab_Code
- Read more: <https://vasanza.blogspot.com/>

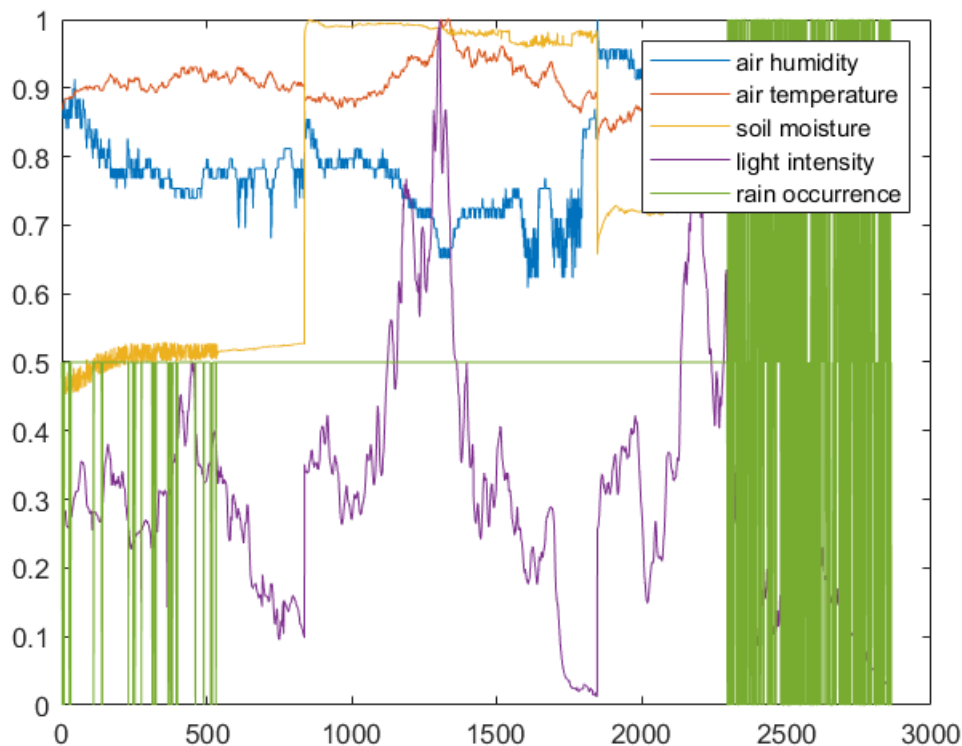
Initialization

```
clear;clc;
path = fullfile('./Data/agriculture.mat');
Datos=load(path);Datos=Datos.Datos;
nDatos=(Datos./max(Datos));

addpath(genpath('./src'))%functions folders
% inputs: Item, air humidity, air temperature, soil moisture, light and rain
input=nDatos(1:length(nDatos)-1,2:6);
% output: soil moisture in the following time step
output=nDatos(2:length(nDatos),4);
```

Data Visualization

```
plot(input)
legend('air humidity', 'air temperature', 'soil moisture', 'light intensity', 'rain occurrence')
```



Training with 70% Dataset

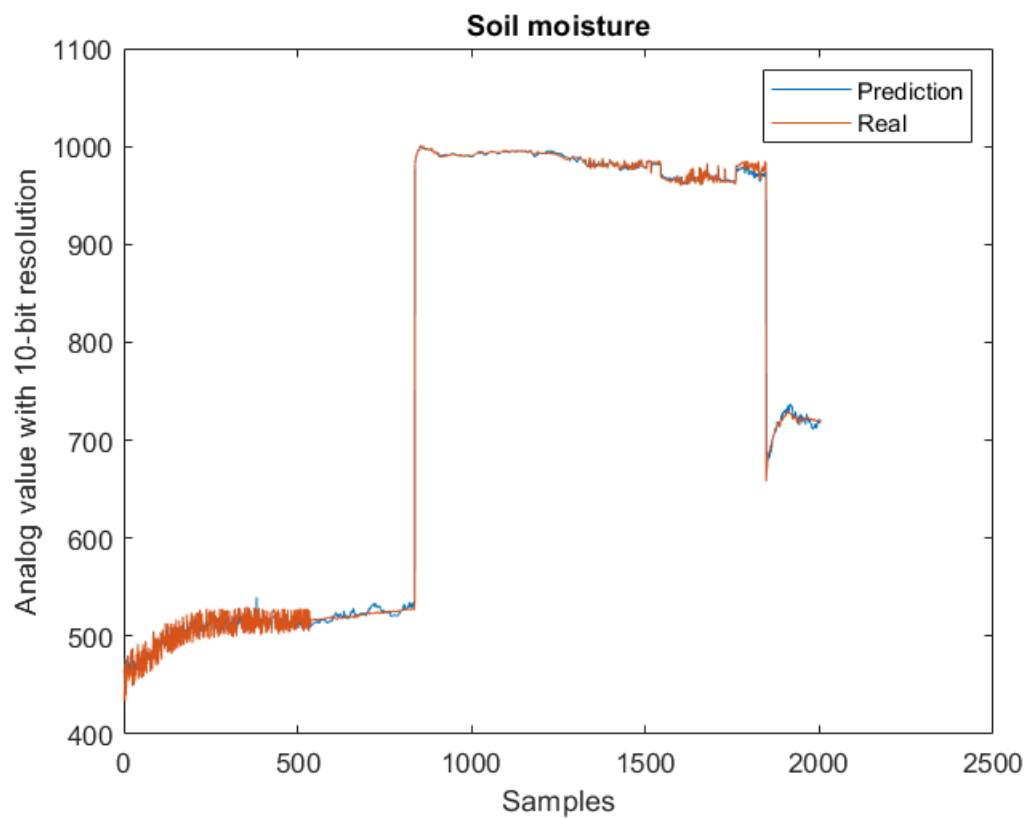
```
output70=[];yest70=[];  
output70=output(1:round(length(output)*.7));  
input70=input(1:round(length(input)*.7),:);  
nnstart
```

Testing NN as Regression (Bayesian Regularization)

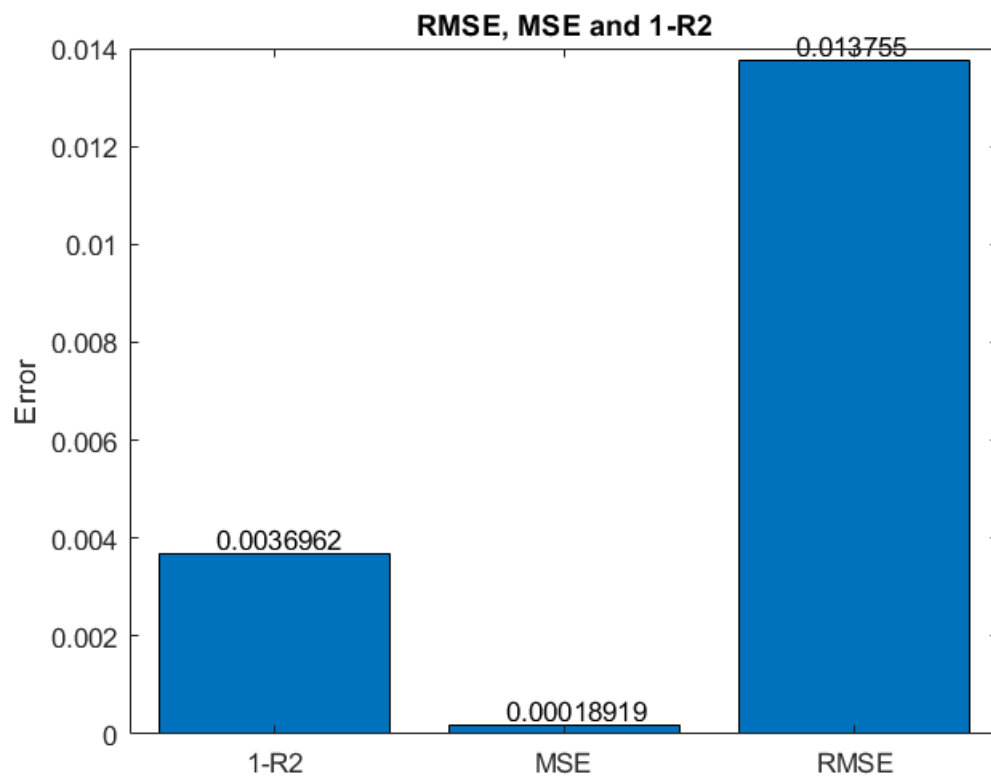
```
yest = myNeuralNetworkFunction_BR(input70)
```

```
yest = 2004x1  
0.4653  
0.4562  
0.4569  
0.4767  
0.4592  
0.4677  
0.4686  
0.4598  
0.4723  
0.4677  
⋮
```

```
figure  
plot(yest*max(Datos(:,4)))  
hold on  
plot(output70*max(Datos(:,4)))  
title("Soil moisture");legend("Prediction","Real");  
xlabel("Samples");ylabel("Analog value with 10-bit resolution");
```



```
[rmse,mse,r2] = fBar_RmseMseR2(yest,output70)
```



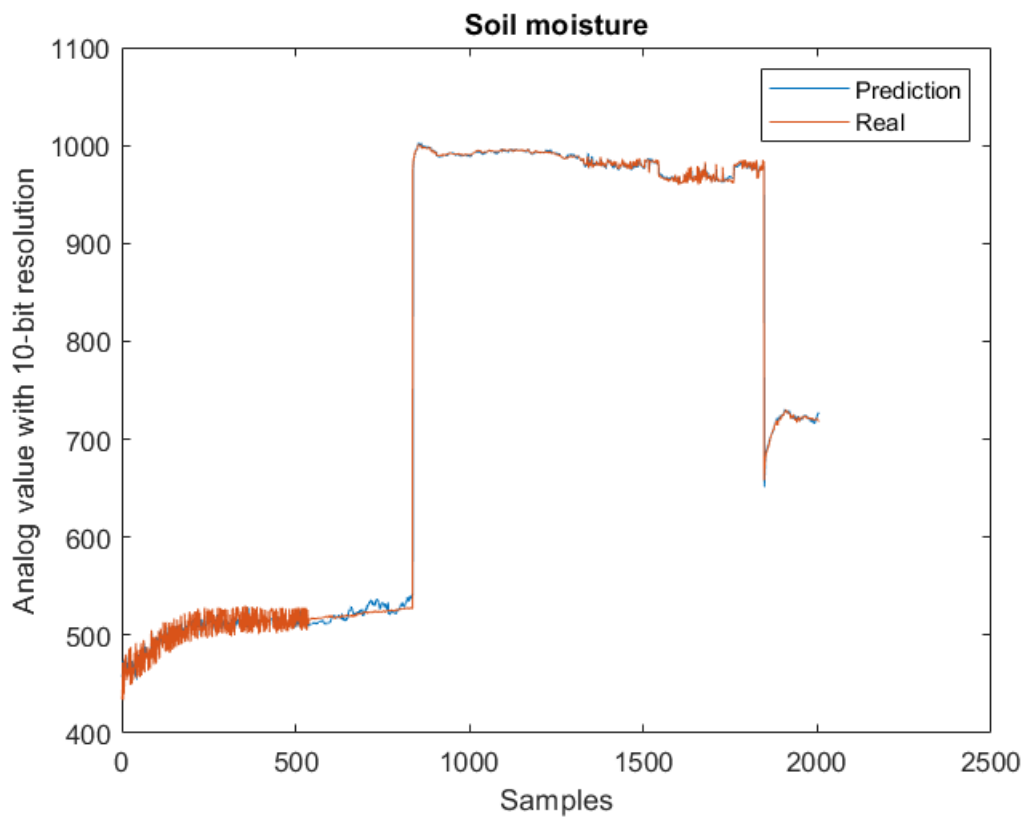
```
rmse = 0.0138
mse = 1.8919e-04
r2 = 0.9963
```

Testing NN as Regression (Levenberg-Marquardt)

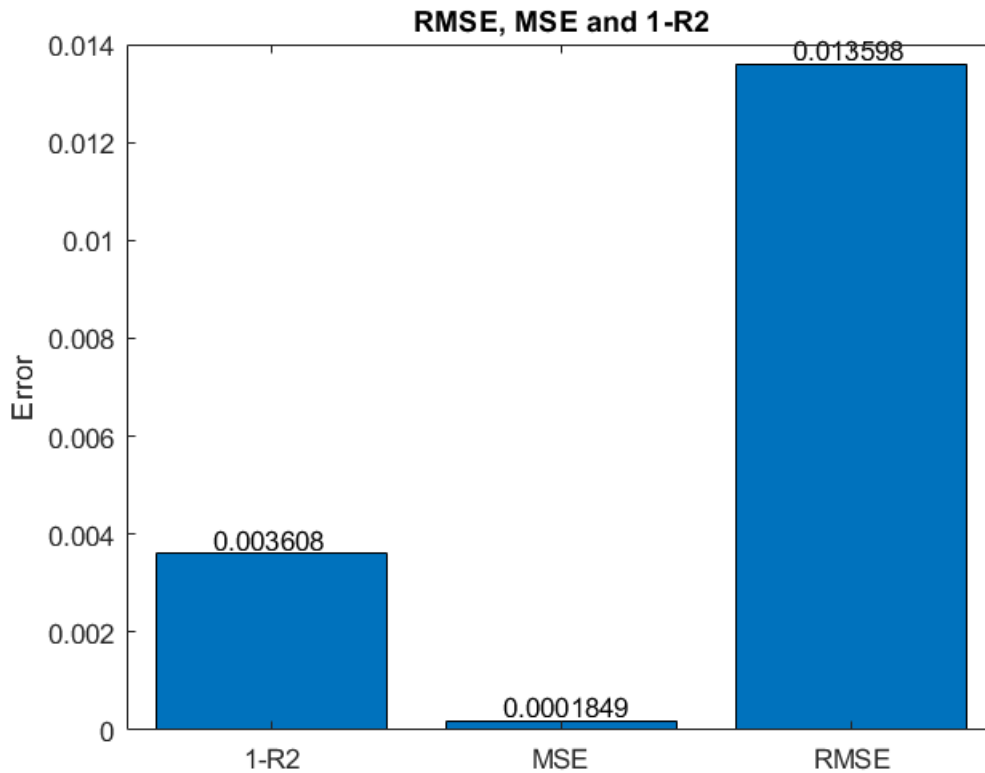
```
yest = myNeuralNetworkFunction_LM(input70)
```

```
yest = 2004x1
0.4561
0.4599
0.4456
0.4736
0.4549
0.4620
0.4654
0.4656
0.4658
0.4609
⋮
```

```
figure
plot(yest*max(Datos(:,4)))
hold on
plot(output70*max(Datos(:,4)))
title("Soil moisture");legend("Prediction","Real");
xlabel("Samples");ylabel("Analog value with 10-bit resolution");
```



```
[rmse,mse,r2] = fBar_RmseMseR2(yest,output70)
```

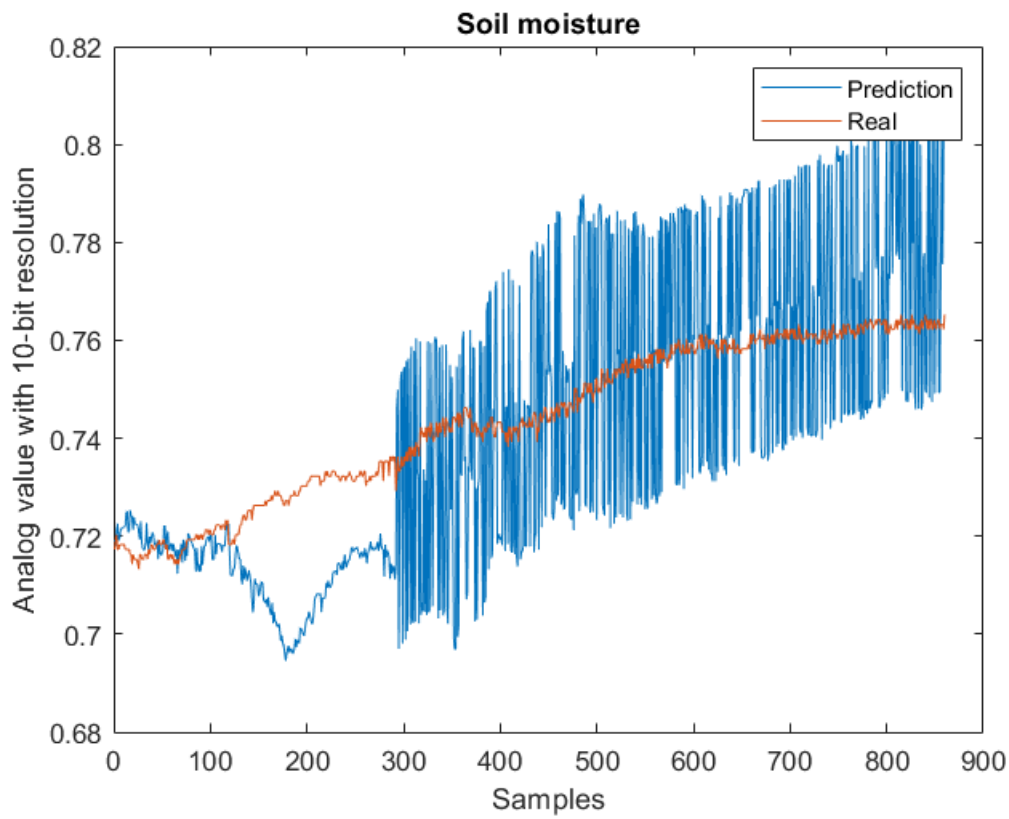


```
rmse = 0.0136
mse = 1.8490e-04
r2 = 0.9964
```

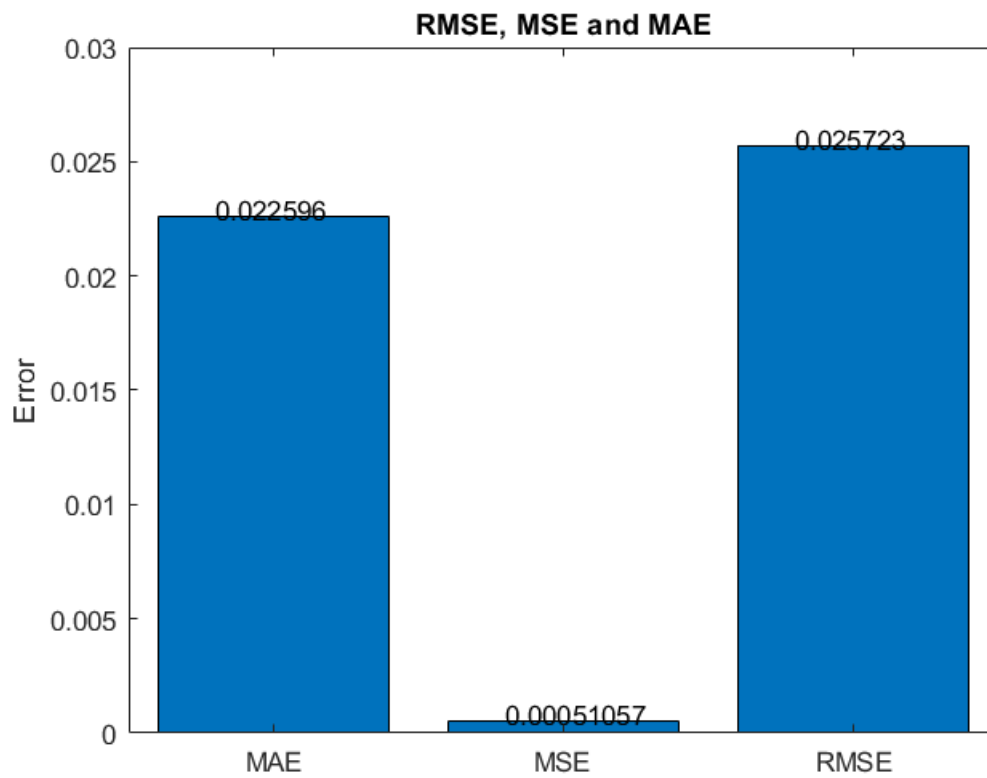
Testing NN as Regression (Bayesian Regularization) - with 30% Dataset

```
output30=[];yest30=[];input30=[];
output30=output(round(length(output)*.7):length(output));
input30=input(round(length(input)*.7):length(input),:);
yest30=myNeuralNetworkFunction_BR(input30);
yest=myNeuralNetworkFunction_BR(input);

figure
plot(yest30)
hold on
plot(output30)
title("Soil moisture");legend("Prediction","Real");
xlabel("Samples");ylabel("Analog value with 10-bit resolution");
```



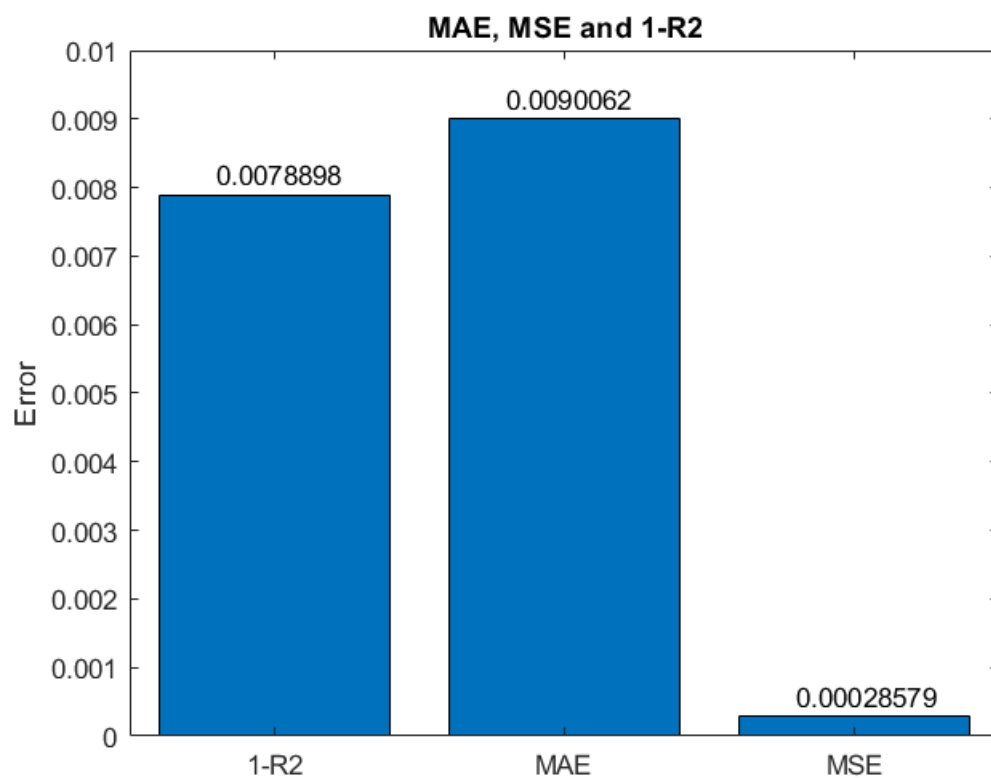
```
[rmse,mse,mae] = fBar_RmseMseMae(yest30,output30)
```



rmse = 0.0226

```
mse = 5.1057e-04  
mae = 0.0257
```

```
[mae,mse,r2] = fBar_MaeMseR2(yest,output)
```



```
mae = 0.0090  
mse = 2.8579e-04  
r2 = 0.9921
```