

TEMA I: MACHINE LEARNING PER I SISTEMI DI CONTROLLO DEGLI ACCELERATORI

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Milestones

01

PYTHON:
-syntax
-control flow
-lists
-functions

03

MACHINE LEARNING:
-regression
-classification

02

PYTHON LIBRARY:
-numpy
-pandas
-matplotlib

04

NEURAL NETWORKS:
-intro to deep learning
-time series forecast

Python library

Numpy

It provides

- a powerful N-dimensional array object
- sophisticated functions
- useful linear algebra
- random number capabilities

Pandas

It provides

- data analysis
- data manipulation
- data structure/operation
- time series

Matplotlib

It provides

- data visualization
- animated visualizations
- interactive visualizations
- graphical plotting

What is machine learning?

1

Machine Learning (ML) is a subset of artificial intelligence (AI) that is concerned with creating systems that learn or improve performance based on the data they use.

2

Artificial intelligence is a generic term and refers to systems or machines that mimic human intelligence.

3

Machine learning is used everywhere today. When we interact with banks, shop online or use social media, machine learning algorithms are used to make our experience efficient, easy and safe.



ML STEPS

5

1

Understand the
problem

Data collection and
Data selection

2



4

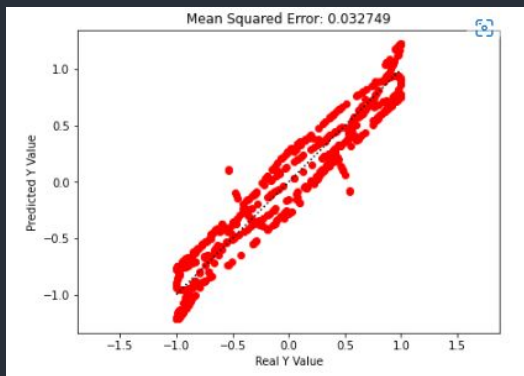
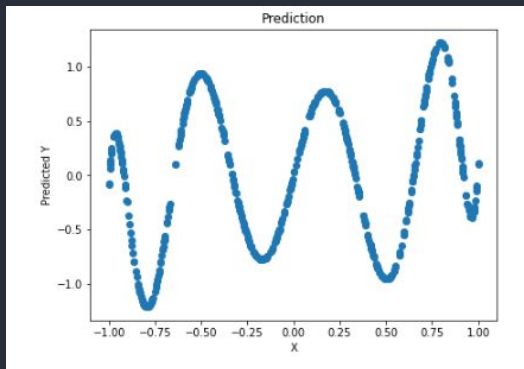
Train and Test the
model

3

Pick a model
(KNN,SVM,Linear Model,NN)

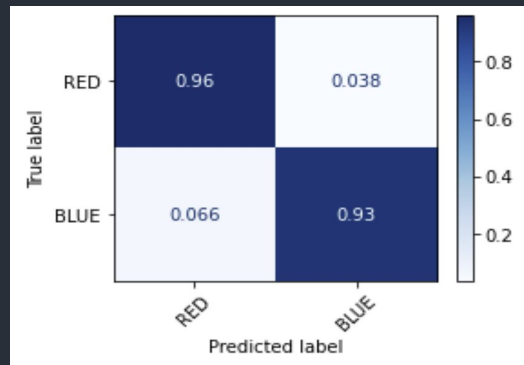
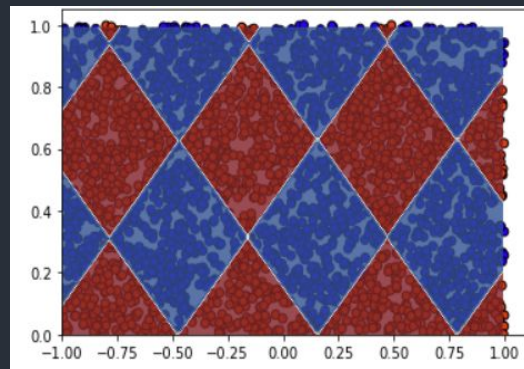
Regression

It's used as a method for predictive modelling in machine learning, in which an algorithm is used to predict continuous outcomes



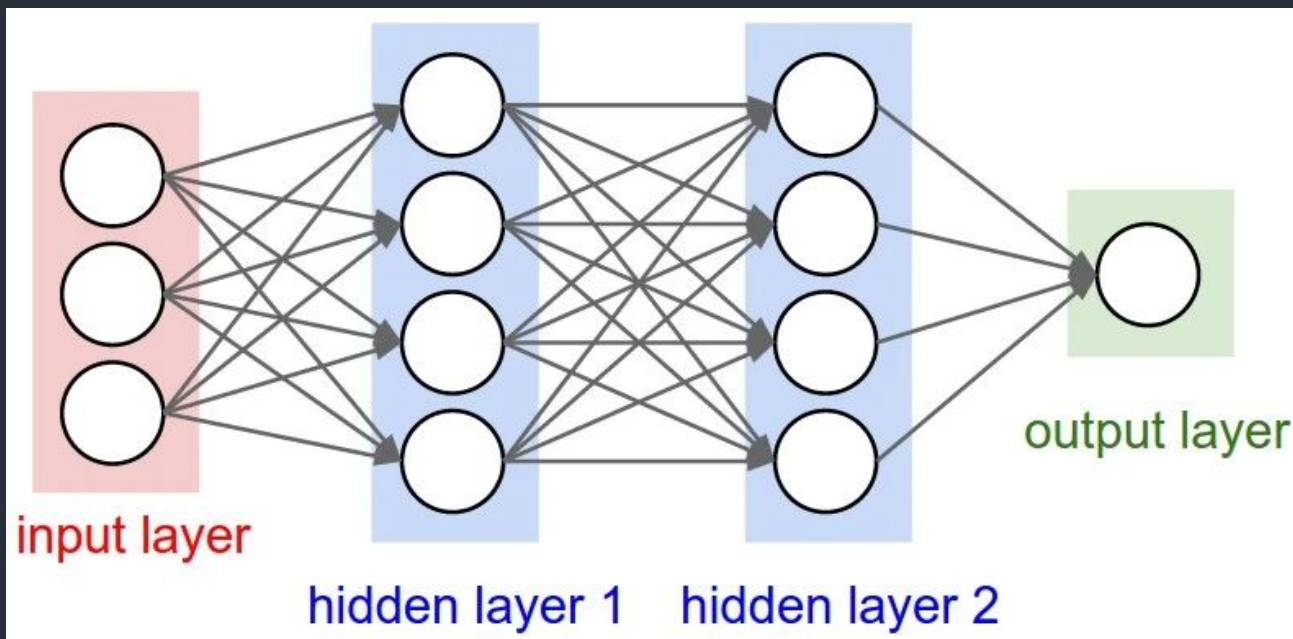
Classification

Classification is the process of predicting the class of given data points.



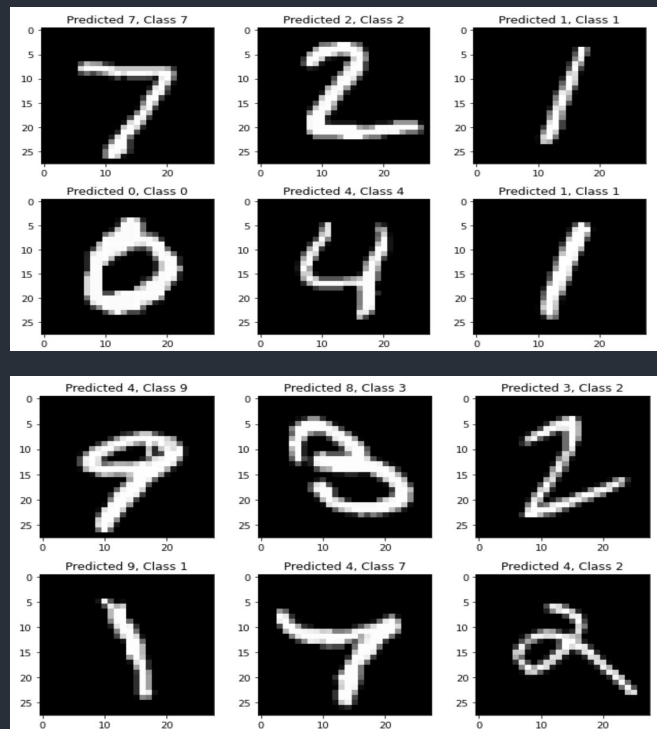
NEURAL NETWORKS

Neural networks is a computer architecture in which a number of processors are interconnected in a manner suggestive of the connections between neurons in a human brain and which is able to learn by a process of trial and error, called also neural net.



NUMBERS IDENTIFIER

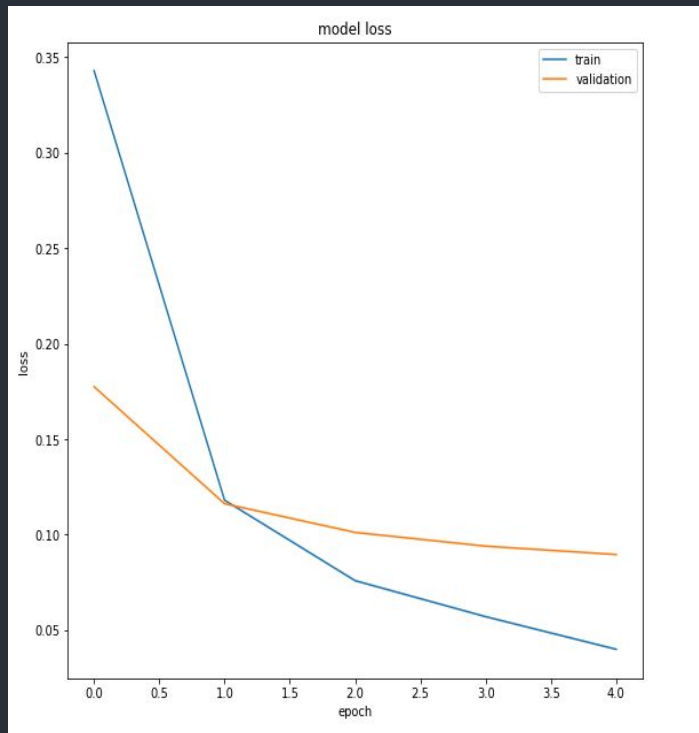
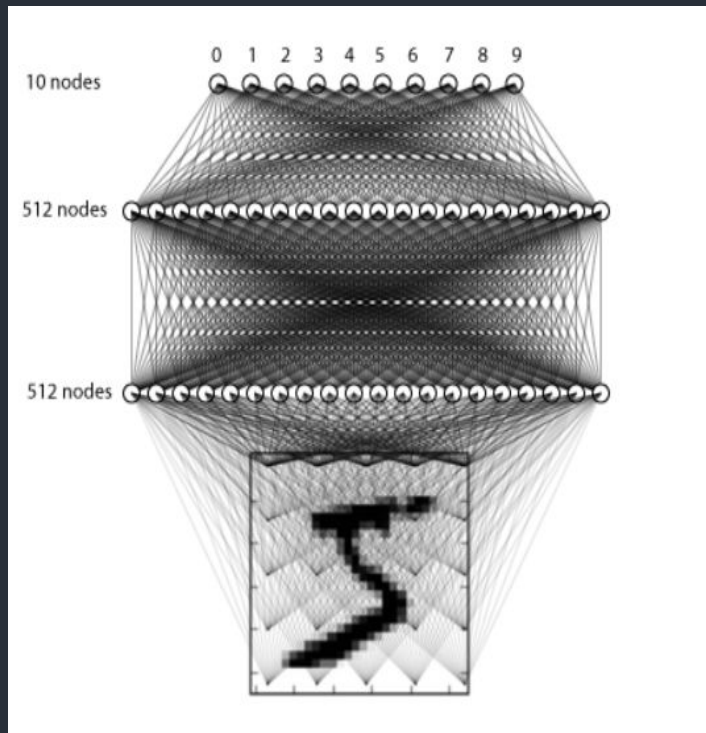
Number identifier is a model that from some images of numbers can tell what number it is.



NUMBERS IDENTIFIER

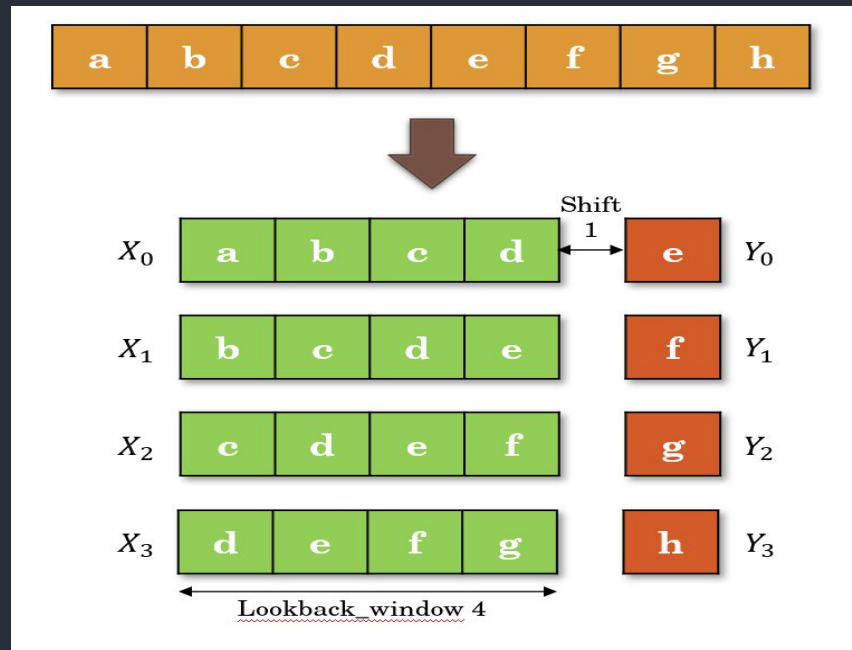
These are some examples which can help you to understand more about the processing of the NN.

Test accuracy: 0.9779

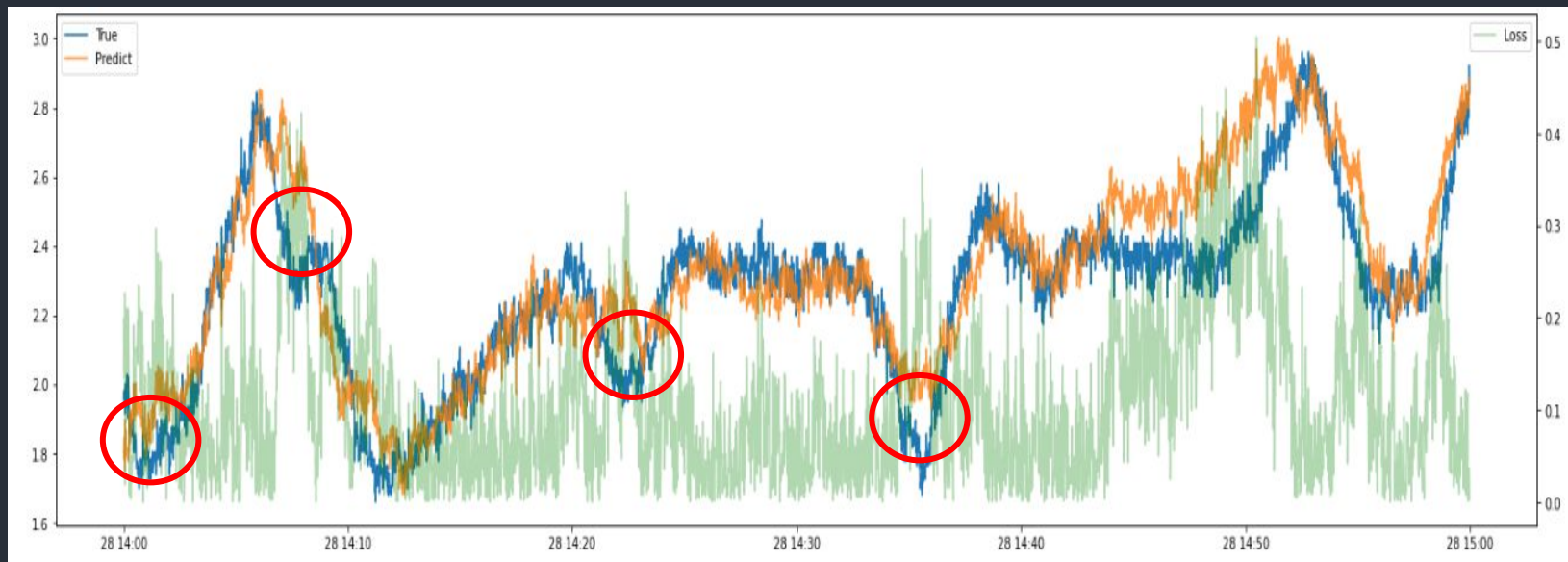


TIME SERIES FORECAST

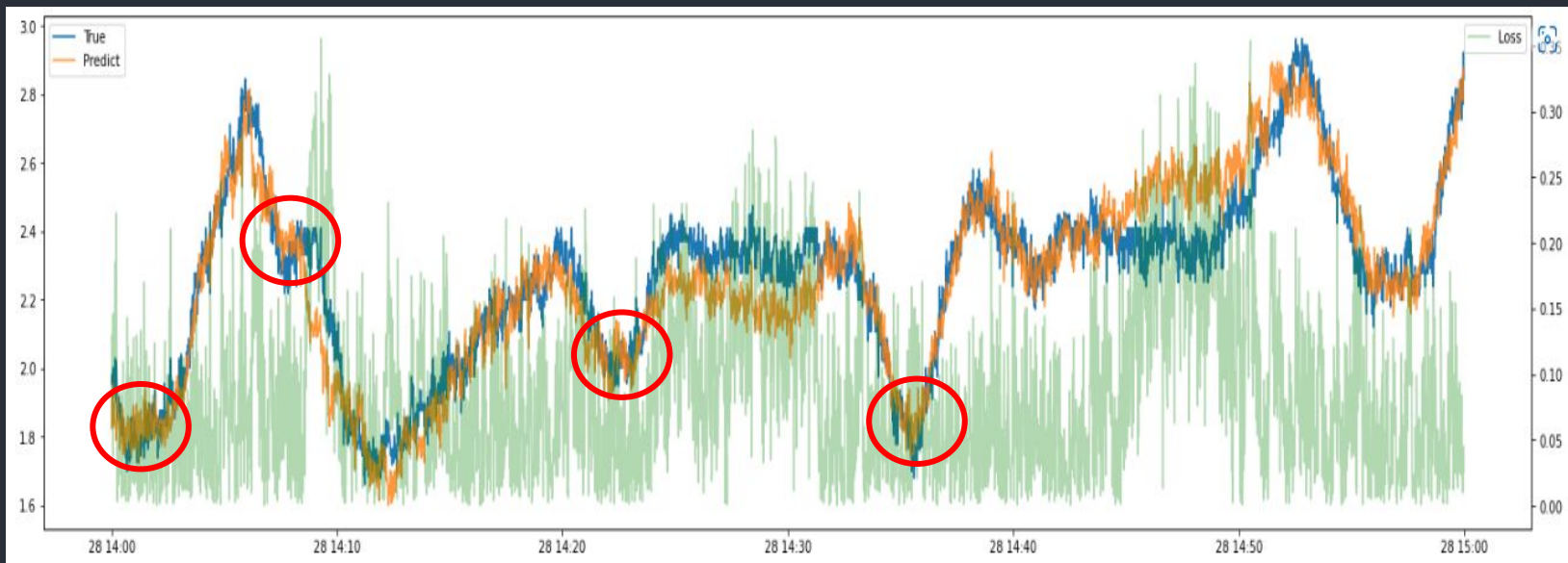
- Used when making scientific predictions based on time stamped historical data. It involves building models through historical analysis and using them to make observations and guide future strategic decision making.



EPOCH = 2, MSE: 0.0115, MAE: 0.0811, Execution time: 384s

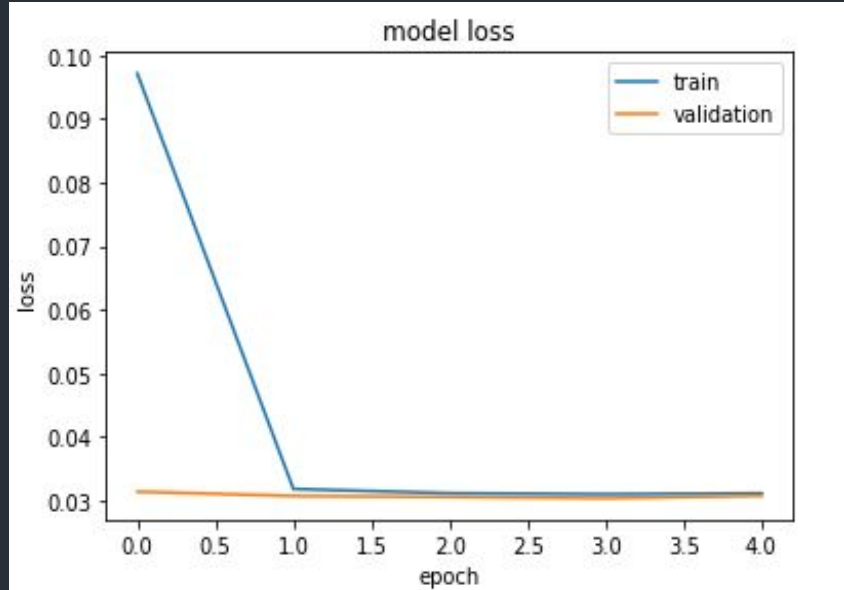


EPOCH = 5, MSE: 0.0101, MAE: 0.0761, Execution time: 909s



FINAL CHALLENGE

Creation of a Machine Learning model able to predict the state of a cavity through the use of Neural Network.



“Thanks for your
attention”



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