

# Computational Intelligence project and laboratory summary

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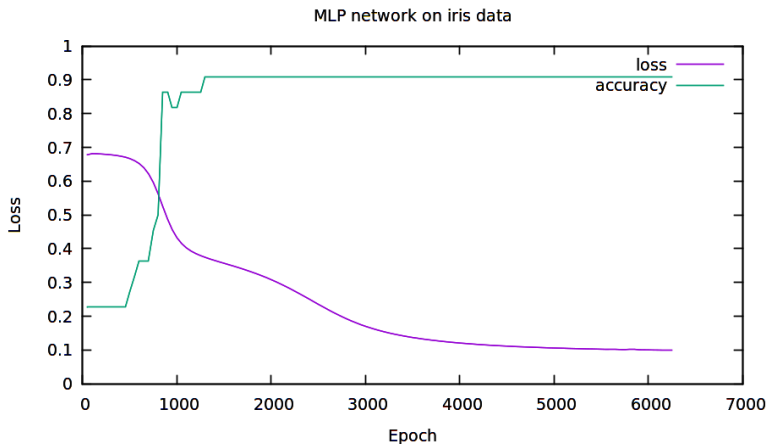
# Multilayer perceptron

- Consists of at least three layers of non-linear perceptron nodes
- MLP very often called "vanilla" neural networks since they were first used in practice
- Uses backpropagation algorithm for learning
- Hard to create very deep networks because of vanishing gradient problem

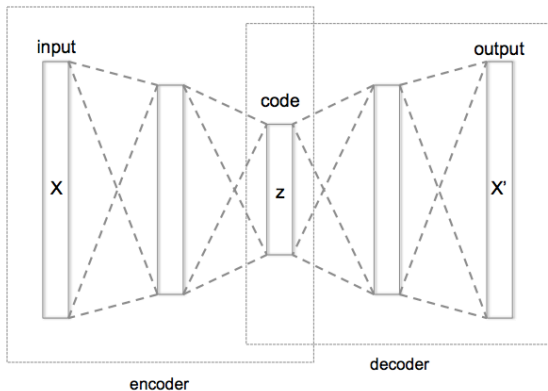
# Multilayer perceptron – my implementation

- Implementation create in C++17
- Each perceptron is separate object
- Perceptrons are using sigmoid activation function
- Input data was normalized using external software

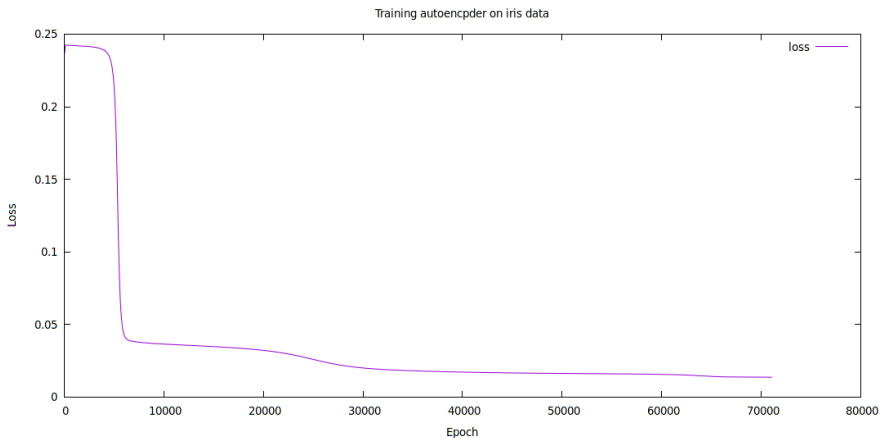
# MLP results on Iris data



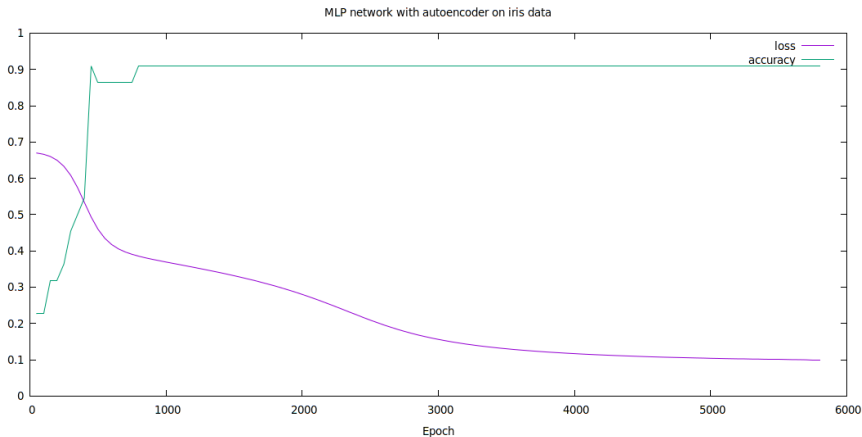
# Autoencoder



# Autoencoder – results on iris data



# Autoencoder – results on iris data



- AGDS – Passive associative graph data structure
- useful for finding similar elements
- Implemented using SortedSet

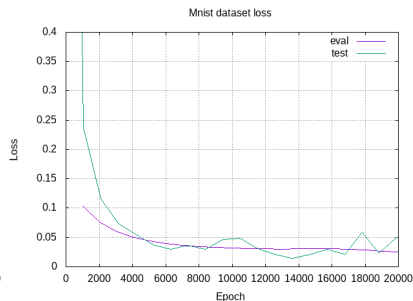
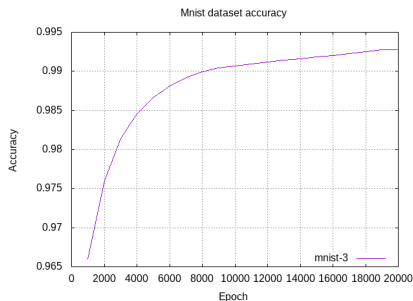


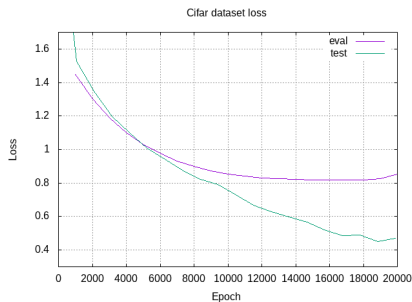
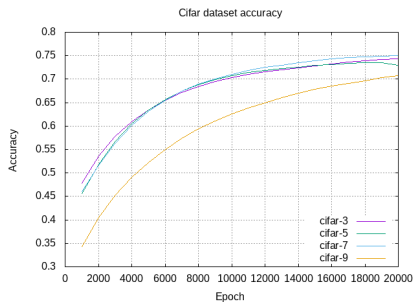
Top similarities to Iris(5.0,2.0,3.5,1.0,2):

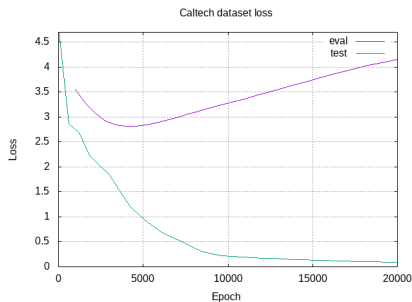
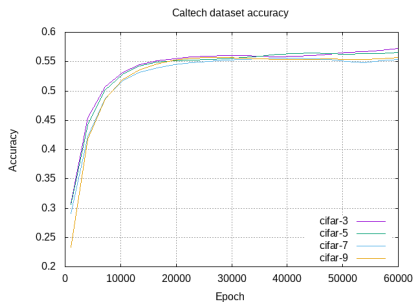
- ① 1.000: Iris(5.0,2.0,3.5,1.0,2)
- ② 0.966: Iris(5.0,2.3,3.3,1.0,2)
- ③ 0.953: Iris(4.9,2.4,3.3,1.0,2)
- ④ 0.932: Iris(5.5,2.4,3.7,1.0,2)
- ⑤ 0.927: Iris(5.1,2.5,3.0,1.1,2)
- ⑥ 0.921: Iris(5.5,2.4,3.8,1.1,2)
- ⑦ 0.916: Iris(6.0,2.2,4.0,1.0,2)
- ⑧ 0.915: Iris(5.7,2.6,3.5,1.0,2)
- ⑨ 0.906: Iris(5.5,2.3,4.0,1.3,2)
- ⑩ 0.891: Iris(5.5,2.5,4.0,1.3,2)

# Project – CNN network for image classification

- Image classification
- Deep Convolutional neural network
- With residual path







- Start with small network first

# Lessons learned

- Start with small network first
- Know your data