[AAA] Advanced Analytics and Applications

Summer Semester 2021

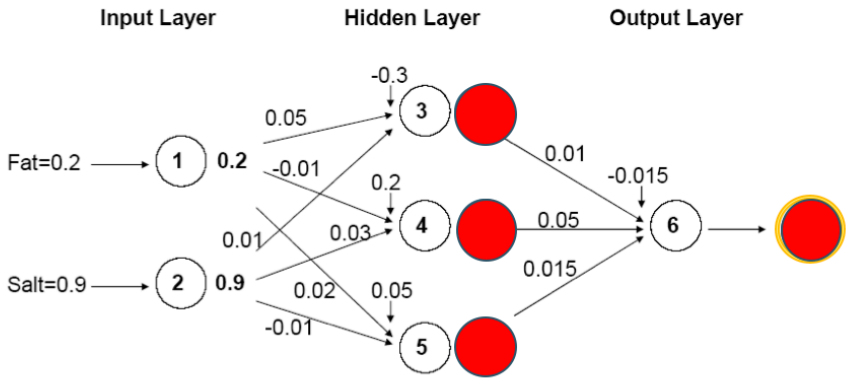
Problem Set 5 – Introduction to Neural Networks

1. Multiple Choice Questions

a. Neural nets are prone to overfitting. What is a feasible approach?
   i. By adding more nodes
   ii. By adding more layers
   iii. By changing the structure of the neural network regularly

b. True or False? Deep learning cannot learn features from data directly.
   i. True
   ii. False

2. Calculation Task: Calculate the missing values (red circles) using a *softplus* activation function.



Activation function: g(z) = ln(1+e^z)

3. Programming Neural Networks:

a. Install Keras:

Installing Keras

```
conda install -c conda-forge keras
```

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b. Read the following tutorial

https://keras.io/getting_started/

and get familiar with the basic concept of keras.

c. Specifically, try to understand and be prepared to work with:
   i. Layers
   ii. Tensors
   iii. Variables

d. What operations are available to work with tensors?

e. Implement a simple neural network which can identify whether a hand-written digit is a “4” or not. Use the MNIST dataset.

```
# Load Data
(train_images, train_labels), (test_images, test_labels) = mnist.load_data()
```