1 Deep Learning Principles [35 Points]

Relevant materials: lectures on deep learning

Problem A [5 points]: Backpropagation and Weight Initialization Part 1

Solution A.:

Problem B [5 points]: Backpropagation and Weight Initialization Part 2

Solution B.:

Problem C: [10 Points]

Solution C:

Problem D: Approximating Functions Part 1 **[7 Points]**

Solution D.:

Problem E: Approximating Functions Part 2 **[8 Points]**

> **Solution E.:**

2   Depth vs Width on the MNIST Dataset [25 Points]

Problem A: Installation [2 Points]

> **Solution A:**
>
> *Keras:*
>
> *Tensorflow:*

Problem B: The Data [1 Point]

> **Solution B.:**

Problem C: One-Hot Encoding [2 Points]

> **Solution C.:**

Problem D: Modeling Part 1 [8 Points]

> **Solution D:**

Problem E: Modeling Part 2 [6 Points]

> **Solution E:**

Problem F: Modeling Part 3 [6 Points]

> **Solution F:**

3   Convolutional Neural Networks [40 Points]

Problem A: Zero Padding **[5 Points]**

Solution A:

5 x 5 Convolutions

Problem B [2 points]:

> **Solution B.:**

Problem C [3 points]:

Solution C.:

Max/Average Pooling

Problem D [3 points]:

> **Solution D.:**

Problem E [3 points]:

> **Solution E.:**

Problem F [4 points]:

> **Solution F.:**

Keras implementation

Problem G [20 points]:

> **Solution G.:**