# NeuralVis Quiz

Welcome to the assessment part of the NeuralVis thesis! This form simply aims to acquire data for an empirical evaluation of NeuralVis' suitability as a learning tool for Neural Networks.

## What is your age? *

- [ ] 18 years or below
- [ ] 18-24
- [x] 24+

## Gender: How do you identify? (choose 'other' if you prefer to self-describe) *

- (•) Male
- ( ) Female
- ( ) Non-binary
- ( ) Prefer not to answer
- ( ) Sonstiges: ......................................................................................................................................

What is the highest degree or level of school you have completed? *

- [ ] No schooling completed
- [ ] High school graduate
- [x] Bachelor's degree
- [ ] Master's degree
- [ ] Professional or doctorate degree
- [ ] Sonstiges: ........................................................................................................................

Do you have a degree in STEM? (science, technology, engineering and mathematics) *

- (•) Yes
- ( ) No

On a scale from 1 to 5, how would you rate your prior knowledge of AI and Artificial Neural Networks (ANNs)? *

|                        | 1 | 2 | 3 | 4 | 5 |                 |
|------------------------|---|---|---|---|---|-----------------|
| Highly knowledgeable   | ( ) | (•) | ( ) | ( ) | ( ) | Layman's level |

If applicable, where did you learn about AI and ANNs?

- [ ] Undergraduate education
- [x] Graduate education
- [ ] Self taught (online resources, textbook studies)
- [ ] Sonstiges: ........................................................................................................................

Before starting with the questions, what material in preparation of this quiz did you use as    *
part of the NeuralVis thesis?

○  The provided introductory text to Neural Networks

◉  The NeuralVis 3D visualization

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How long did you prepare with the provided material? *

15 minutes
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If applicable, how long did you spend interacting with the NeuralVis visualizations?

5 minutes
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Quiz section. At least 1 answer is correct, depending on how the question is phrased.

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What is the primary function of a neural network? *

☐  To generate rule-based patterns

☑  To recognize patterns based on data

☐  To store data in an efficient structure

☐  To increase speed of certain computations

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How does a neural network learn? *

☐  By memorizing the input data

☐  By randomly changing the neuron's parameters

☐  By looking up optimal parameters in a database

☑  By adjusting its parameters based on the prediction errors

What is the purpose of the output layer in a neural network? *

☐ To randomly initialize weights and biases

☐ To serve as an interface for the input data

☑ To provide the prediction results in an interpretable way

☐ To optimize the storage of data

What is the role of an activation function in a neuron? *

☑ To limit the output to a specific range

☐ To randomly adjust the neuron's weights

☐ To increase the neuron's speed

☐ To directly predict the output

How are the neurons in a neural network structured? *

☐ Randomly without a specific order

☐ Hierarchical based on their activation values

☐ Based on the size of the input data

☑ In layers that are interconnected

What is the purpose of the input layer in a neural network? *

☐ To randomly initialize weights and biases

☐ To normalize the input data for further operations

☑ To serve as an interface for the input data

☐ To serve as a control element for the neural network's parameters

What signifies the start of backward propagation? *

- ☐ The input of new data samples
- ☑ The calculation of errors from the current prediction
- ☐ The final output of the activation functions
- ☐ The initialization of the weights and biases

What is the purpose of forward propagation? *

- ☐ To adjusts the weights and biases based on the prediction error
- ☐ To randomize the network's parameters for better predictions
- ☐ To stores the input data for future reference
- ☑ To calculate the network's output for a given input

What are the characteristics of the MNIST dataset? *

- ☑ It includes tens of thousands of handwritten digits
- ☐ It consists of high-resolution color images of various objects
- ☑ It contains images represented as 28x28 grayscale values
- ☐ It contains audio recordings of loudly and clearly spoken digits

What is the purpose of backward propagation? *

- ☐ To input new data samples into the neural network
- ☐ To call the neuron's activation functions
- ☑ To adjust the weights and biases based on the prediction error
- ☐ To propagate the input back towards the output layer

How many neurons are present in the input layer? *

- ☐ None, the input layer is the only layer without neurons
- ☑ As many as there are features in the data samples
- ☐ As many as the network designer chooses as a hyperparameter
- ☐ Any number that is a power of 2

What are components of a single neuron? *

- ☑ Weights
- ☐ Input Filter
- ☑ Bias
- ☑ Activation Function

Which types of layers are present in a neural network? *

- ☑ Output Layer
- ☐ Activation Layer
- ☑ Input Layer
- ☑ Hidden Layer

How many neurons are present in a hidden layer? *

- ☑ As many as the network designer chooses as a hyperparameter
- ☐ At least as many as in the previous layer
- ☐ 2^n where n is the index of the current hidden layer
- ☐ None, as hidden layers don't have any neurons

What inspired the design of a neural network? *

- ☐ A web of silk strings made by a spider
- ☐ Traffic behaviour in a vast network of city streets
- ☑ The connections in the human brain
- ☐ The communication of satellites in orbit

How many neurons are present in the output layer? *

- ☐ As many as the network designer chooses as a hyperparameter
- ☑ As many as there are prediction targets
- ☐ Always 10 in any network setup
- ☐ None, as the output only contains the prediction value

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