Deep Learning Fundamentals: Takeaways ⤴

Syntax

- Creating an array with values `x` and `y` using NumPy:

```python
np.array([x, y])
```

- Printing the type of `arrayname` to confirm it's a NumPy array:

```python
print(type(arrayname))
```

- Computing the dot product of two arrays, `X` and `Y`, can be done using the following code:

```python
(X * Y).sum()
```

- Defining `relu()` function can be done using the following code:

```python
def relu(input_value):
    output_value = max(0, input_value)
    return(output_value)
```

Concepts

- A neural network is comprised of the following components:

  - **Input Layer**: This is where the training observations are fed through the independent variables.

  - **Hidden Layers**: These are the intermediate layers between the input and output layers. This is where the neural network learns about the relationships and interactions of the variables fed in the input layer.

  - **Output Layer**: This is the layer where the final output is extracted as a result of all the processing that takes place within the input layers.

  - **Node**: A node, also called a neuron, in a neural network is a computational unit that takes in one or more input values and produces an output value.

- A **shallow neural network** is a neural network with a small number of layers--often one or two layers. Shallow neural networks are typically used for simple tasks such as regression or classification.

- The calculations at the nodes are performed using the **multiply then sum** process. If you're familiar with vector algebra or linear algebra, that operation is commonly called a dot product.

- An **activation function** is a mathematical function that is used to determine the output of a neuron. The main purpose of the activation function is to introduce non-linearity into the output of a neuron.

- There are many activation functions to choose from and the choice is often motivated by design.

- ReLU is the most popular and widely-used activation function in the industry, being far more computationally efficient when compared to the sigmoid and tanh functions. It stands for rectified linear unit and is defined as follows: ReLU(x) = `max(0,x)`
  - The `max(0,x)` function call returns the maximum value between 0 and x, which means that:
    - when x is less than or equal to 0, the value 0 is returned, and
    - when x is greater than 0, the value x is returned.

Resources

- [Shallow Neural Network](#)
- [Layers of Neural Network](#)
- [Activation Functions](#)