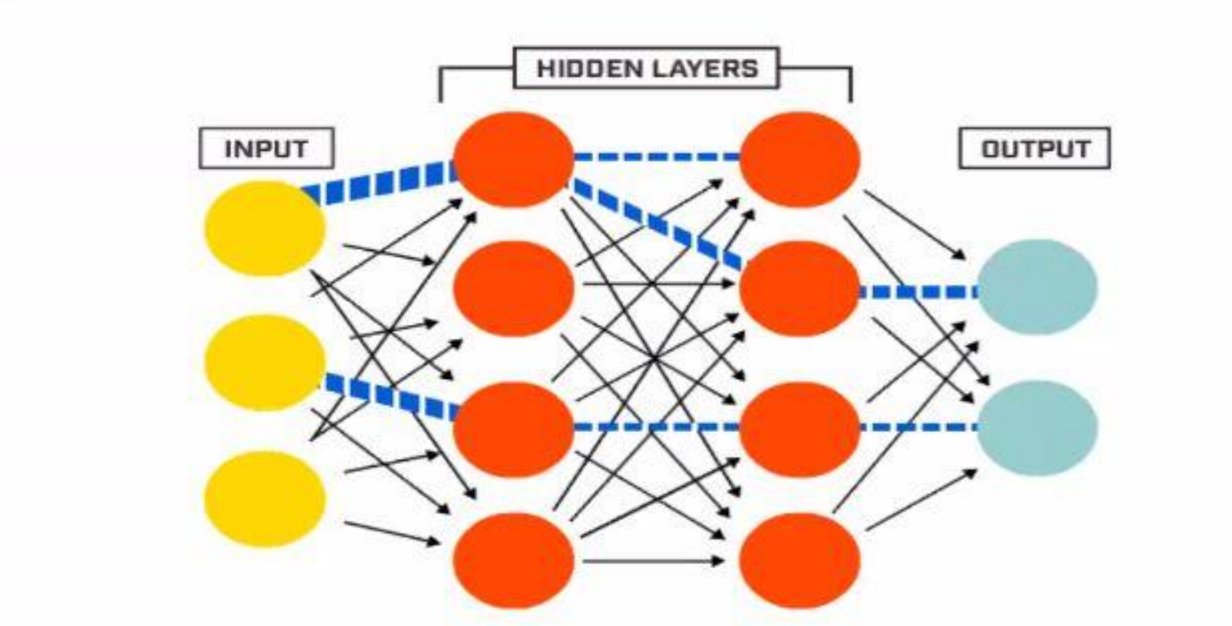
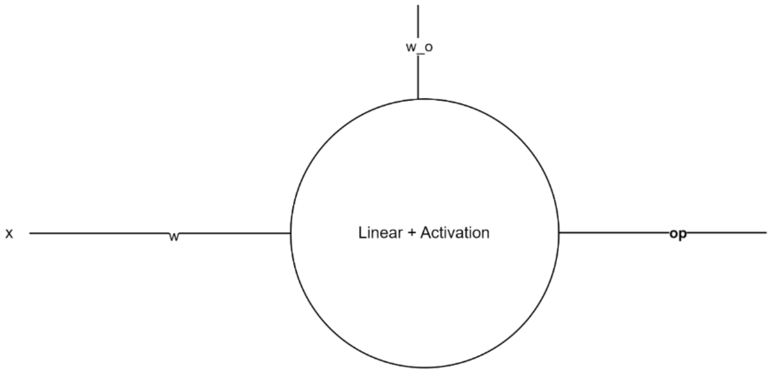
1. Multilayer Perceptron/ANN



1. The Number of Hidden Layer
2. The number of neurons,
3. Weight Initialization
4. Activation function
5. Loss Function
6. Metrics
7. Optimizer,
8. Learning rate,
9. Batch size
10. Epochs
11. Iteration
12. Dropout rate etc

what is Neuron - How neuron works



Linear: W_o + W*X

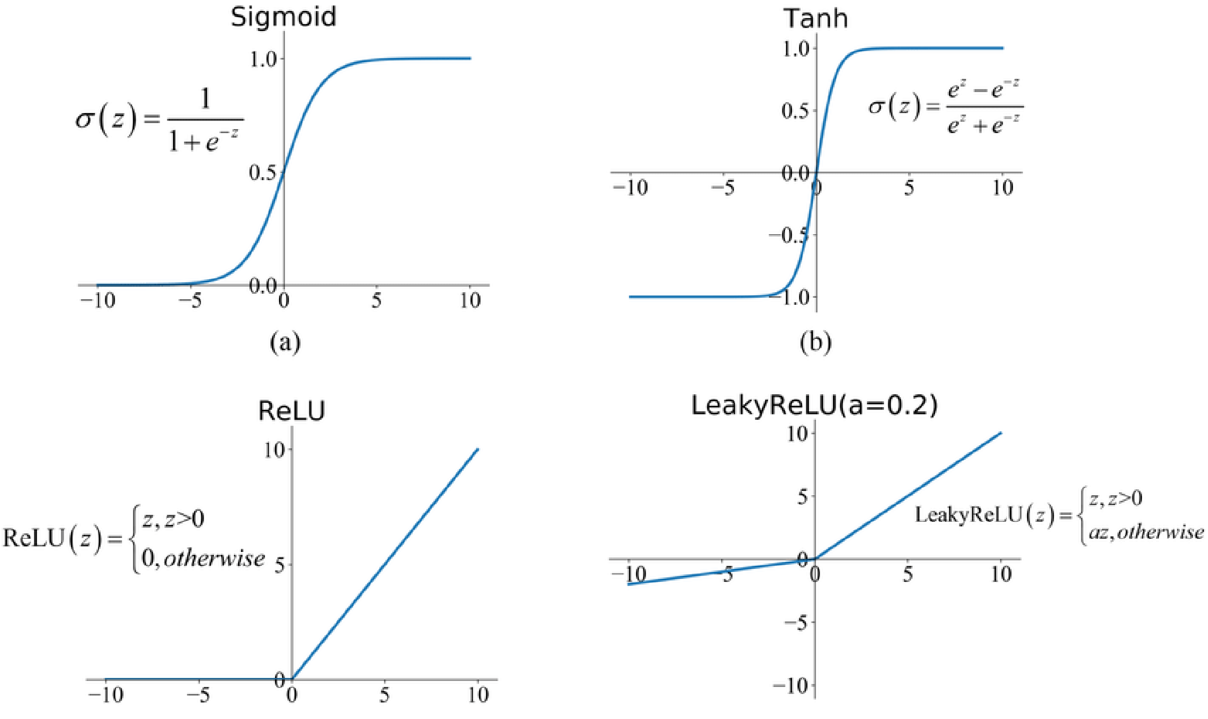
Activation= activaton(Linear)= activation(W_o+W*X)

Output = activation(W_o +W*X)

1. In a single neuron two operations are performed
2. Neuron is Linear combinations and Activations
3. If there no activations it is simply a Linear network
4. It will not understand and patterns, the deeper thinking is not possible
5. In order to get the more patterns, we need to apply Non linearity
6. This non linearity is given by activation functions
7. The perfect example is sigmoid activation function
8. It is look like s curve, which means it is Nonlinear curve
9. Now it is the time, understand human brain neuron

There are many activation functions are available

- Sigmoid
- SoftMax
- Tanh
- ReLU Rectified Linear unit
- Leaky ReLU



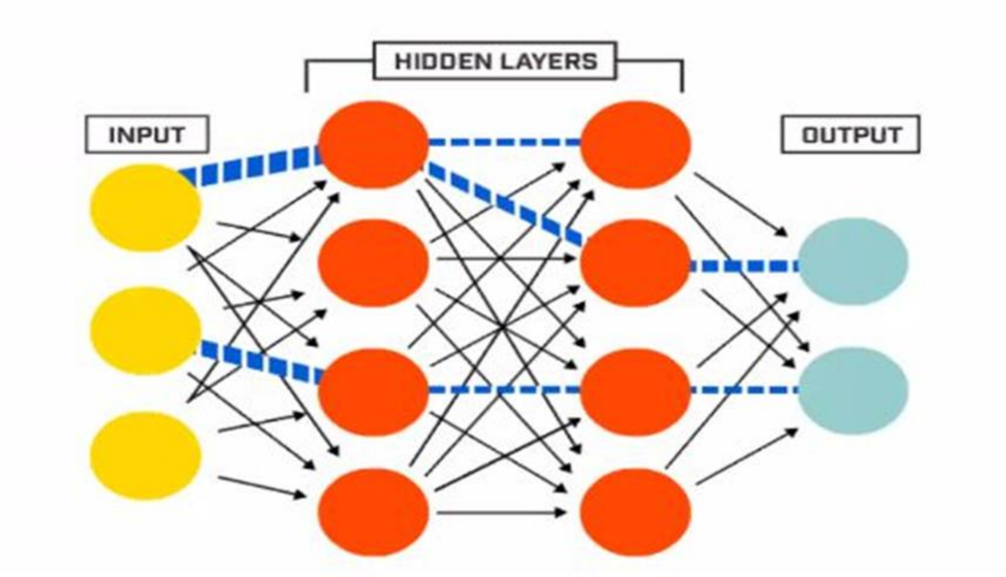
(a)

(b)

(c)

(d)

Let's calculate the number of parameters for the given architecture:



1. **Input layer**: There are no parameters, only inputs.
2. **First hidden layer**:
    a. Total parameters in this layer: (3×4) +4= 16 parameters.
3. **Second hidden layer**:
    a. Total parameters in this layer: (4×4) +4= 20 parameters.
4. **Output layer**:
    a. Total parameters in this layer: (4×2) +2= 10 parameters.

Total parameters = 36

Let's calculate the number of parameters for the given architecture:

- Input layer: 10 neurons
- First hidden layer: 10 neurons
- Second hidden layer: 5 neurons
- Output layer: 2 neurons

For each layer, the number of parameters can be calculated as follows:

1. **Input layer**: There are no parameters, only inputs.
2. **First hidden layer**:
   - Each neuron has 10 weights (one for each input) and 1 bias term.
   - Total parameters in this layer: (10×10) +10=110 parameters.
3. **Second hidden layer**:
   - Each neuron has 10 weights (one for each neuron in the previous layer) and 1 bias term.
   - Total parameters in this layer: (10×5) +5=55 parameters.
4. **Output layer**:
   - Each neuron has 5 weights (one for each neuron in the previous layer) and 1 bias term.
   - Total parameters in this layer: (5×2) +2=12 parameters.

Now, summing up the parameters from all layers:

110 parameters in the first hidden layer
55 parameters in the second hidden layer
12 parameters in the output layer

=177 parameters in