Assignment #2: Artificial neural network

Logical gates are the basis of any modern-day computer. The device you are using to read this article is using them for certain. One of the great things about these gates is their easy interpretability. Many of these gates are named in plain English, such as the AND, NOT and OR gates. Others are written in less familiarly but are still simple. These logical gates are summarized in the table below

Name	NOT	AND	NAND	OR	NOR	XOR	XNOR
Alg. Expr.	$\overline{A}$	AB	$\overline{AB}$	$A+B$	$\overline{A+B}$	$A \oplus B$	$\overline{A \oplus B}$
Symbol							
Truth Table	A X 0 1 1 0	B A X 0 0 0 0 1 0 1 0 0 1 1 1	B A X 0 0 1 0 1 1 1 0 1 1 1 0	B A X 0 0 0 0 1 1 1 0 1 1 1 1	B A X 0 0 1 0 1 0 1 0 0 1 1 0	B A X 0 0 0 0 1 1 1 0 1 1 1 0	B A X 0 0 1 0 1 0 1 0 0 1 1 1

In this task you need to use a neural network to emulate the behaviour of logical gates.

Methodology

- You should have a GUI to choose between the logic gates. Once selecting the gate, the system should define the network structure (perceptron, or multi-layer network).
- Use backpropagation learning algorithm
  - Give an initial random number for all the weights and biases
  - Choose the layers activation function.
  - Use Gradient Descent as training algorithm
  - You may use SSE or MSE as performance metric
- Your GUI should have a graph showing the classification region after training