Neuronal Network Model of McCulloch y Pitts

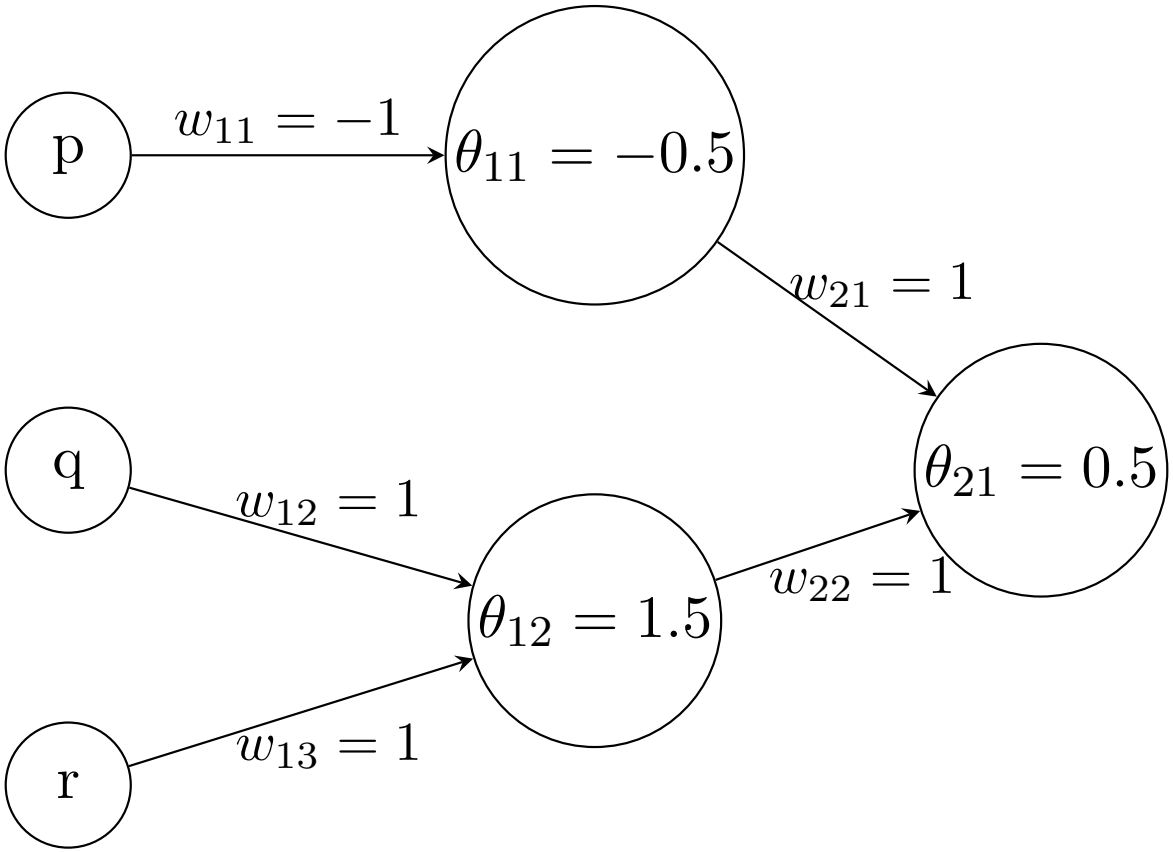
Andrés Vizcaya Santacruz

August 26, 2025

Truth Table

p	q	r	$p \Rightarrow (q \wedge r)$
1	1	1	1
1	1	0	0
1	0	1	0
1	0	0	0
0	1	1	1
0	1	0	1
0	0	1	1
0	0	0	1

Architecture



Results - Detailed Calculations

Example 1: p=1, q=1, r=1

$$h_1 = f(1 \cdot (-1), -0.5) = f(-1, -0.5) = 0$$
$$h_2 = f(1 \cdot 1 + 1 \cdot 1, 1.5) = f(2, 1.5) = 1$$
$$output = f(0 \cdot 1 + 1 \cdot 1, 0.5) = f(1, 0.5) = 1$$

Result: 1

Example 2: p=1, q=1, r=0

$$h_1 = f(1 \cdot (-1), -0.5) = f(-1, -0.5) = 0$$
$$h_2 = f(1 \cdot 1 + 0 \cdot 1, 1.5) = f(1, 1.5) = 0$$
$$output = f(0 \cdot 1 + 0 \cdot 1, 0.5) = f(0, 0.5) = 0$$

Result: 0

Example 3: p=0, q=0, r=0

$$h_1 = f(0 \cdot (-1), -0.5) = f(0, -0.5) = 1$$
$$h_2 = f(0 \cdot 1 + 0 \cdot 1, 1.5) = f(0, 1.5) = 0$$
$$output = f(1 \cdot 1 + 0 \cdot 1, 0.5) = f(1, 0.5) = 1$$

Result: 1

Visual Representation

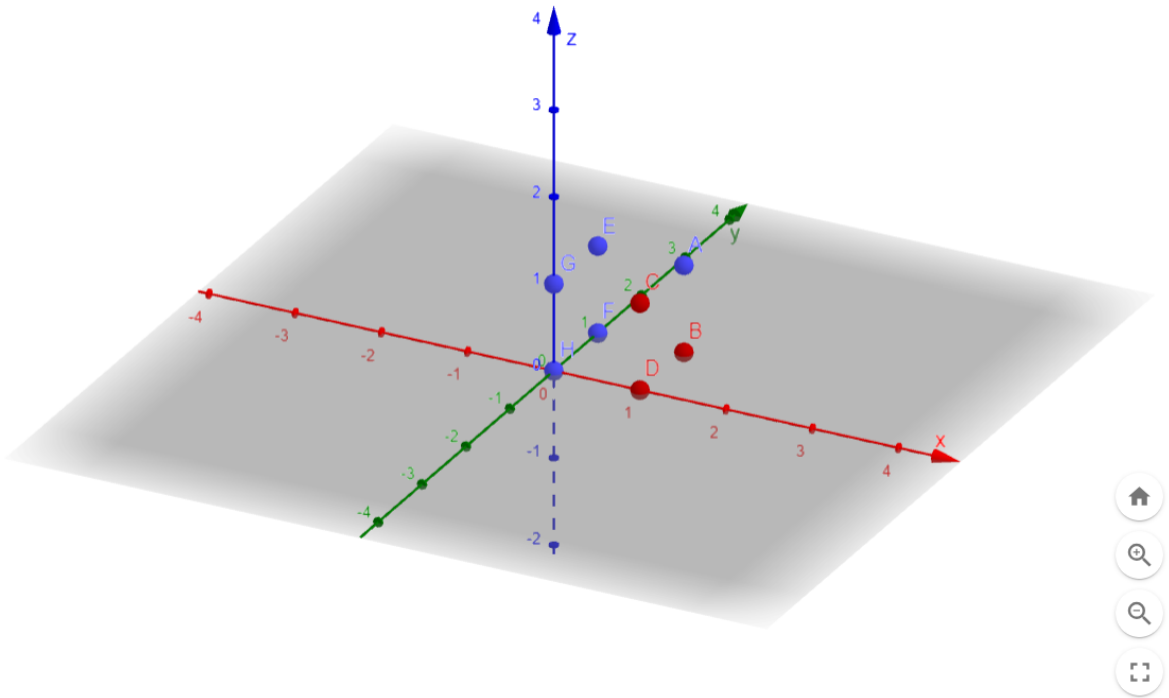


Figure: Input points for the proposition $p \Rightarrow (q \wedge r)$.

Visual Representation

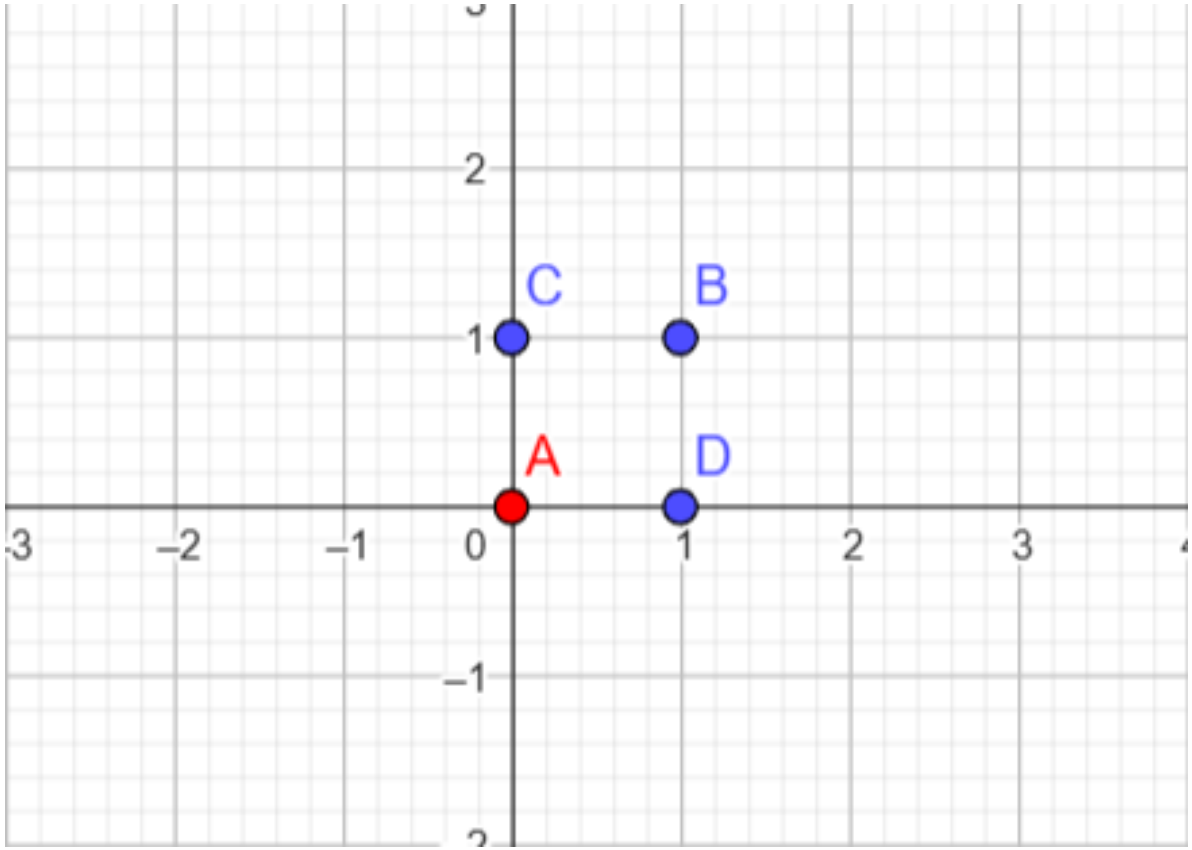


Figure: Points after the first (hidden) network layer.