

Arborescent Neural Network

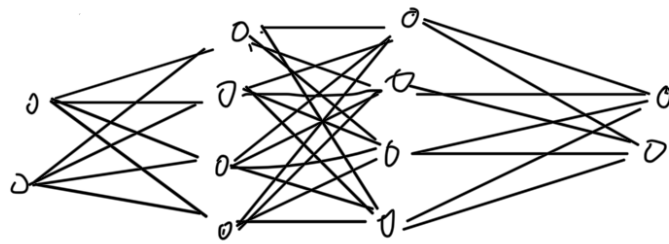


Table \rightarrow Matrix

NOT

$$\begin{matrix} 0 & 1 \\ 1 & 0 \end{matrix} \rightarrow \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\text{True } 1 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

$$\text{False } 0 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

NOT

A	B	A	B
0	0	0	0
0	1	0	1
1	0	1	1
1	1	1	1

$$\sum_j | \text{Input}_j \rangle \langle \text{Output}_j | =$$

$$= |0\rangle\langle 1| + |1\rangle\langle 0| \quad \text{if } A = 0 \quad \text{do nothing}$$

$$= \begin{bmatrix} 1 \\ 0 \end{bmatrix} \times \begin{bmatrix} 0 & 1 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} \times \begin{bmatrix} 1 & 0 \end{bmatrix} \quad \text{if } B \text{ else}$$

$$\begin{matrix} \{0\} & \{1\} \\ \text{---} & \text{---} \end{matrix} \rightarrow \text{swap it around}$$

$$= \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} + \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

Hadamard Gate

$$|\psi\rangle = \alpha |0\rangle + \beta |1\rangle$$