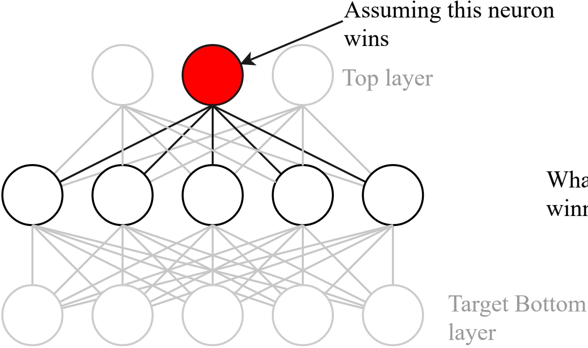
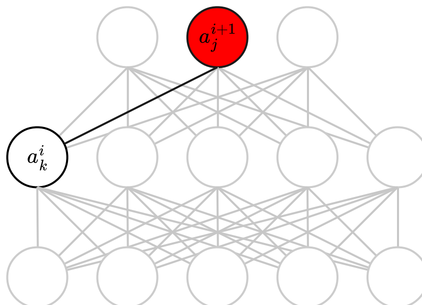
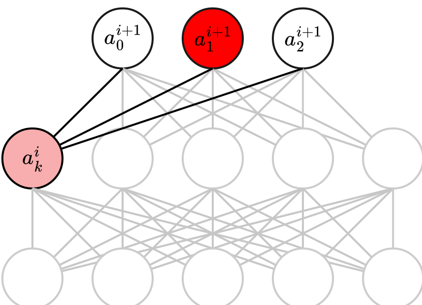


What are the probabilities of the neurons in this layer being winners, given we know the parent neuron is a winner?

The probability of a_k^i being a winner conditioned on a_j^{i+1} being a winner is dependent upon its activation $\hat{a}_k^i$, the weight linking it to its winner parent w_{kj}^i and the normalisation factor Z_j^{i+1} (computed from the weighted activations of all the children of a_j^{i+1}) to ensure $\sum_k P(a_k^i|a_j^{i+1}) = 1$





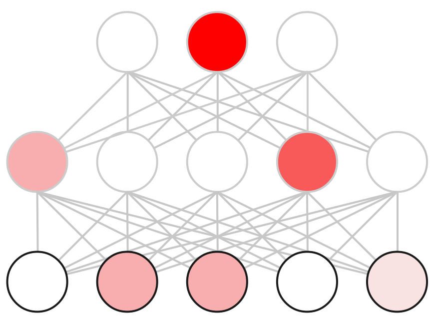
The marginal winning probability of a_k^i, $P(a_k^i|a_j^{i+1})$, is computed by marginalising the conditional winning probabilities of a_k^i over its parents $\mathcal{P}_k^i$:

$$\mathcal{P}_k^i = \{a_j^{i+1}|w_{kj}^i \neq 0\}$$

giving

$$P(a_k^i) = \sum_{a_j^{i+1} \in \mathcal{P}_k^i} P(a_k^i|a_j^{i+1})P(a_j^{i+1})$$

Once the marginal winning probabilities for a layer are calculated, the process is repeated at the next layer down, until the marginal winning probabilities for the target bottom layer have been computed.



Colours indicate the magnitude of marginal winning probability