Preventing overfitting (TECNICHE CHE SI POSSONO USARE)

- **Early stopping**

Use a validation set. (GIÀ VISTA) MI FERMO QUANDO HO RAGGIUNTO UN CERTO ERRORE

- **Gathering more training data**

Increase the size of the training data. → GENERALIZZA MEGLIO

→ MAGARI NON SI POSSONO CREARE NUOVI DATI PERCHÉ È COSTOSO

- **Performing dataset augmentation**

Artificially increase the size of the dataset by introducing different types of transformations or distortions of the available data.

- **Reducing the capacity of the network**

Reduce the size of the network.

- **Adding weight regularization**

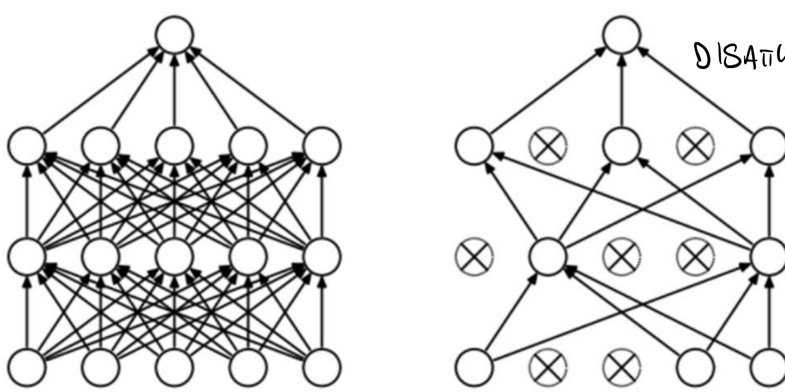
Force the weights of a network to take small values by adding a penalty that penalizes large weights to the loss function of the network.

L2 regularization: $J_{Reg} = \frac{1}{2}\lambda \sum_i w_i^2$

L1 regularization: $J_{Reg} = \lambda \sum_i |w_i|$

For example, $J_{Tot} = J_{Cross-Entropy} + J_{Reg}$ $\qquad \frac{\partial J_{Reg}}{\partial w_k} = \frac{\partial}{\partial w_k}\left(\frac{1}{2}\lambda \sum_i w_i^2\right) = \lambda \cdot w_k$

- **Dropout**



Standard Neural Net — After applying dropout

DISATTIVO TEMPORANEAMENTE DEI NEURONI → METTO I LORO OUTPUT A Ø