Deep Learning

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Outline

1. Metrics for Classification Problems

2. Basic Recurrent Neural Networks

ROC Curve

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- A ROC curve is a way to compare diagnostic tests. It is a plot of true positive rate against the false positive rate:

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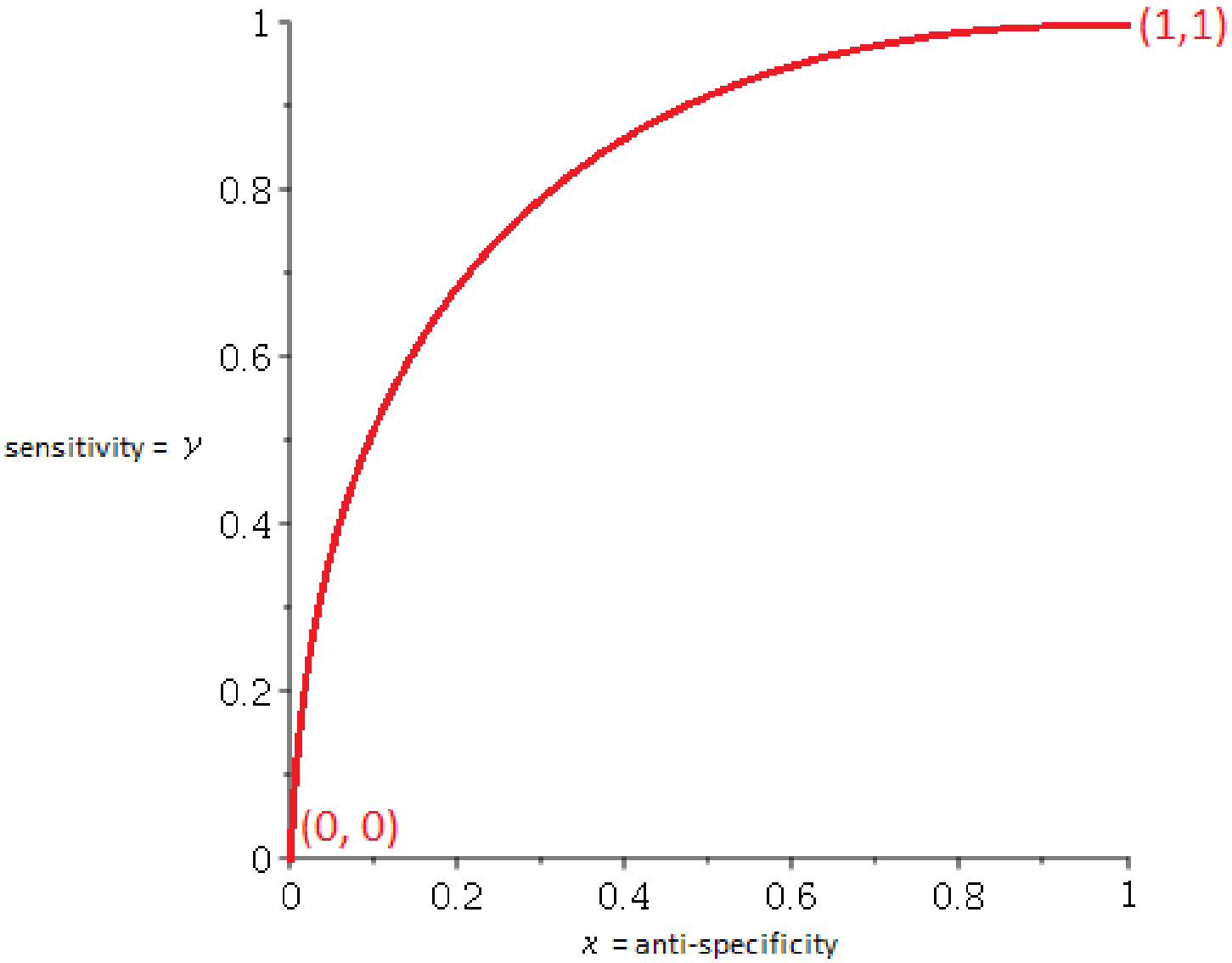
1
0.8
0.6
0.4
0.2
0
sensitivity = y
(1,1)
(0, 0)
0
0.2
0.4
0.6
0.8
1
x = anti-specificity

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- How to use ROC curve for multi-class model?

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$$L(w) = \frac{1}{n} \sum_{i=1}^{n} \left(-(\alpha * y_i)^T \log f_w(x_i) \right).$$

Where $\alpha^T = [\alpha_1, \ldots, \alpha_k]$, $\alpha_i \in (0, 1)$ and $\sum_{i=1}^{k} \alpha_i = 1$.

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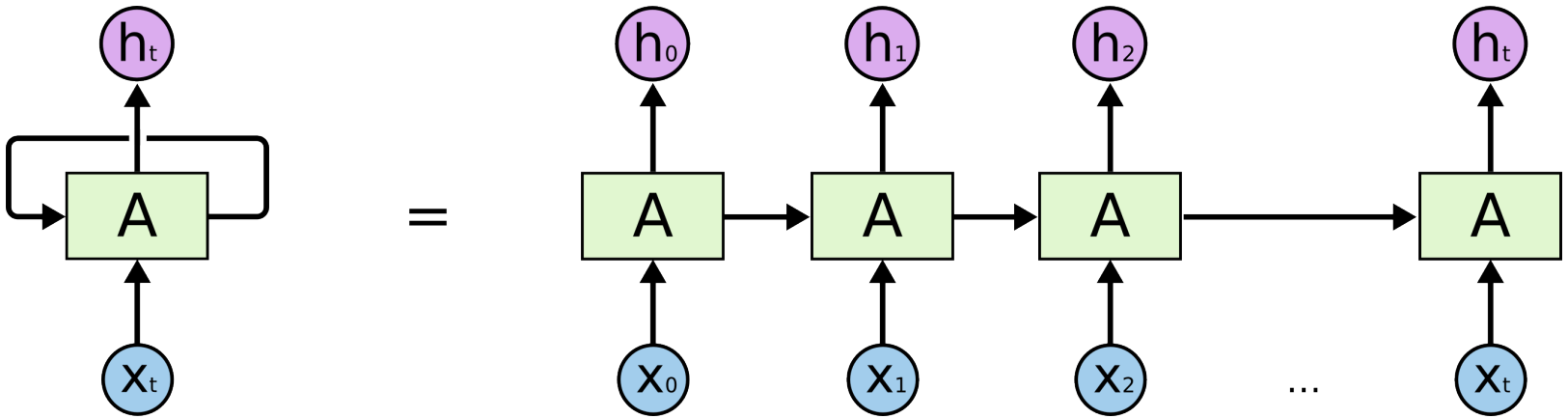
- Why don't to use known networks?
  - Inputs, outputs can be different lengths in different examples.
  - Doesn't share features learned across different positions of sequence.

Basic RNNs



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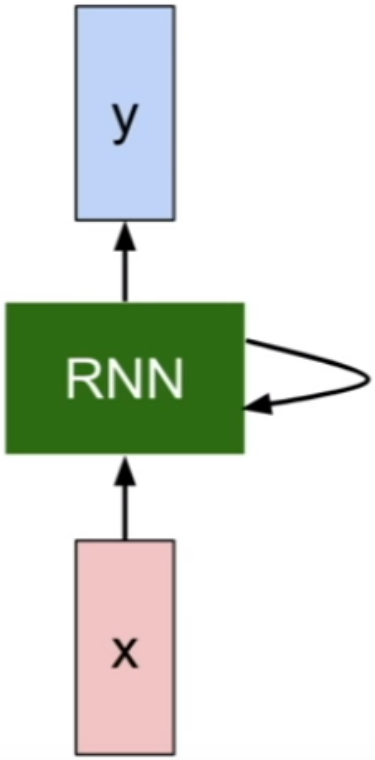

$$h_t = f_W(h_{t-1}, x_t)$$

$$\downarrow$$

$$h_t = \tanh(W_{hh}h_{t-1} + W_{xh}x_t)$$

$$y_t = W_{hy}h_t$$

Different Types of RNNs

- Many to many

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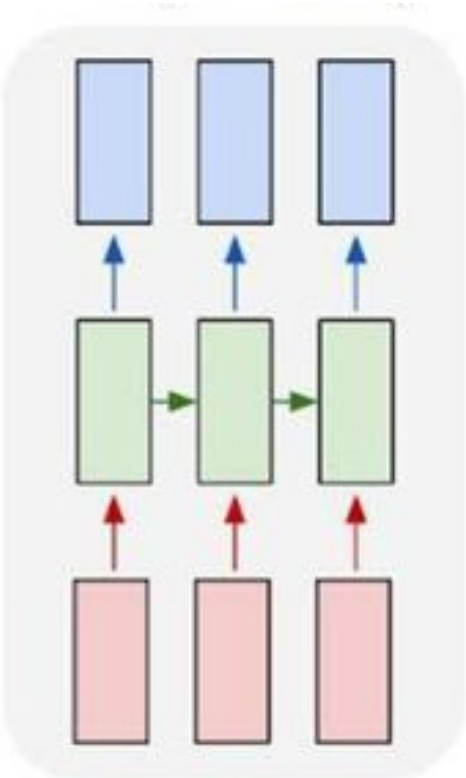

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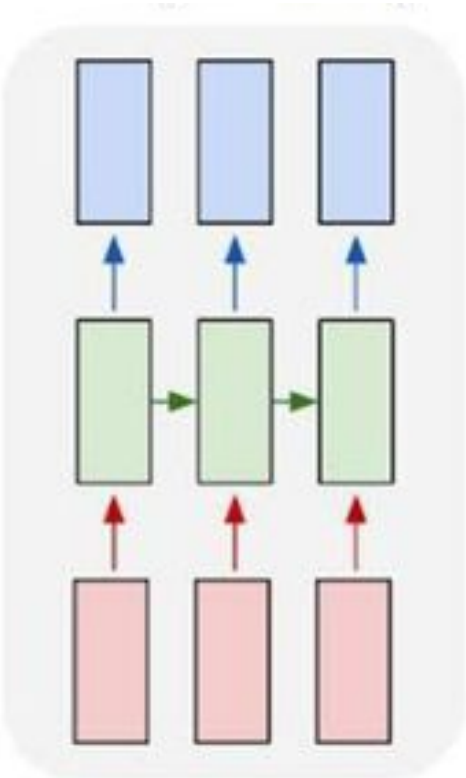

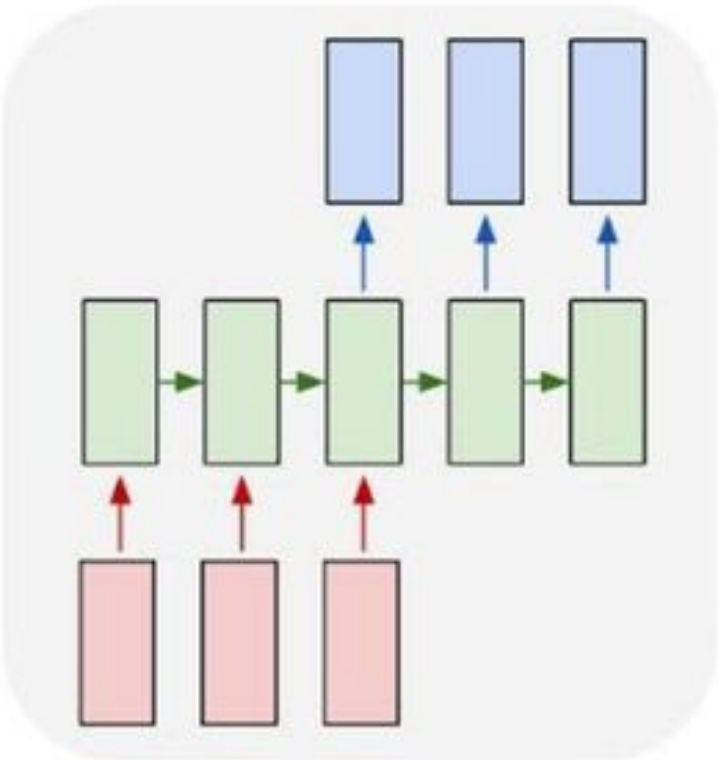

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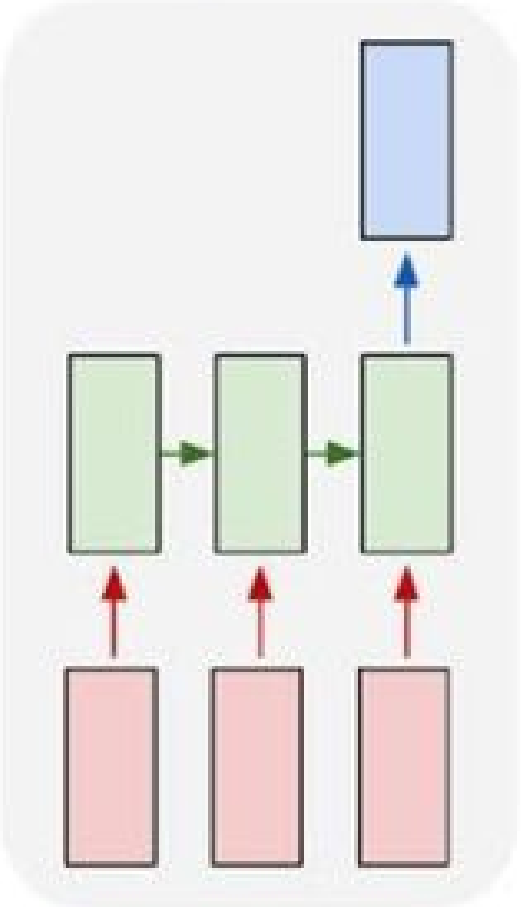

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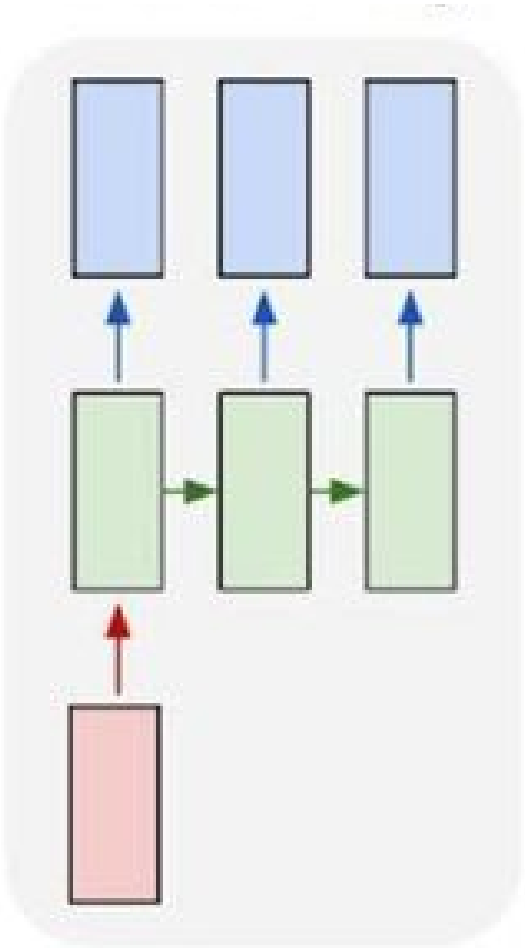

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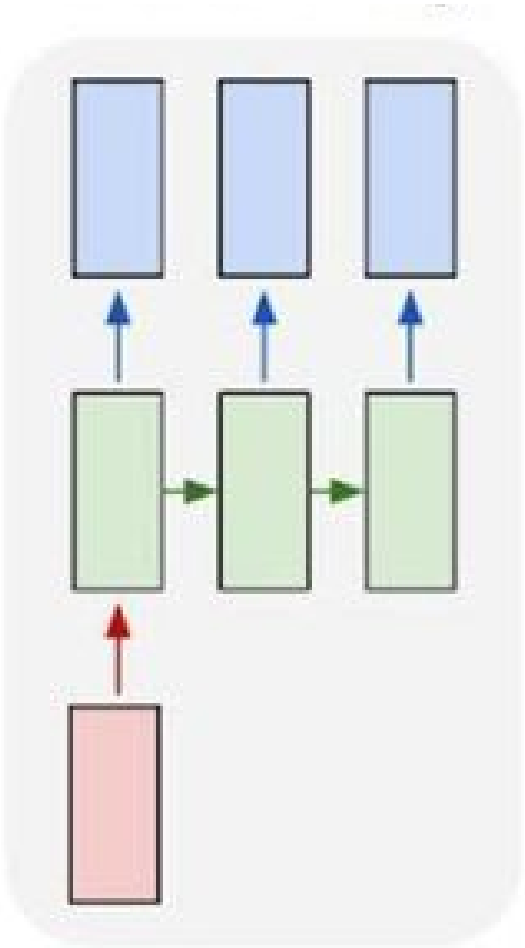

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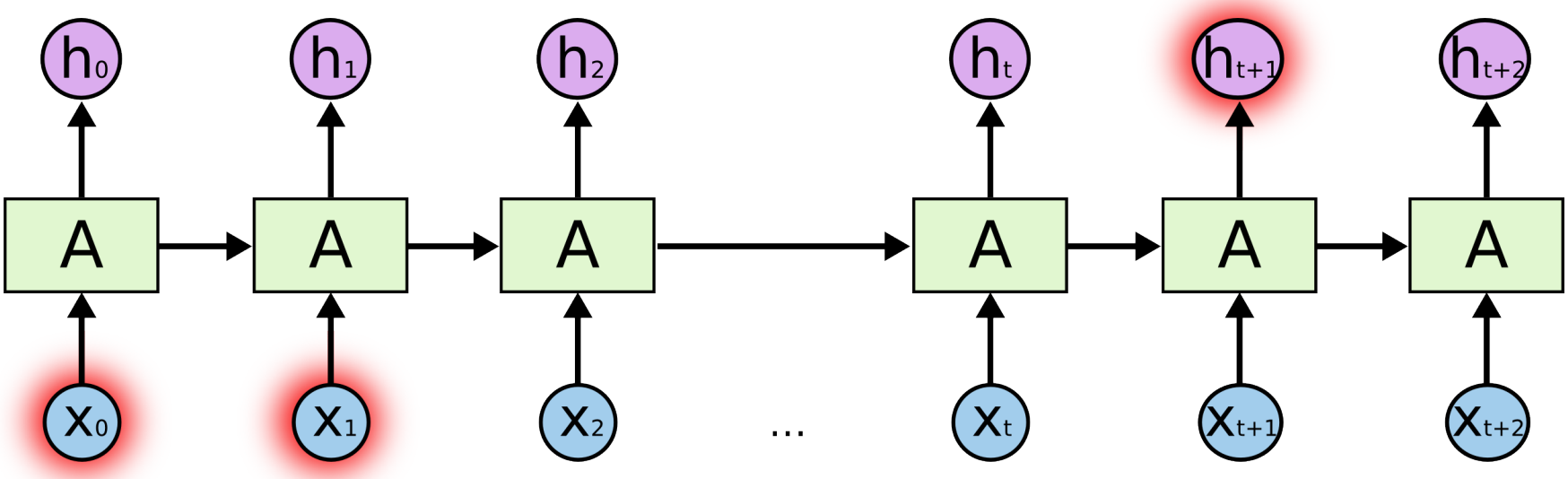
Problem of Long Term Dependencies