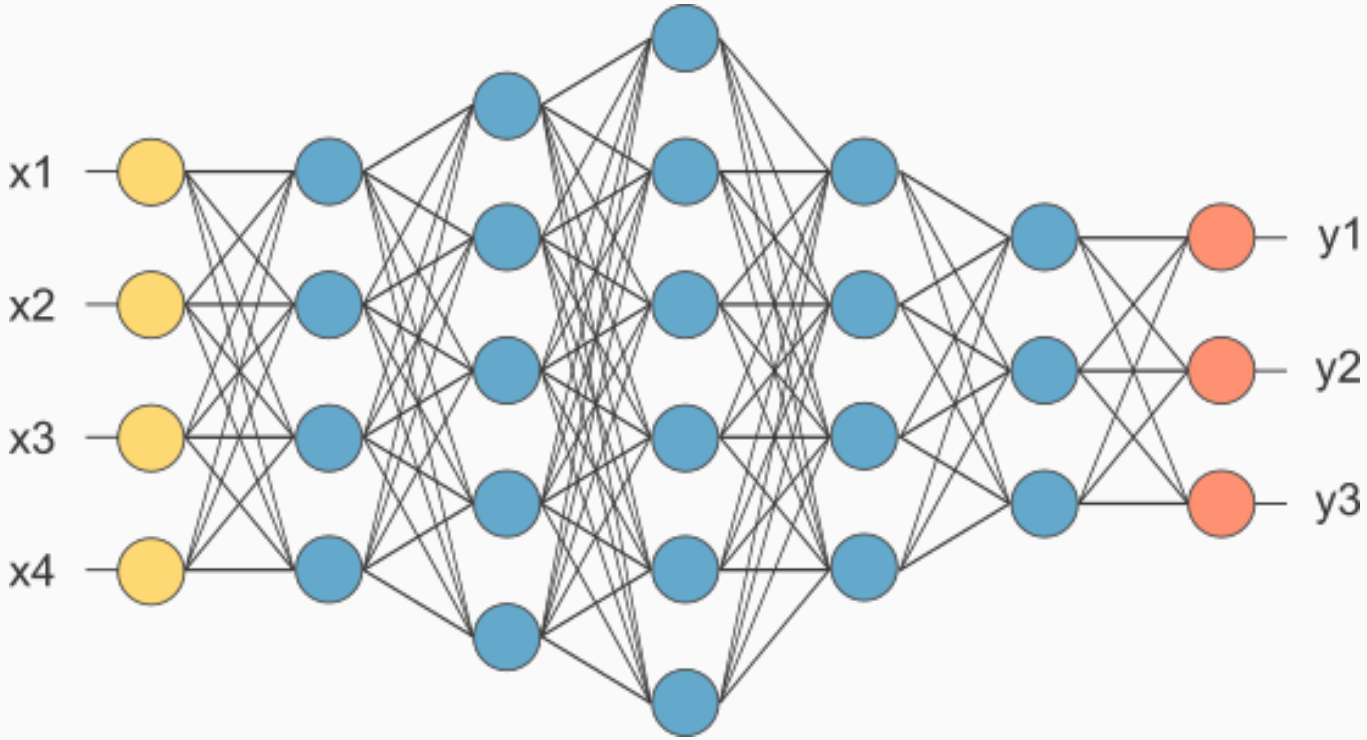
Redes Neurais

- Modelo para criarmos classificadores ou regressores não-lineares
- Podem ser compostas de unidades de processamento simples, por exemplo, regressores logísticos

Redes Neurais

- Diagrama de uma rede neural típica:



Fonte: https://www.kaggle.com/shokhan/neural-network-to-predict-dota-2-winner/comments

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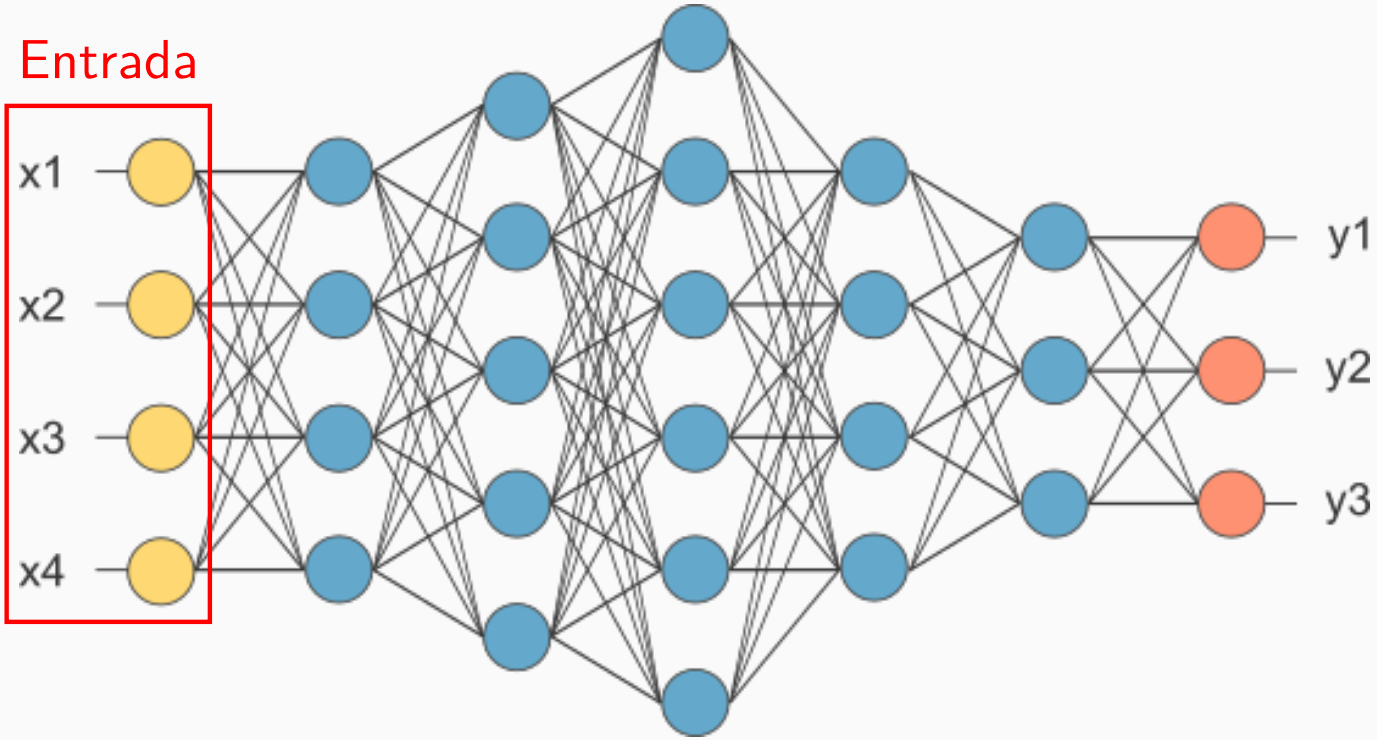

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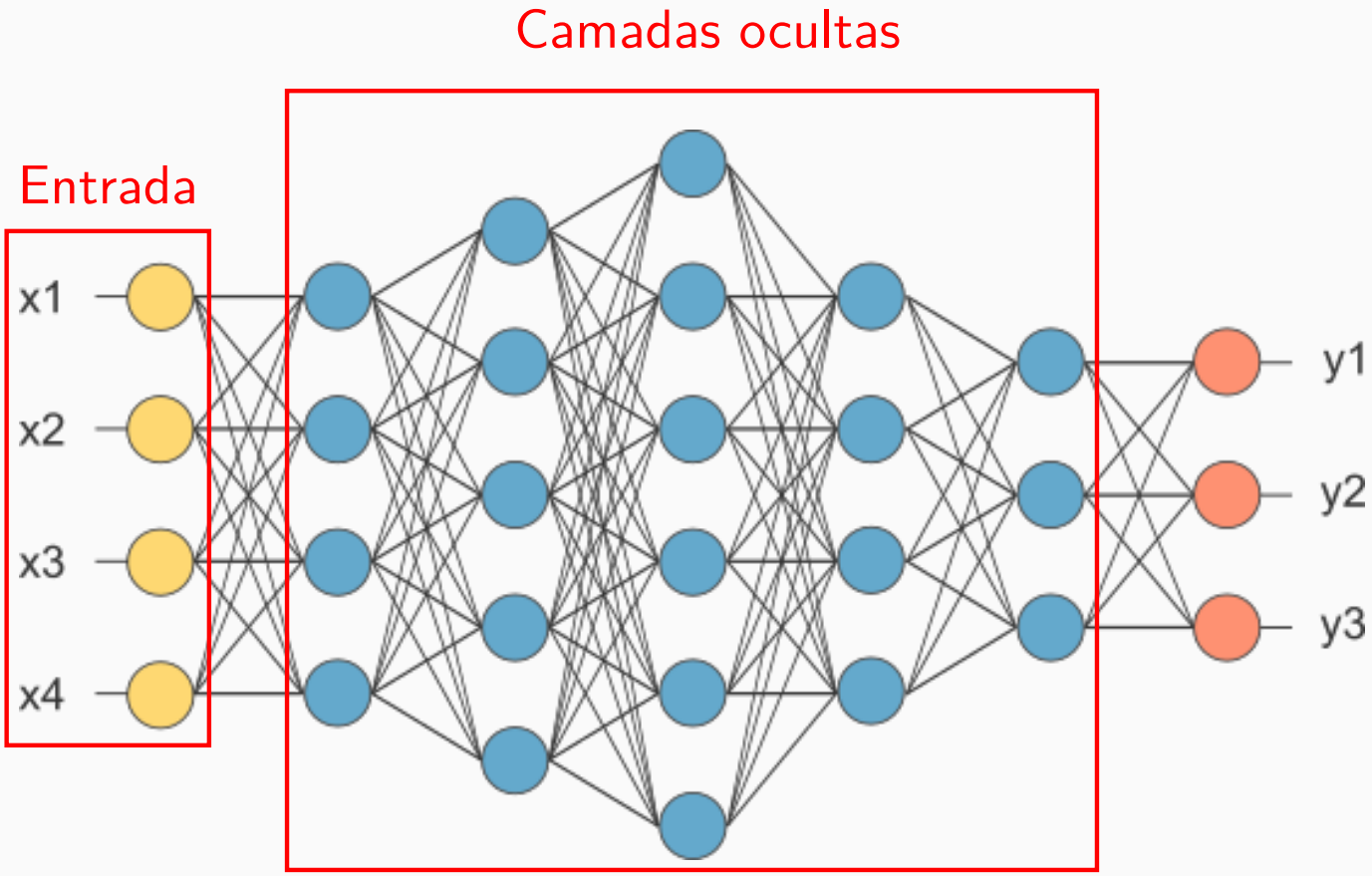

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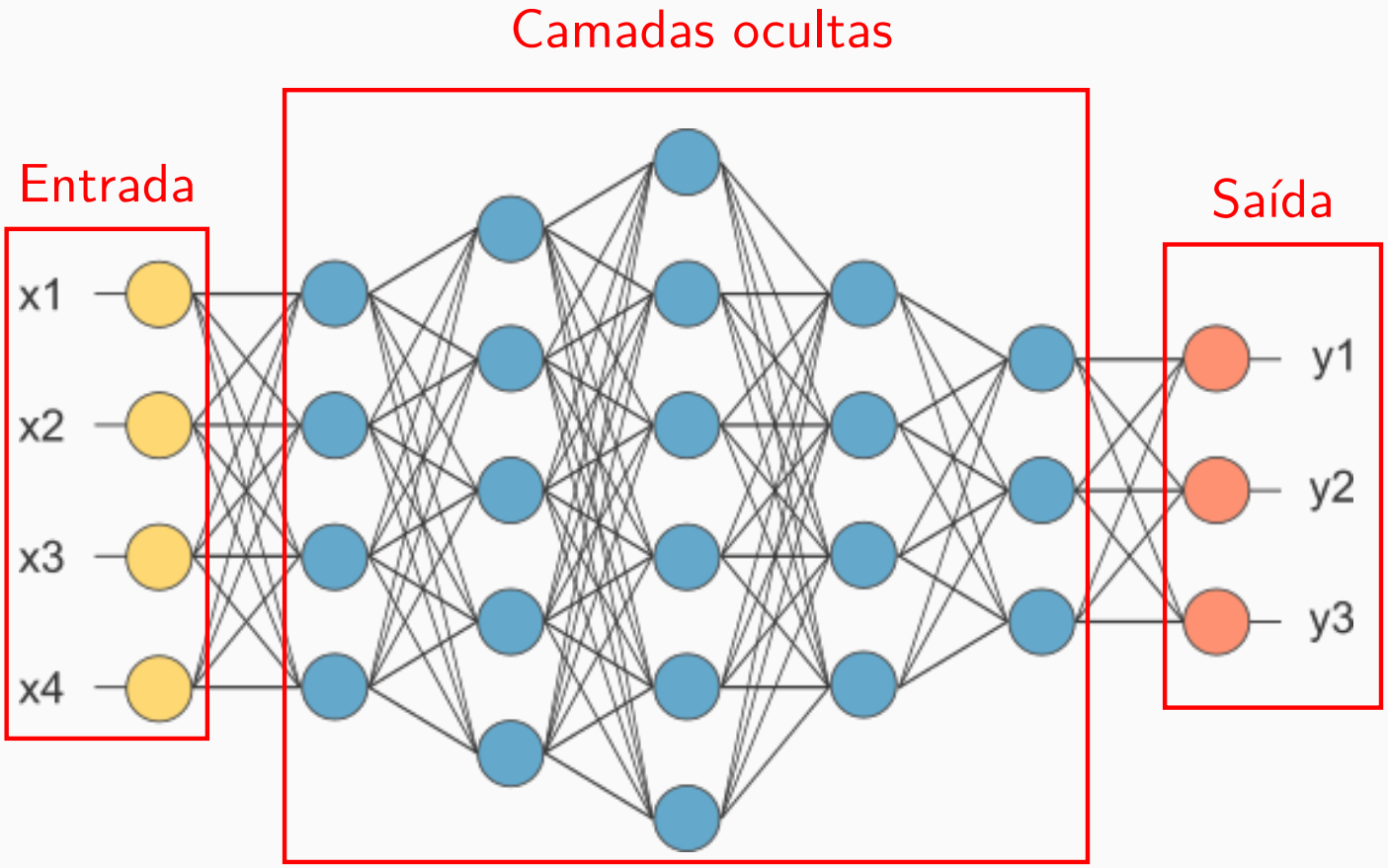

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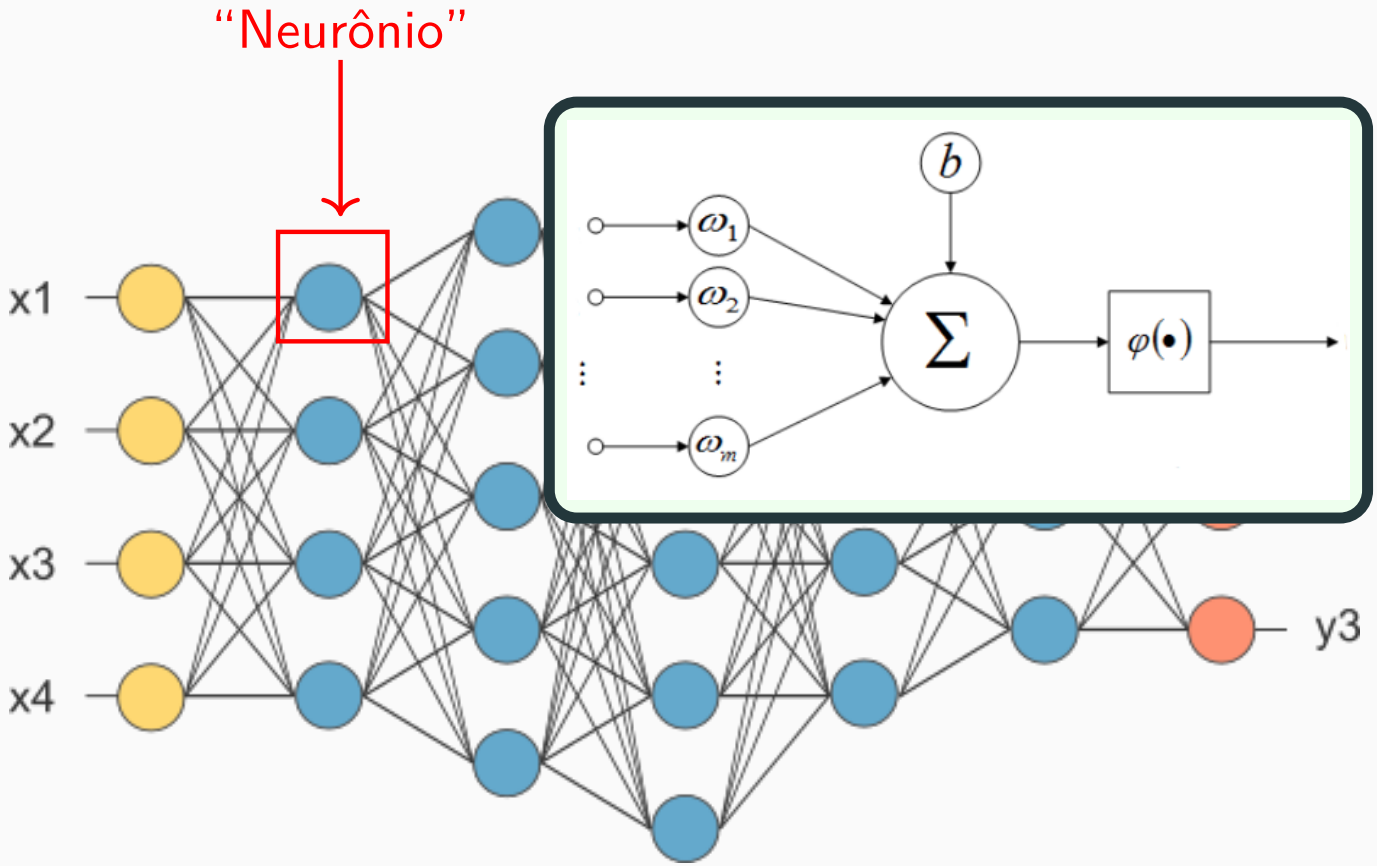

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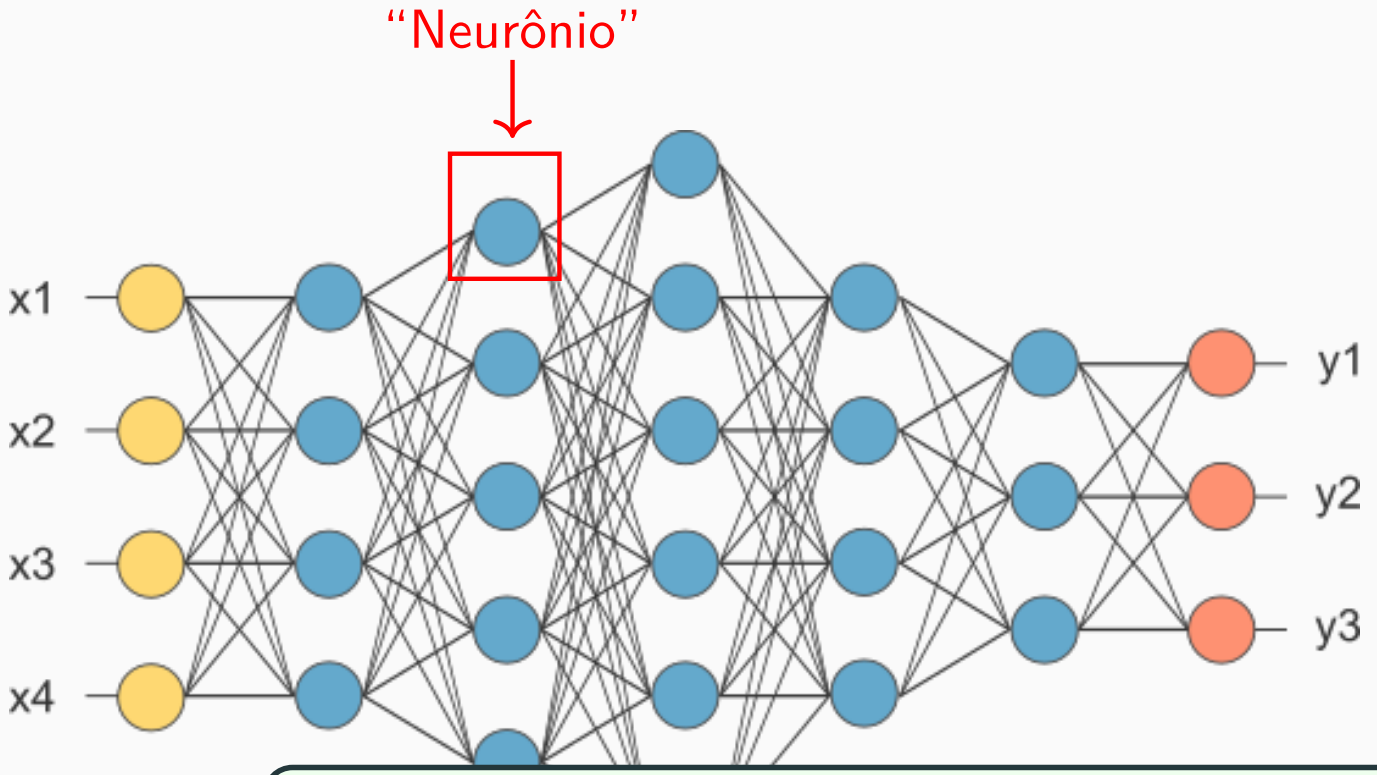

$$\varphi\Big(w_1\varphi(s_1) + w_2\varphi(s_2) + w_3\varphi(s_3) + w_4\varphi(s_4)\Big)$$

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Redes Neurais

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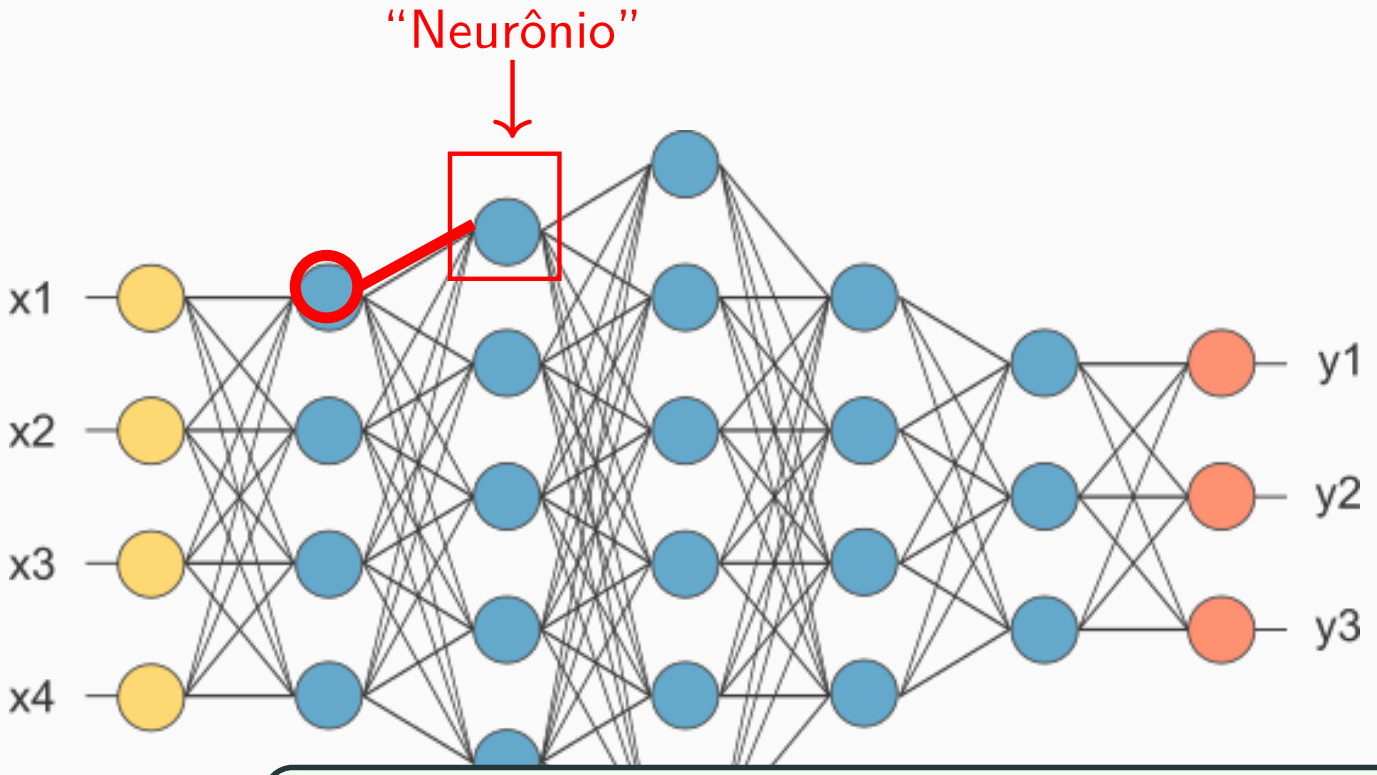

$$\varphi\Big(w_1\varphi(s_1) + w_2\varphi(s_2) + w_3\varphi(s_3) + w_4\varphi(s_4)\Big)$$

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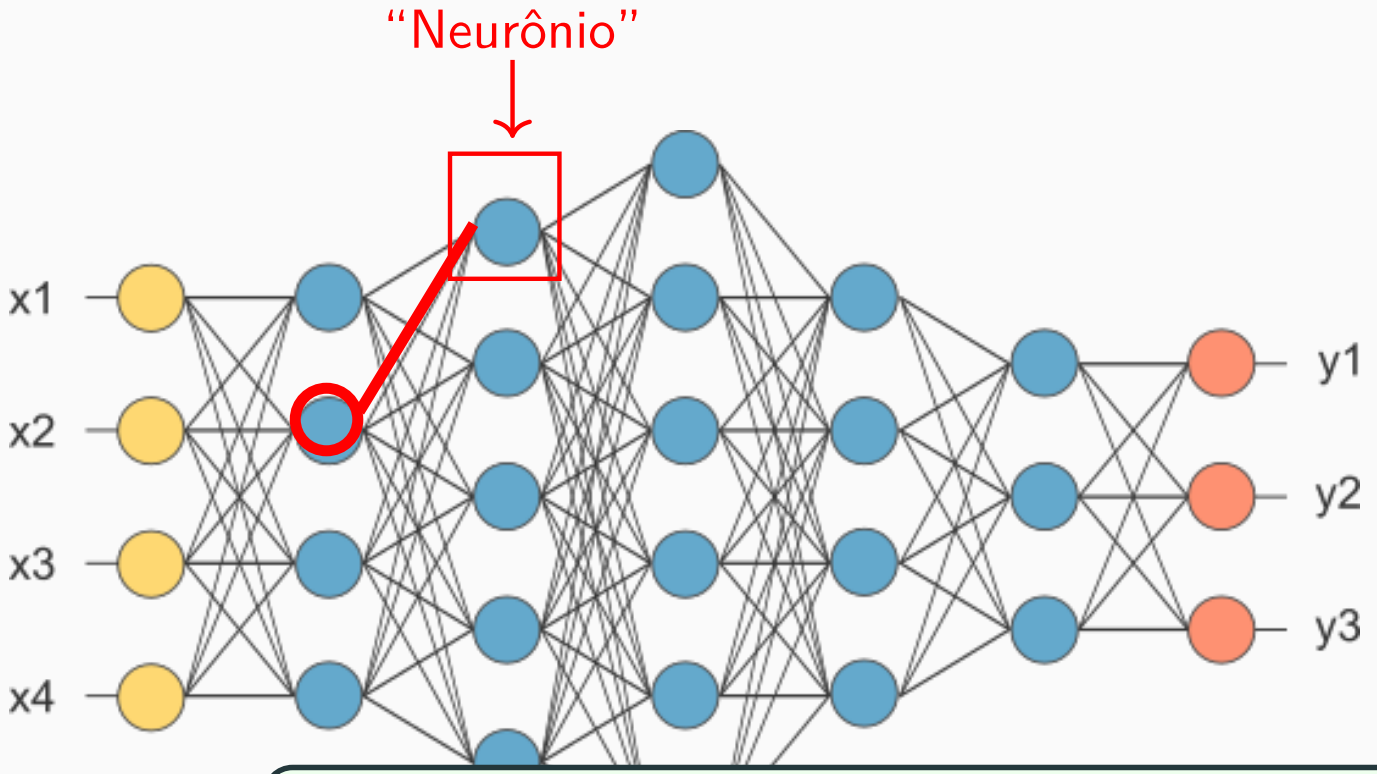

$$\varphi\Big(w_1\varphi(s_1) + w_2\varphi(s_2) + w_3\varphi(s_3) + w_4\varphi(s_4)\Big)$$

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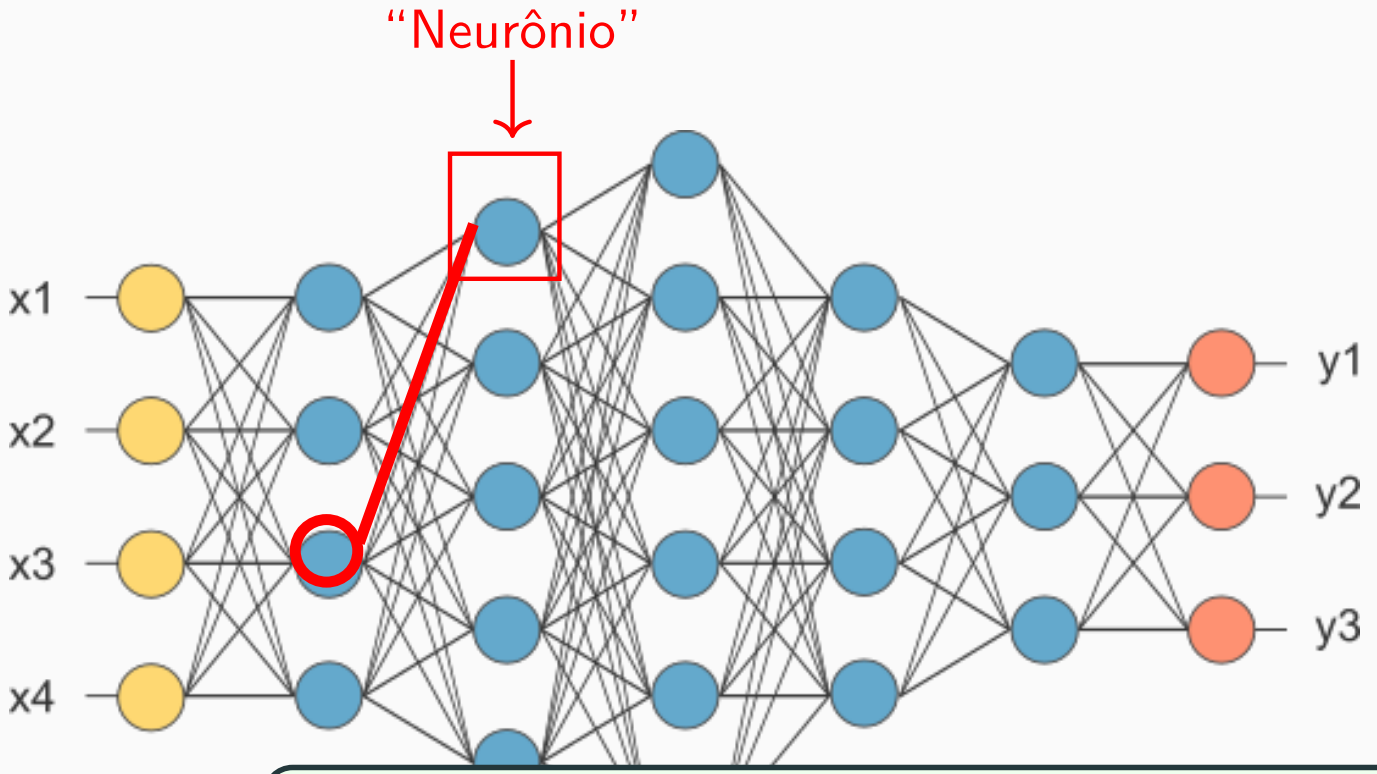

$$\varphi\Big(w_1\varphi(s_1) + w_2\varphi(s_2) + w_3\varphi(s_3) + w_4\varphi(s_4)\Big)$$

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Redes Neurais

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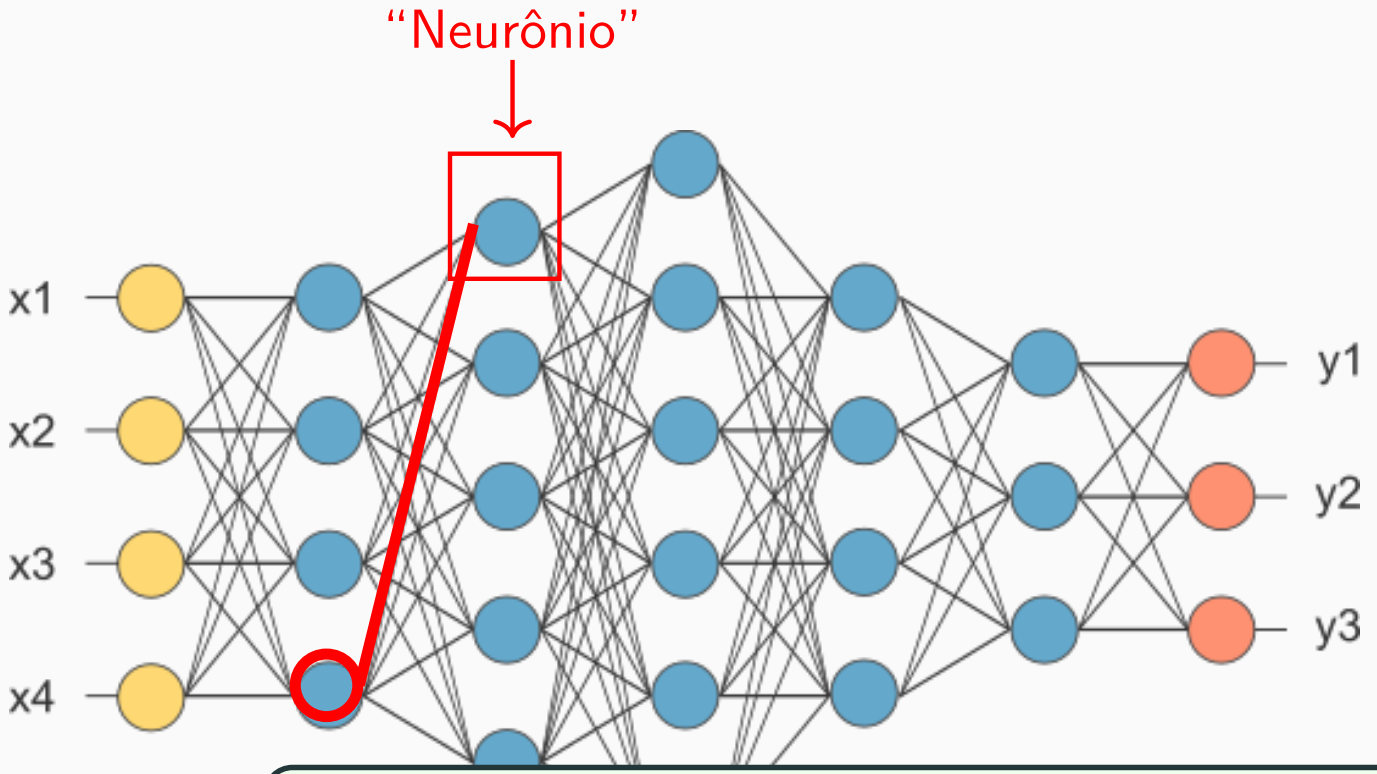

$$\varphi\Big(w_1\varphi(s_1) + w_2\varphi(s_2) + w_3\varphi(s_3) + w_4\varphi(s_4)\Big)$$

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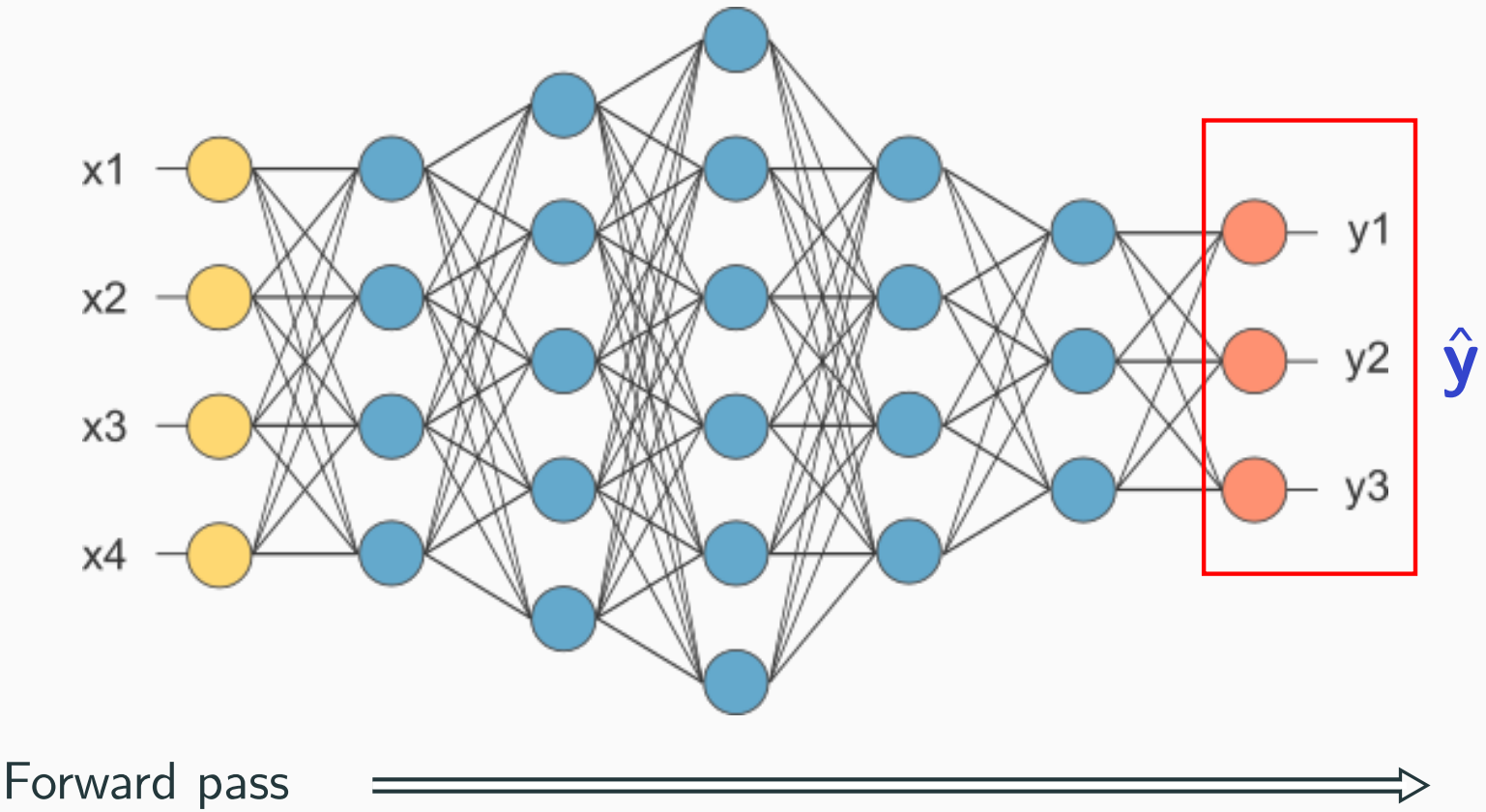

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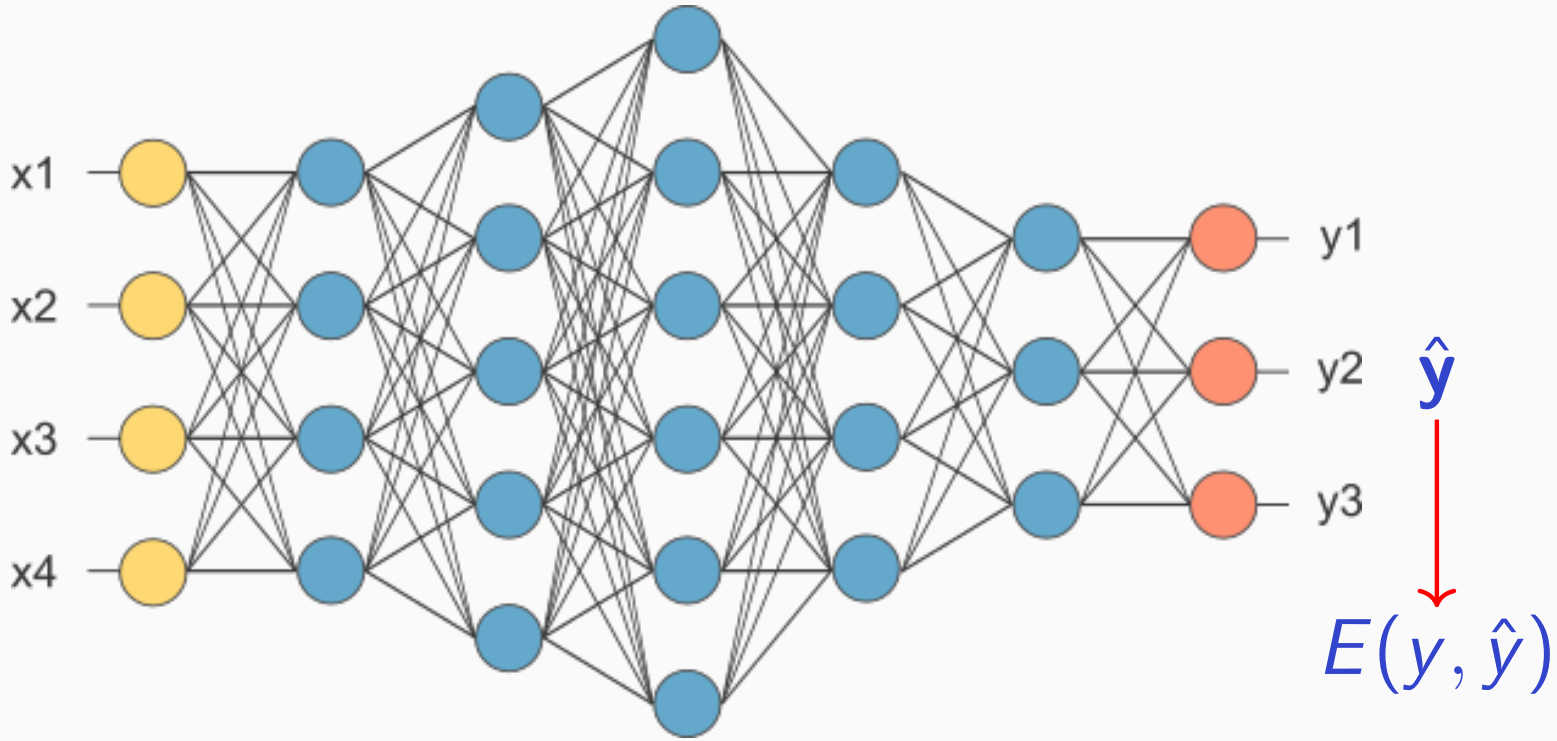

Backward pass ⟸

Fonte: https://www.kaggle.com/shokhan/neural-network-to-predict-dota-2-winner/comments

Treinamento de Redes Neurais

- Ideia geral:
  - **Saída esperada** (target): y_i
  - **Forward pass**: predições $\hat{y}_i$
  - **Erro** entre saída esperada e predita: $E(y_i - \hat{y}_i)$
  - A **função custo** depende de $\hat{y}_i$
  - $\hat{y}_i$, por sua vez, é uma **composição de funções**
  - (que indiretamente depende das entradas $x_1, \ldots, x_d$)
  - O **gradiente** da função custo com respeito aos pesos w pode ser calculado aplicando-se a regra da cadeia

Treinamento de Redes Neurais

- Na prática, precisamos pensar em:
  - Inicialização dos pesos
  - Taxa de Aprendizado
  - Número de iterações
  - Tamanho de batch (Stochastic Gradient Descent)
  - Arquitetura da rede (quantidade de camadas e de unidades por camada)