Fundamentos das redes neurais

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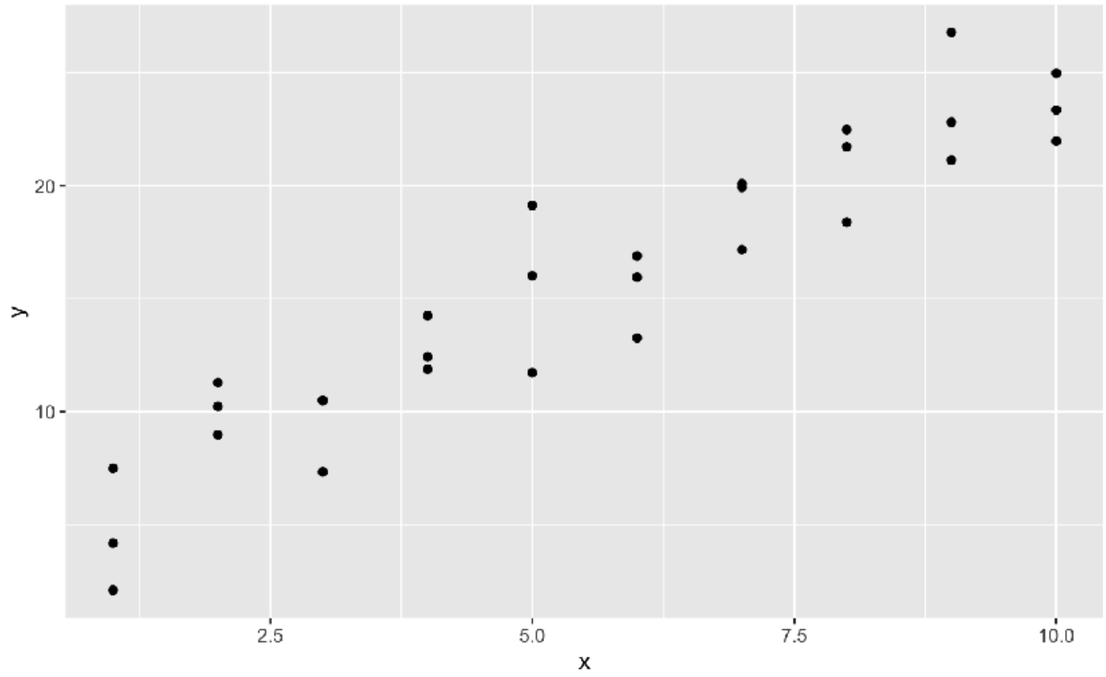
Tópicos

- PC e SVD
  - Aprendizagem não supervisionada
  - Encontrar padrões nos dados
- Modelo preditivo (regressão)
  - Aprendizagem supervisionada
- Redes neurais

Modelagem com regressão

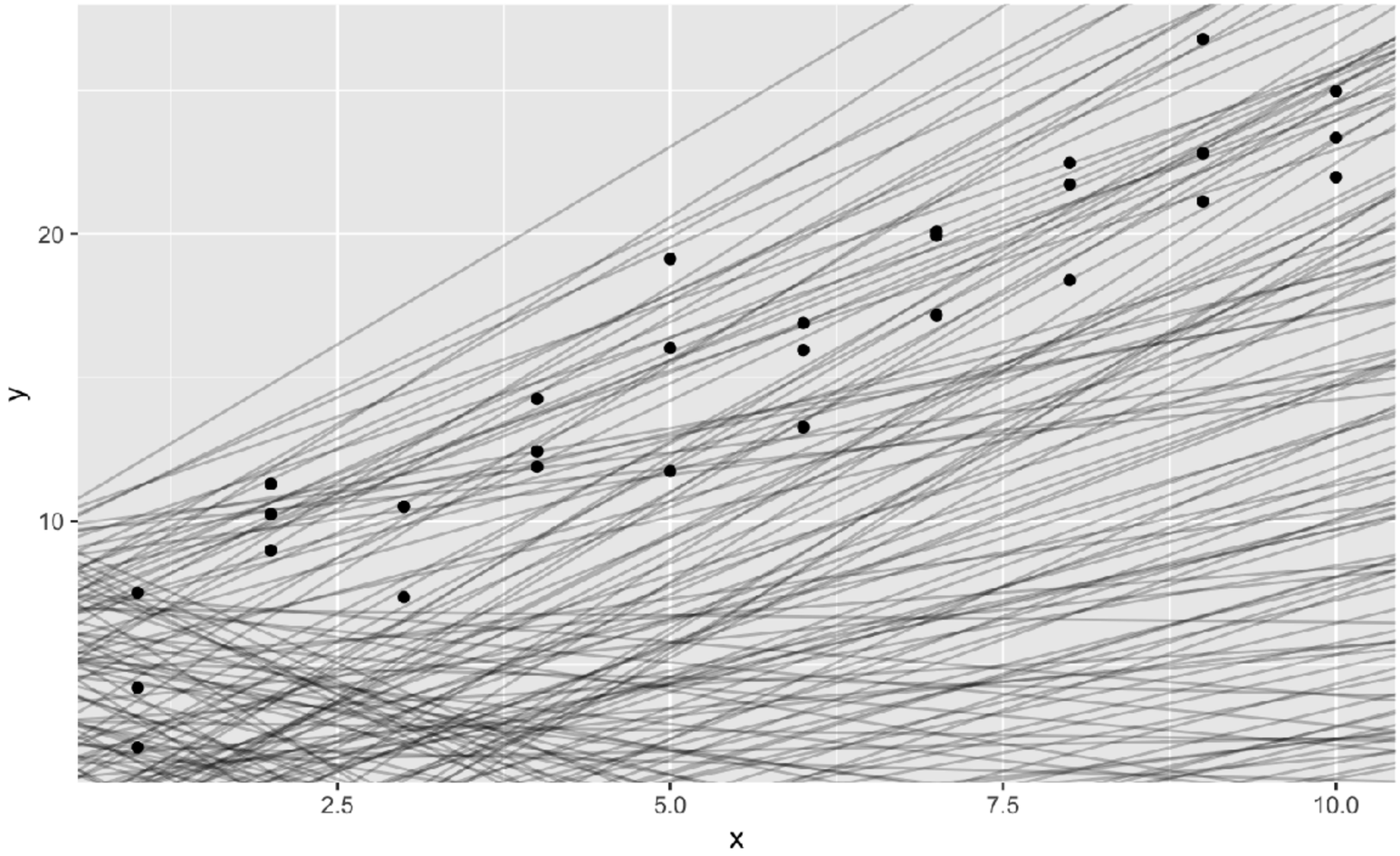
https://r4ds.had.co.nz/model-basics.html

$y = a1*x + a2$



Variando a1 e a2

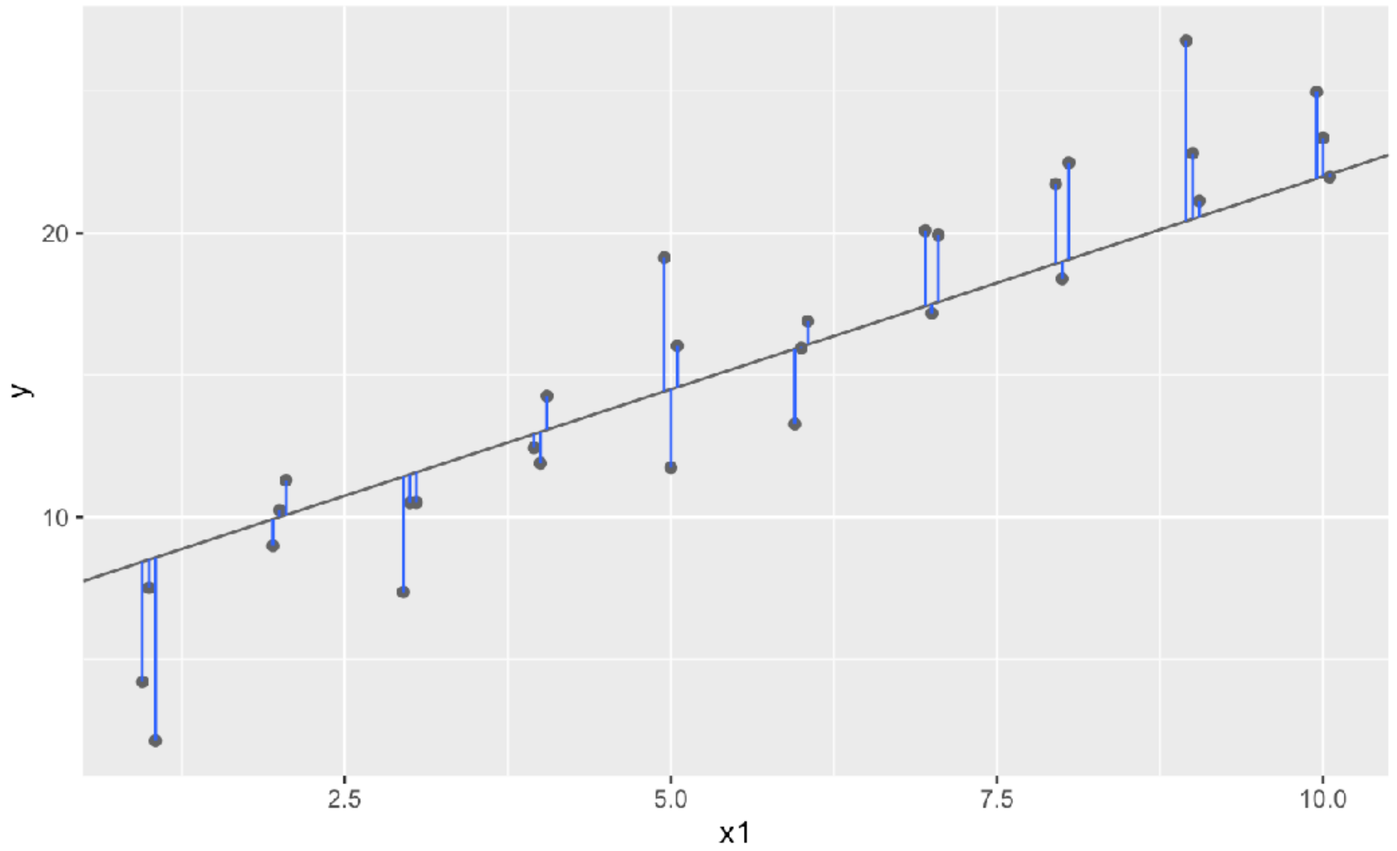
a1 = runif(250, -10, 10), a2 = runif(250, -3, 3)



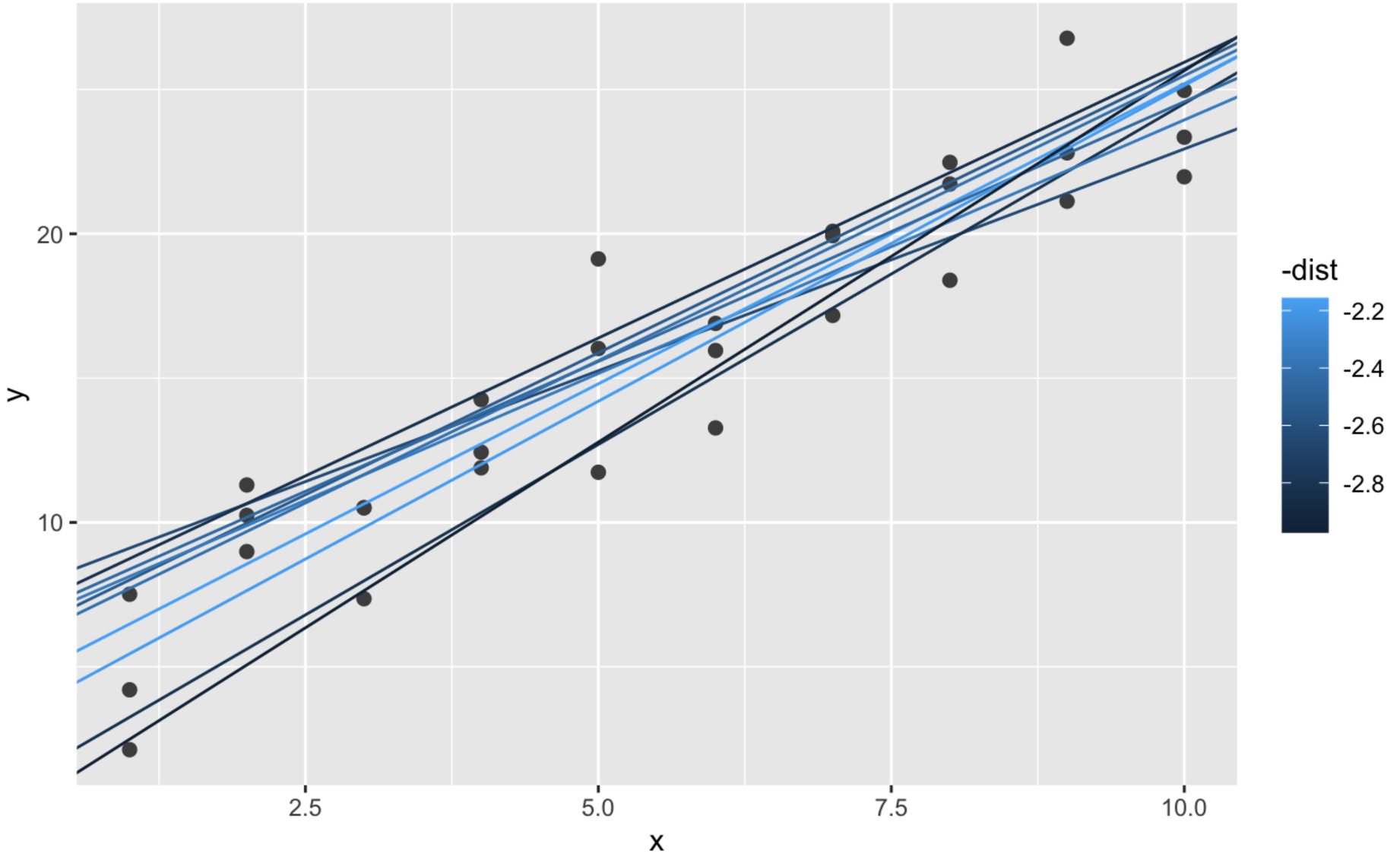
Entendendo o modelo linear

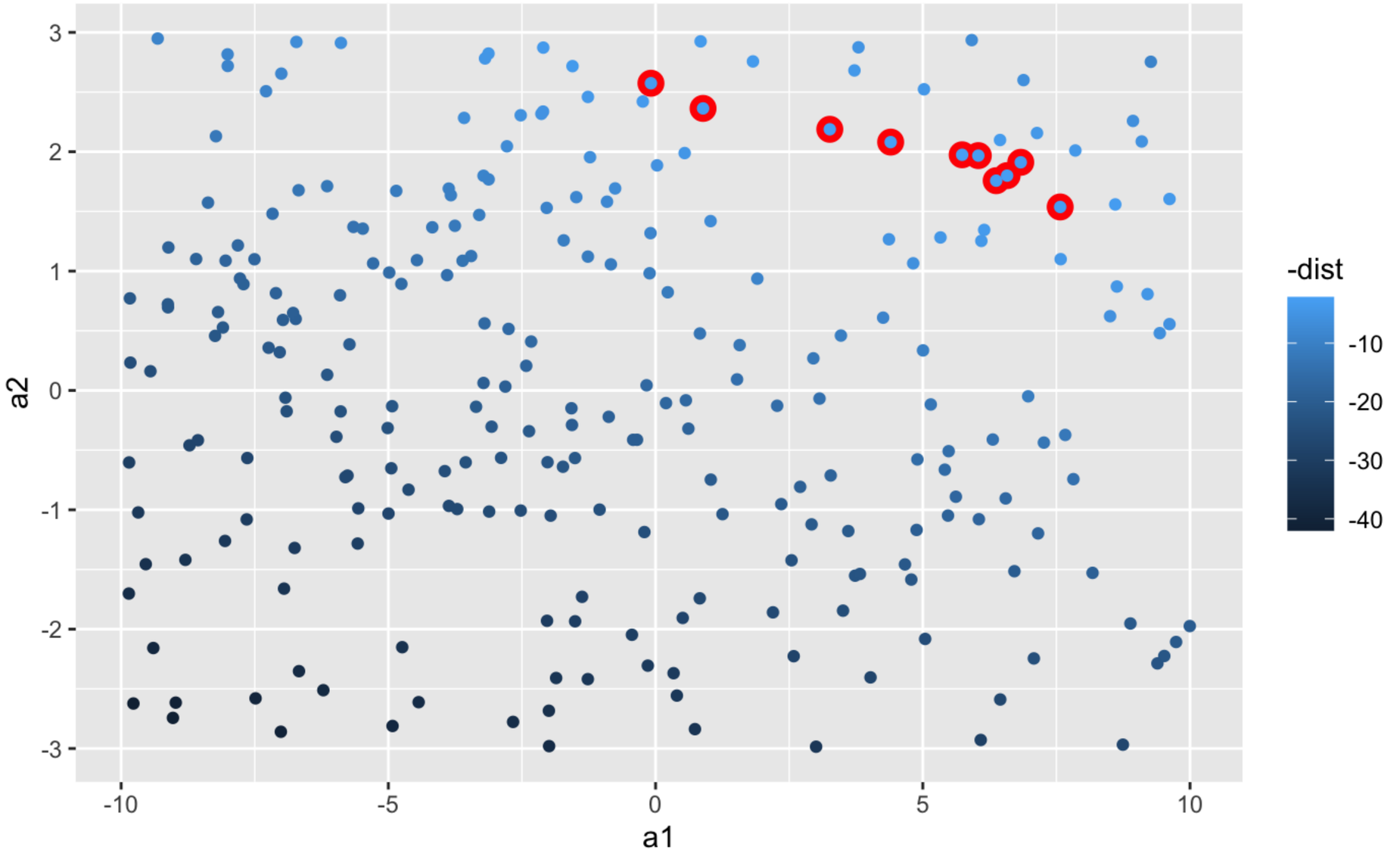
y = ax + b

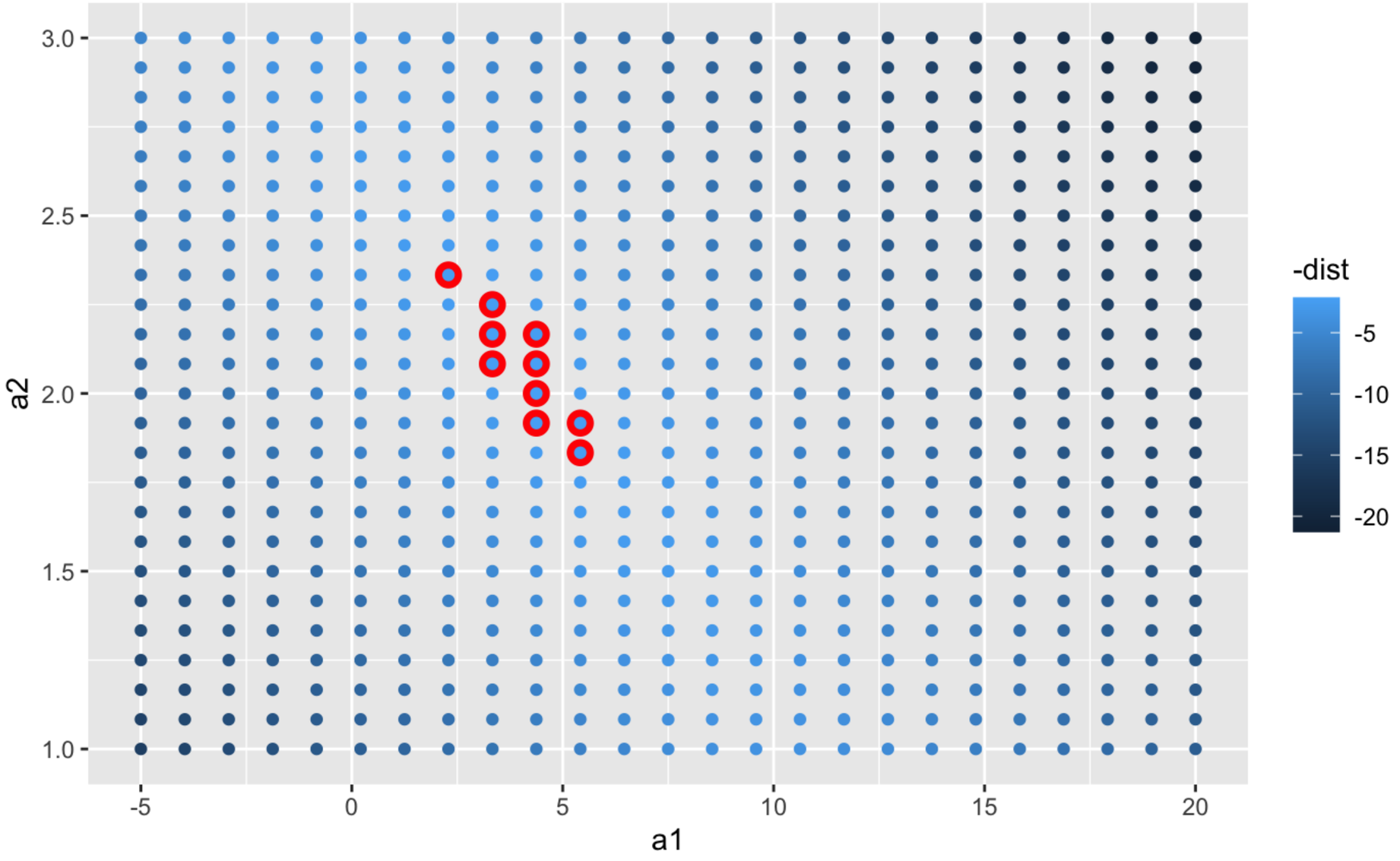
https://www.desmos.com



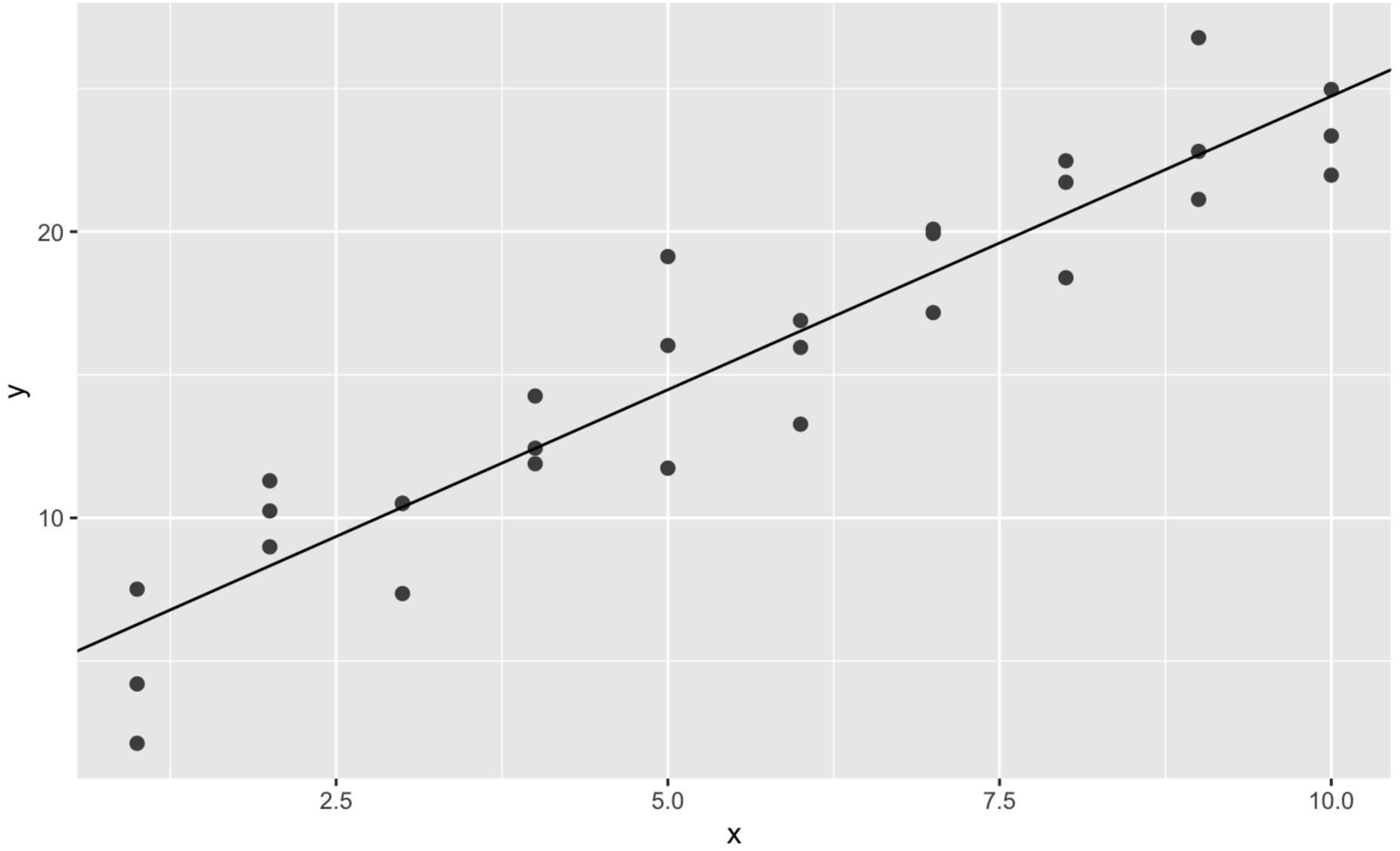
- Escolha um modelo (valores de a1 e a2)
- Calcule o valor predito usando a fórmula
- Calcule o erro entre o valor real e o valor predito para todos os valores


20
10
y
2.5
5.0
7.5
10.0
x
-dist
-2.2
-2.4
-2.6
-2.8


3
2
1
0
-1
-2
-3
a2
-10
-5
0
5
10
a1
-dist
-10
-20
-30
-40


3.0
2.5
2.0
1.5
1.0
a2
-5
0
5
10
15
20
a1
-dist
-5
-10
-15
-20

y = 2,05*x + 4.22



Abstraindo

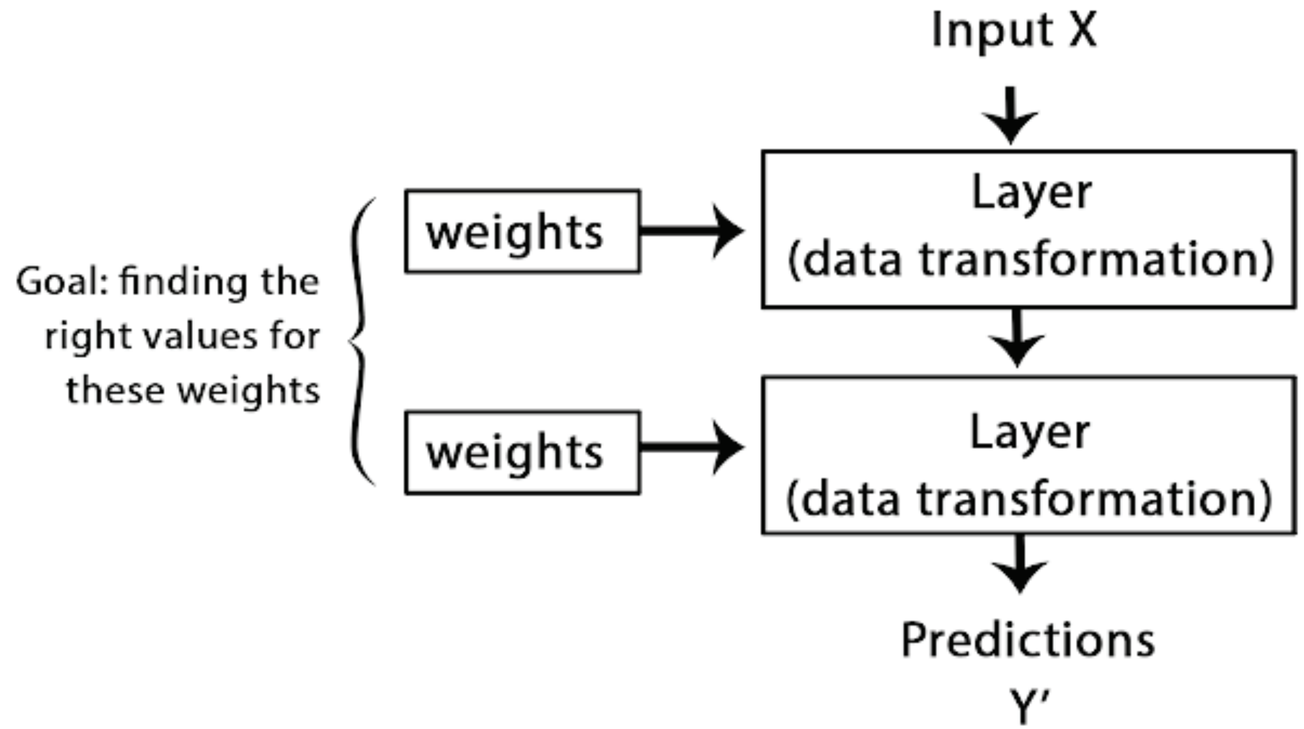


Figure 1.7 A neural network is parametrized by its weights.

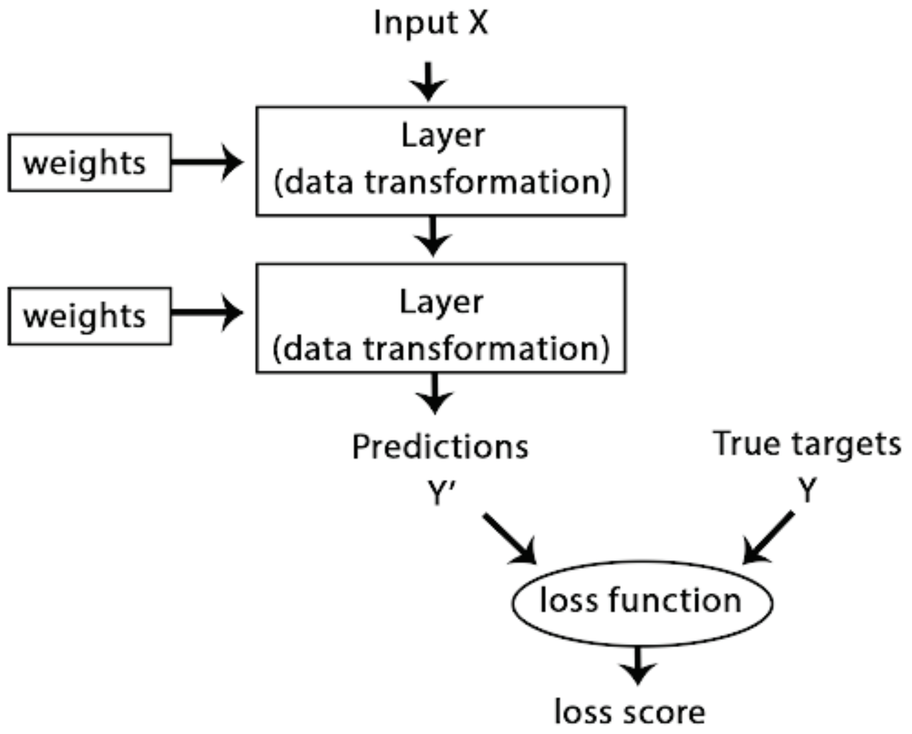


Figure 1.8 A loss function measures the quality of the network's output.

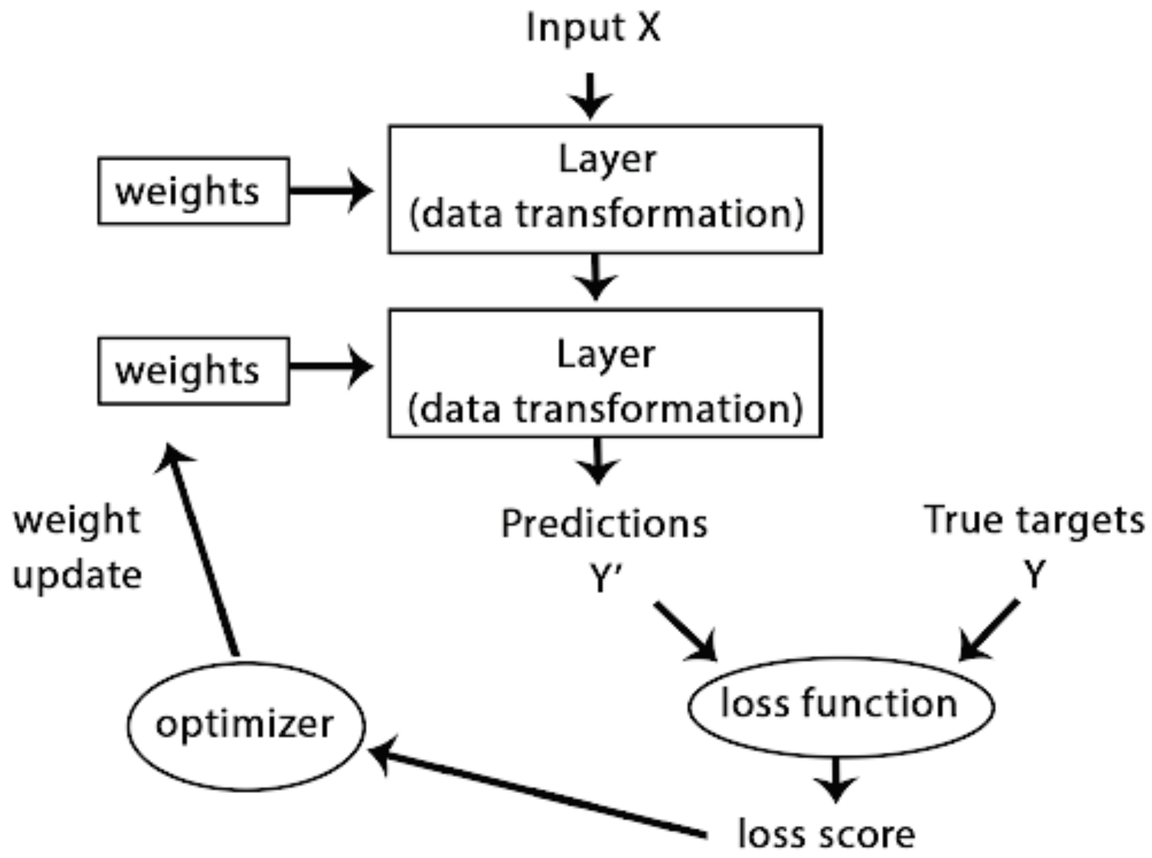
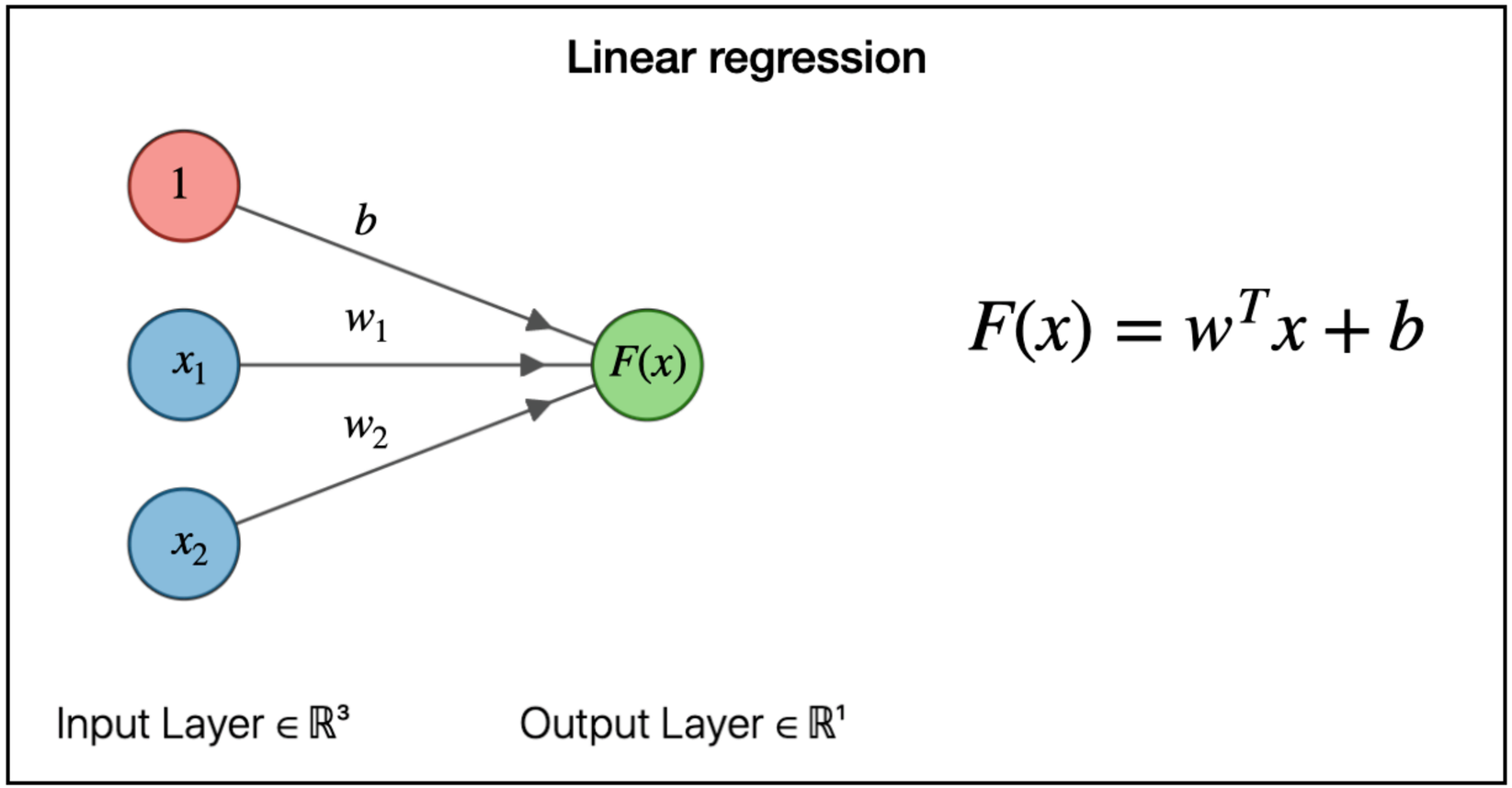


Figure 1.9 The loss score is used as a feedback signal to adjust the weights.



$$F(x) = w^T x + b$$

$$F(x) = w_1 \cdot x_1 + w_2 \cdot x_2 + 1 \cdot b$$

- Como aplicamos isso na nossa matriz de textos DFM ?

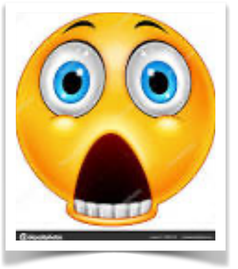
Algebra linear

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}_{3\times 2} \times \begin{bmatrix} 1 & 1 & 1 \\ 2 & 2 & 2 \end{bmatrix}_{2\times 3} =$$

$$\begin{bmatrix} 1\times 1 + 2\times 2 & 1\times 1 + 2\times 2 & 1\times 1 + 2\times 2 \\ 3\times 1 + 4\times 2 & 3\times 1 + 4\times 2 & 3\times 1 + 4\times 2 \\ 5\times 1 + 6\times 2 & 5\times 1 + 6\times 2 & 5\times 1 + 6\times 2 \end{bmatrix}_{3\times 3} =$$

$$\begin{bmatrix} 5 & 5 & 5 \\ 11 & 11 & 11 \\ 17 & 17 & 17 \end{bmatrix}$$

Algebra linear



$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}_{3\times 2} \Rightarrow \grave{A} \text{ ou } A^T = \begin{bmatrix} 1 & 3 & 5 \\ 2 & 4 & 6 \end{bmatrix}$$

$$B = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix} \Rightarrow \text{DIAG}(B) = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix}$$