Ministério da Ciência, Tecnologia e Inovações

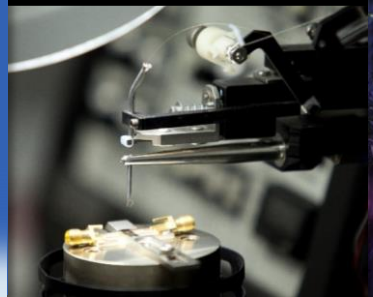
Centro Brasileiro de Pesquisas Físicas

Métodos para Análise de grande volume de dados e Astroinformática

Clécio Roque De Bom – debom@cbpf.br

CBPF

clearnightsrthebest.com





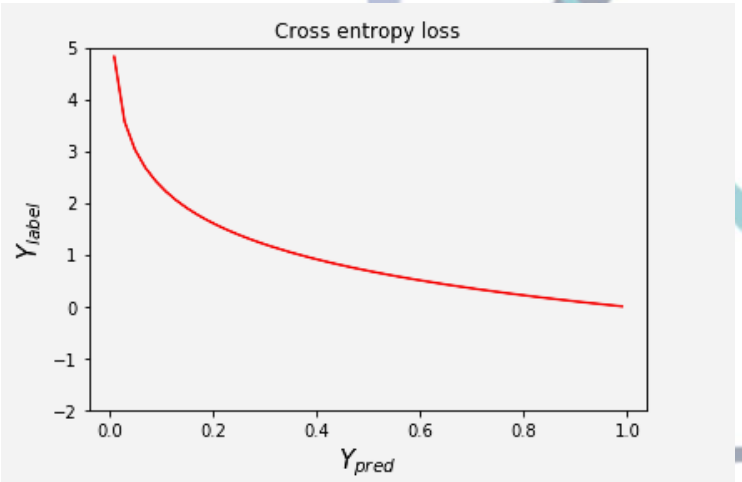

Loss function (função custo)

Loss functions in Machine Learning serve as ways to measure the distance or difference between a model's predicted output Y_{out} and the ground truth label Y in order to train our model effectively

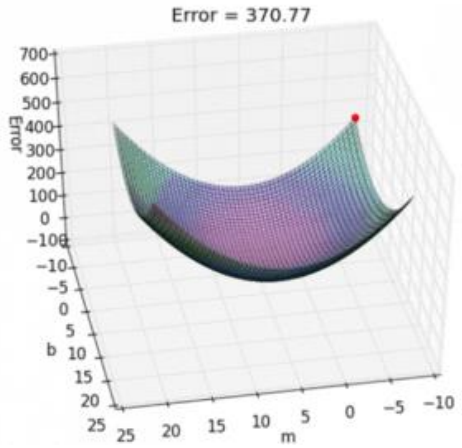
- **L2 Norm loss/ Euclidean loss function:** $L2 = \left(Y_{true} - Y_{pred}\right)^2$

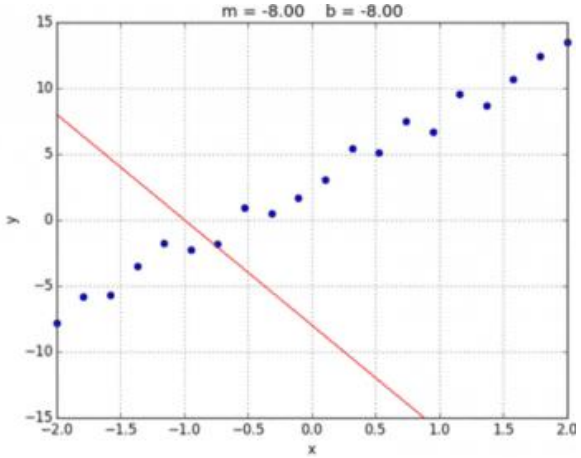
- **Cross entropy Loss:**

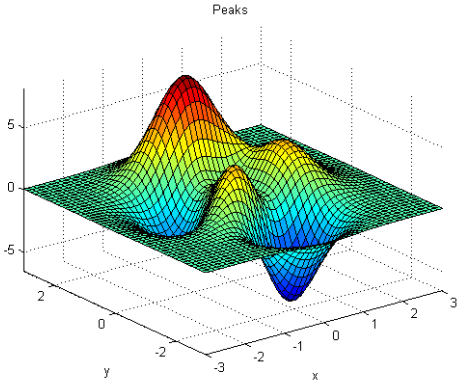
$$H(p,q) = -\sum_i p_i log q_i = -y\ log\hat{y} - (1-y)\log(1-\hat{y})$$

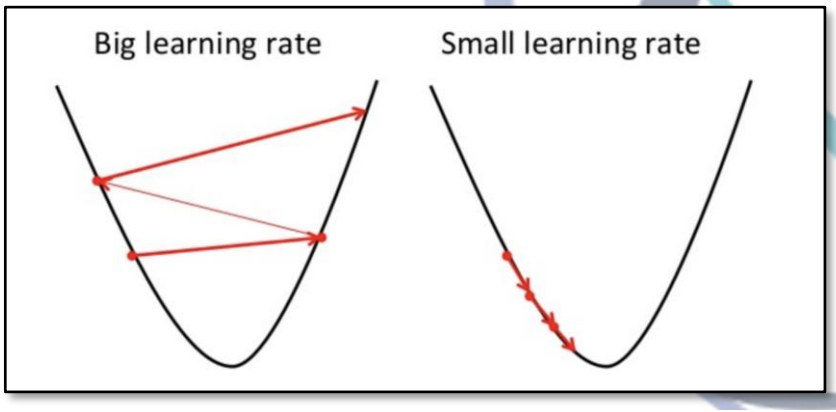


Rede Neural Artificial: Stochastic Gradient Descent - Algorithm



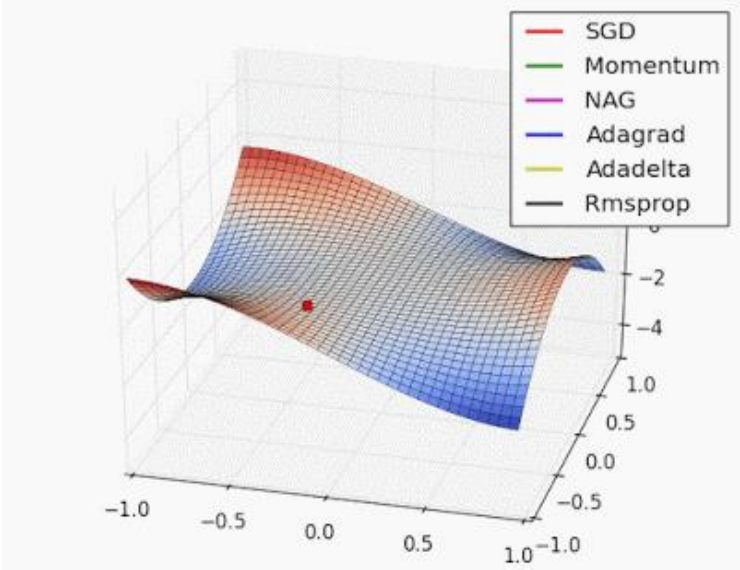


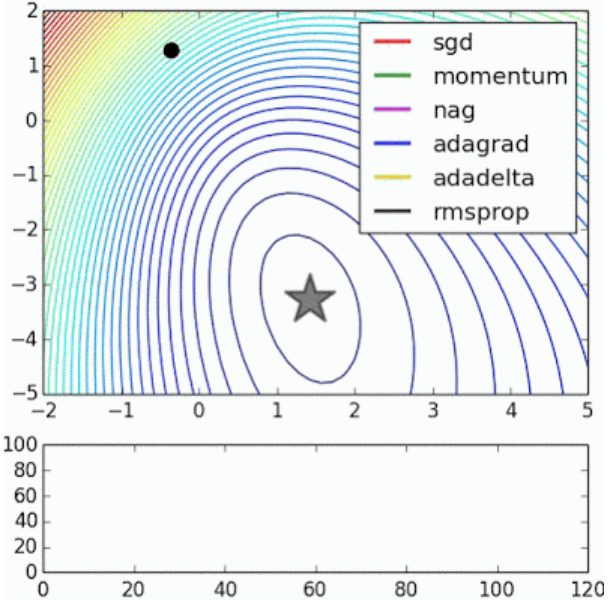




https://towardsdatascience.com/a-look-at-gradient-descent-and-rmsprop-optimizers-f77d483ef08b

Artificial Neural Network: Optimization Algorithms



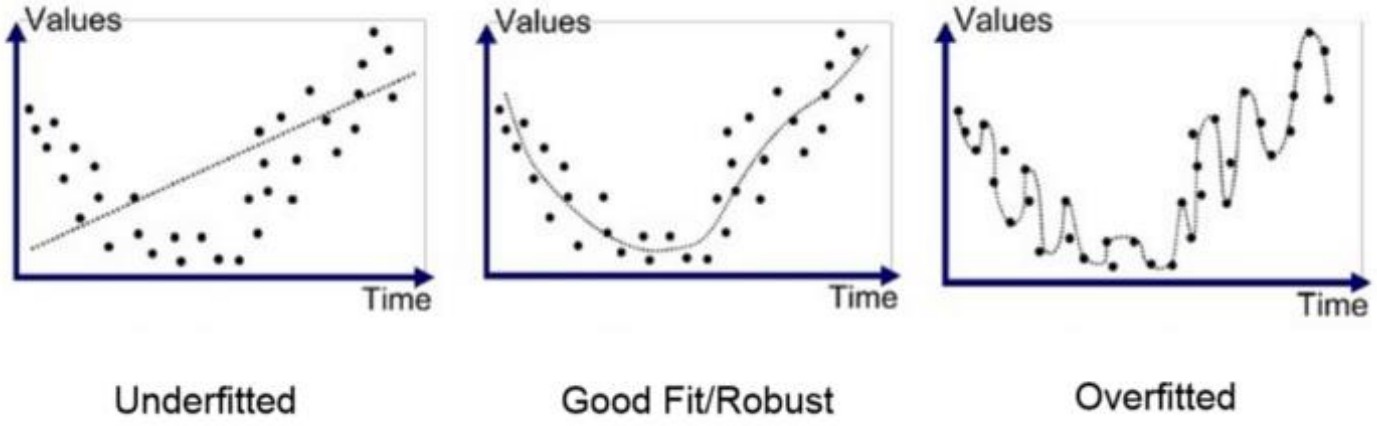


SGD: Stochastic Gradient Descent
ADAGRAD: Adaptive Gradient
ADADELTA: Adaptive Learning Rate Method
RMSPROP: Root Mean Square Propagation

Gradient depends on the average of the magnitudes of squares of previous gradients.

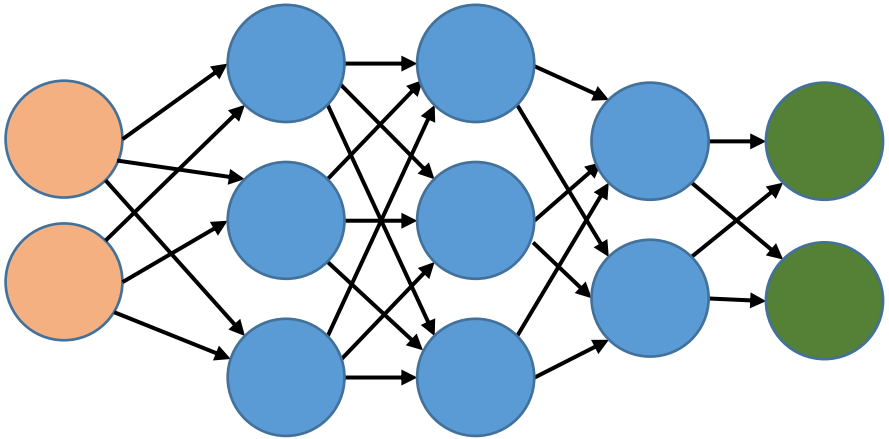
http://www.denizyuret.com/2015/03/alec-radfords-animations-for.html

Artificial Neural Network: Overfitting



O **overfitting** (*sobreajuste*) é um termo para descrever quando um modelo se ajusta muito bem ao conjunto de dados, mas se mostra ineficaz para prever novos resultados.

Artificial Neural Network: DROPOUT

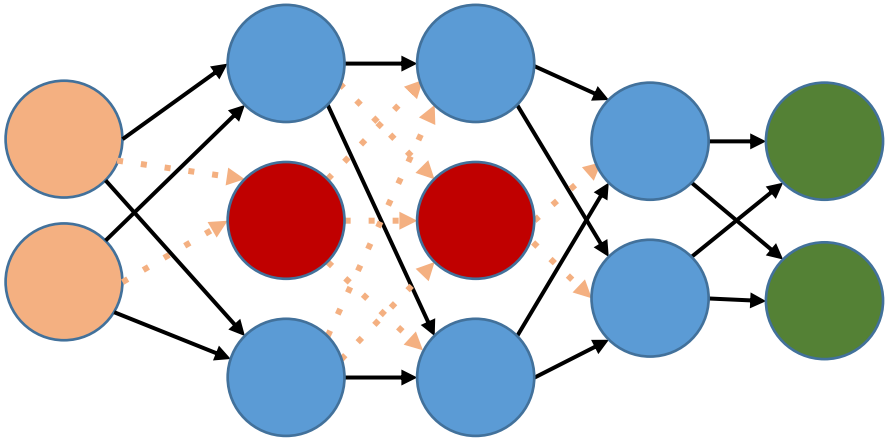


Dropout is a technique where randomly selected neurons are ignored during training. They are “dropped-out” randomly.

Durante o processo de treinamento devemos escolher uma probabilidade de retirada de neurônios.

A Simple Way to Prevent Neural Networks from Overfitting.

Artificial Neural Network: DROPOUT



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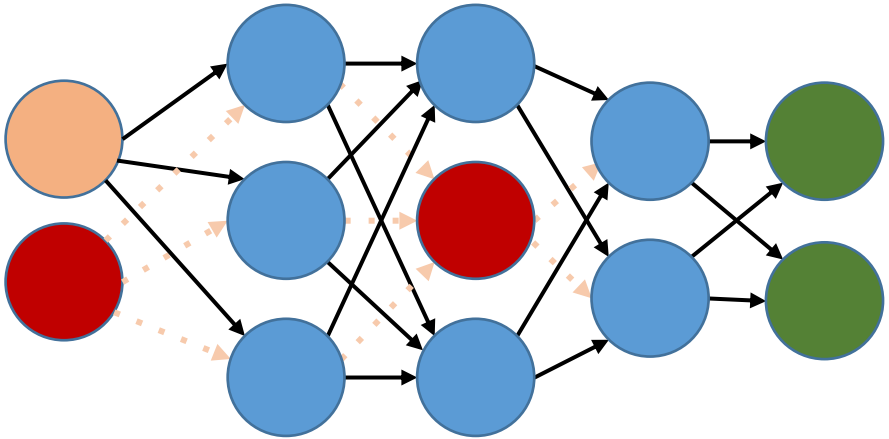

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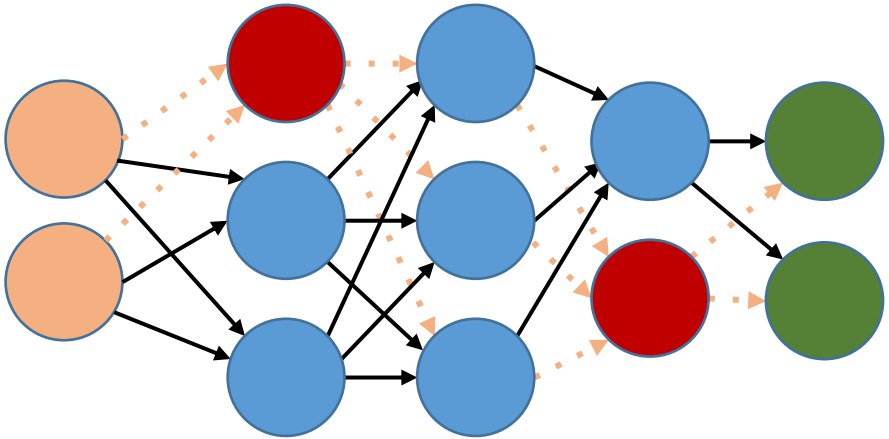

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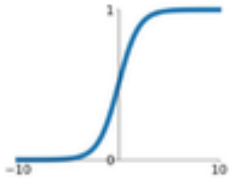
A Simple Way to Prevent Neural Networks from Overfitting.

Função de Ativação

Activation Functions

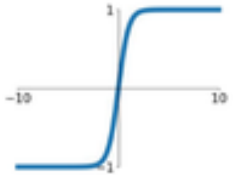
Sigmoid

$$\sigma(x) = \frac{1}{1+e^{-x}}$$



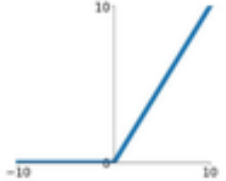
tanh

$$\tanh(x)$$



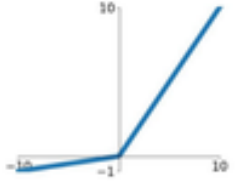
ReLU

$$\max(0, x)$$



Leaky ReLU

$$\max(0.1x, x)$$

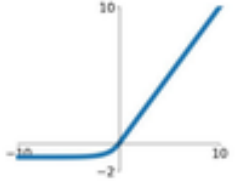


Maxout

$$\max(w_1^T x + b_1, w_2^T x + b_2)$$

ELU

$$\begin{cases} x & x \geq 0 \\ \alpha(e^x - 1) & x < 0 \end{cases}$$



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