



# INSIGHT

Data Science Laboratory  
Federal University of Ceará

# Data Science

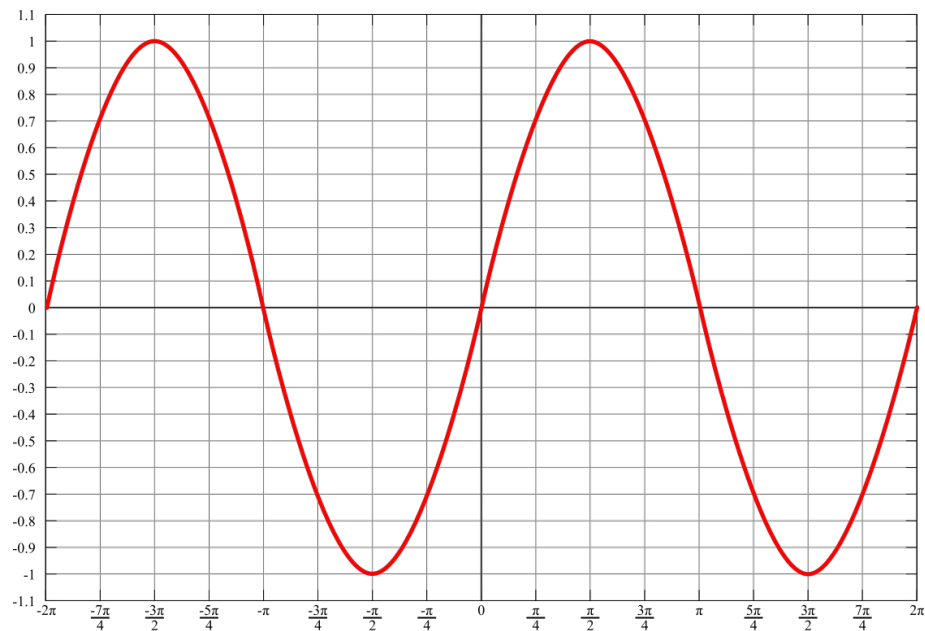
## Mais Redes Neurais

## Limitações dos perceptrons

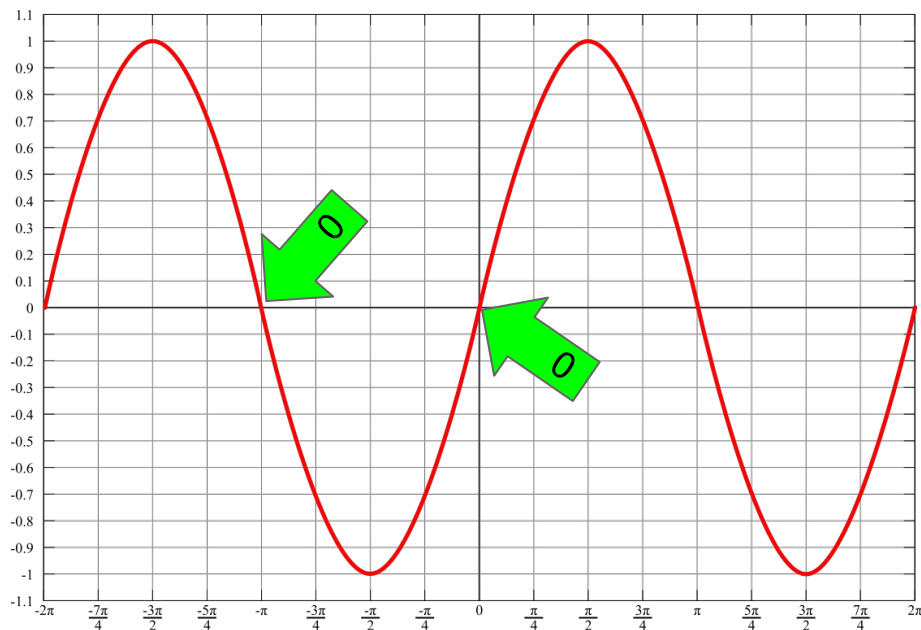
- Outputs 0 ou 1
- Não possuem noção de sequência de inputs
- Não leva os vizinhos do input em consideração



# Noção de sequência

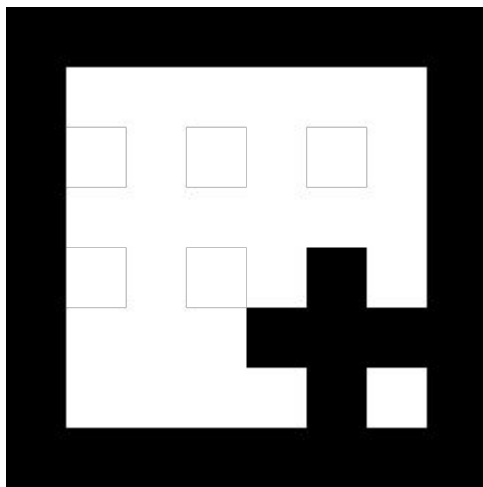
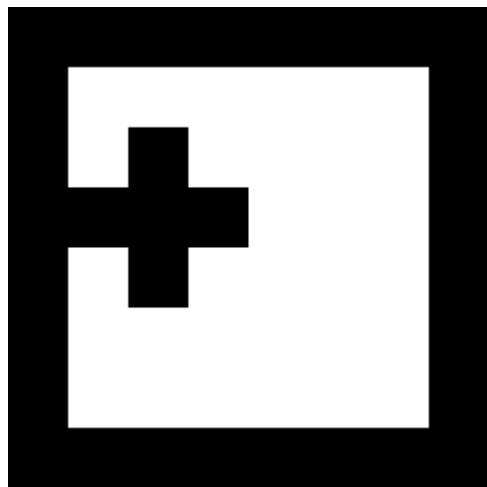


# Noção de sequência



Qual o próximo?

## Noção de Vizinhança



O MLP vai receber apenas um array achatado dos pixels

A noção dos pontos próximos em uma matrix se perde

The background image is a blurred office space. In the foreground, a wooden desk holds a computer monitor, a red desk lamp, a black desk lamp, a small potted plant, and a black cat figurine. In the background, other desks with computers and large windows are visible, creating a sense of a modern, open-plan office environment.

# Outros Tipos de Redes Neurais

## Tipos de redes neurais

- Deep Neural Network
- Recurrent Neural Network (RNN)
- LSTM
- Convolutional Neural Network (CNN)



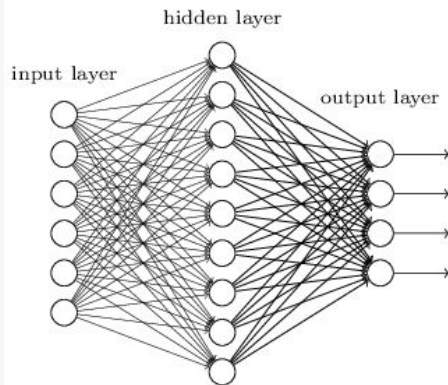


# Deep Neural Network

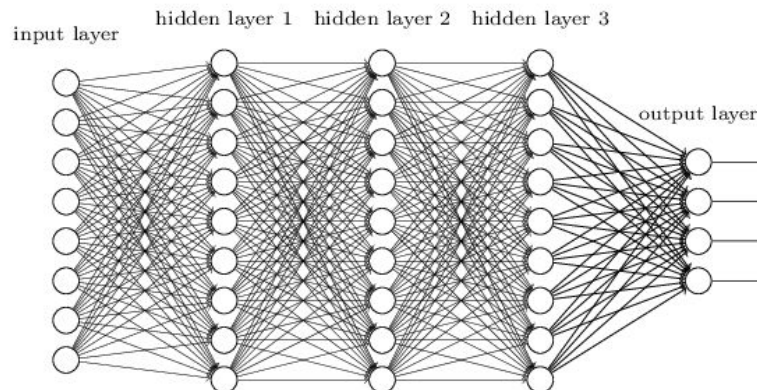
Perigo de overfitting em problemas simples

Necessário em problemas complexos

"Non-deep" feedforward  
neural network

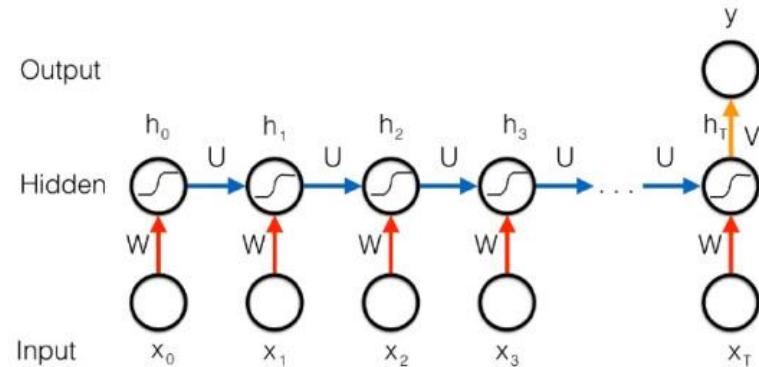
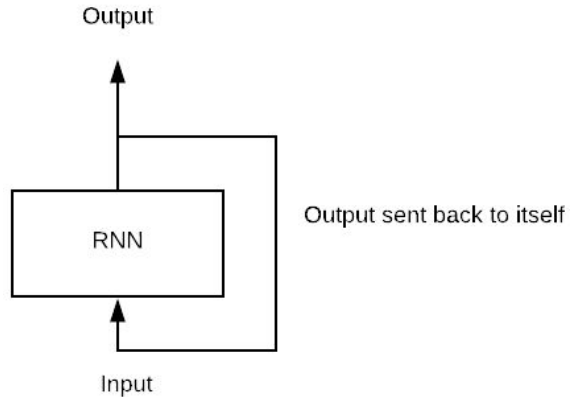


Deep neural network



# Recurrent Neural Network

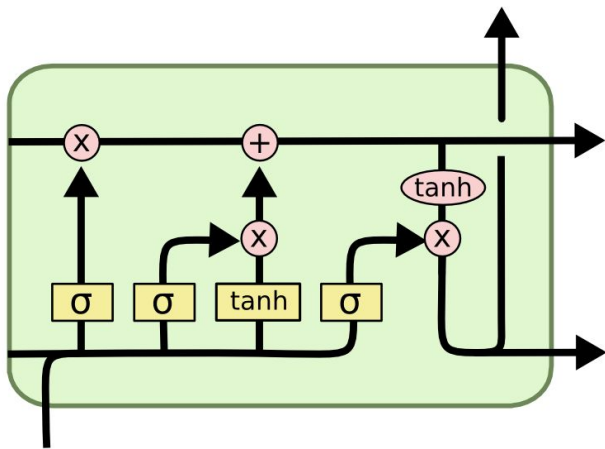
Utiliza o output anterior como um dos inputs da camada oculta



# LSTM

Versão melhorada do RNN

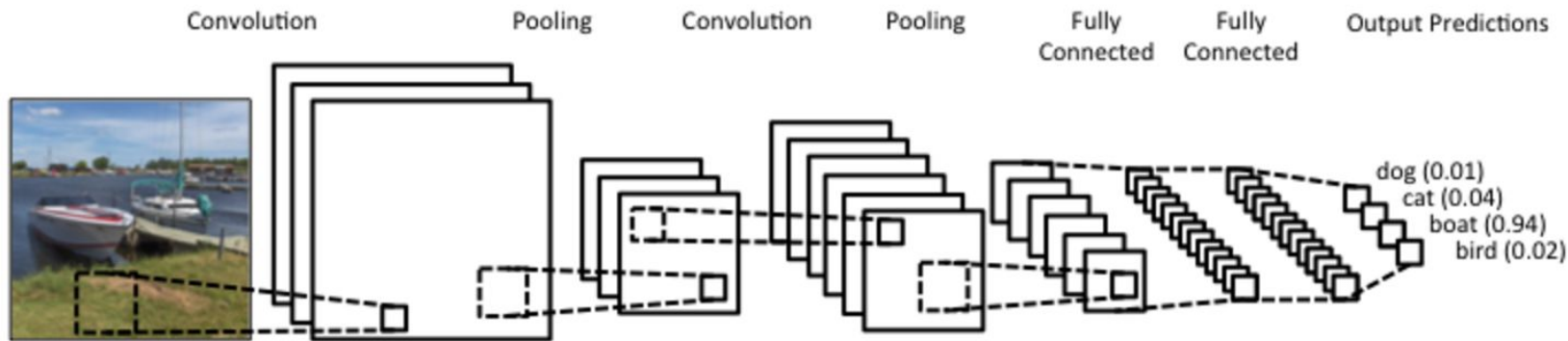
Trata melhor eventos mais distantes no passado



Não precisa tentar entender, já tem tudo pronto nas bibliotecas!

# Convolutional Neural Network

Utiliza um conjunto de filtros para descobrir padrões baseando-se na vizinhança

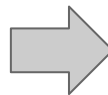


# Convolutional Neural Network

## Convolução

0	0	0	0	0	0
0	1	0	0	0	0
1	1	1	0	0	0
0	1	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

-1	1	-1
1	1	1
-1	1	-1



-2	0	-1	-1	-1	-1
1	0	1	0	0	-1
-1	5	0	1	0	-1
1	0	1	0	0	-1
-1	1	-1	0	0	-1
-1	-1	-1	-1	-1	-1

# Convolutional Neural Network

## Max Pooling

-2	0	-1	-1	-1	-1
1	0	1	0	0	-1
-1	5	0	1	0	-1
1	0	1	0	0	-1
-1	1	-1	0	0	-1
-1	-1	-1	-1	-1	-1



1	1	0
5	1	0
1	0	0

# Convolutional Neural Network

## Max Pooling

-2	0	-1	-1	-1	-1
1	0	1	0	0	-1
-1	5	0	1	0	-1
1	0	1	0	0	-1
-1	1	-1	0	0	-1
-1	-1	-1	-1	-1	-1



1	1	0
5	1	0
1	0	0

The background image is a dimly lit office space. In the foreground, a desk is visible with a computer monitor, a desk lamp, a small potted plant, and some other items. In the background, there are more desks, computers, and a large window that lets in some light. The overall atmosphere is quiet and focused.

Mãos à obra!