Deep Learning

UFRN 2018.1

Prof. Helton Maia

Plano de Estudos

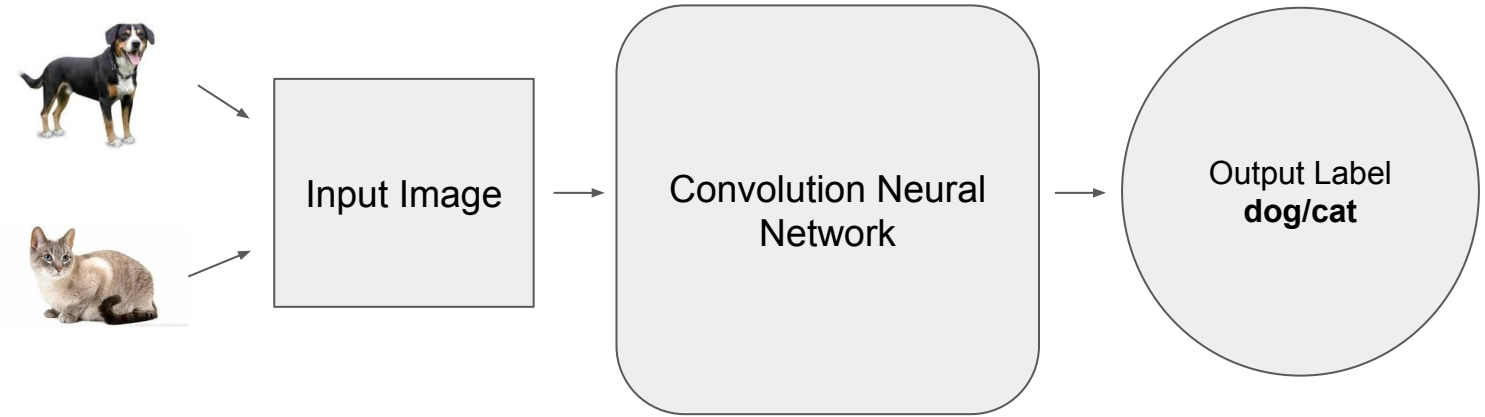
- **Semana 1**: *What is Deep Learning ?*
- **Semana 2: Fundamentos de Machine Learning**
  - **Introdução**
  - **Aprendizagem Supervisionada**
  - **CNN - *Layers : Convolutional, Activation, Pooling, Flattening, Fully-connected***
- **Semana 3**: Processamento de Imagens em Python
  - Instalação de pacotes e preparação do ambiente
  - Manipulando imagens com OpenCV
- **Semanas 4-5**: Construíndo o Primeiro Classificador
  - Conheçendo o Keras
  - Repetindo exemplos conhecidos
  - Projeto: Desenho e implementação de um novo experimento
- **Semanas 6-7**: Otimizando o Classificador
  - Analisando resultados e testando parâmetros
  - Apresentação de resultados

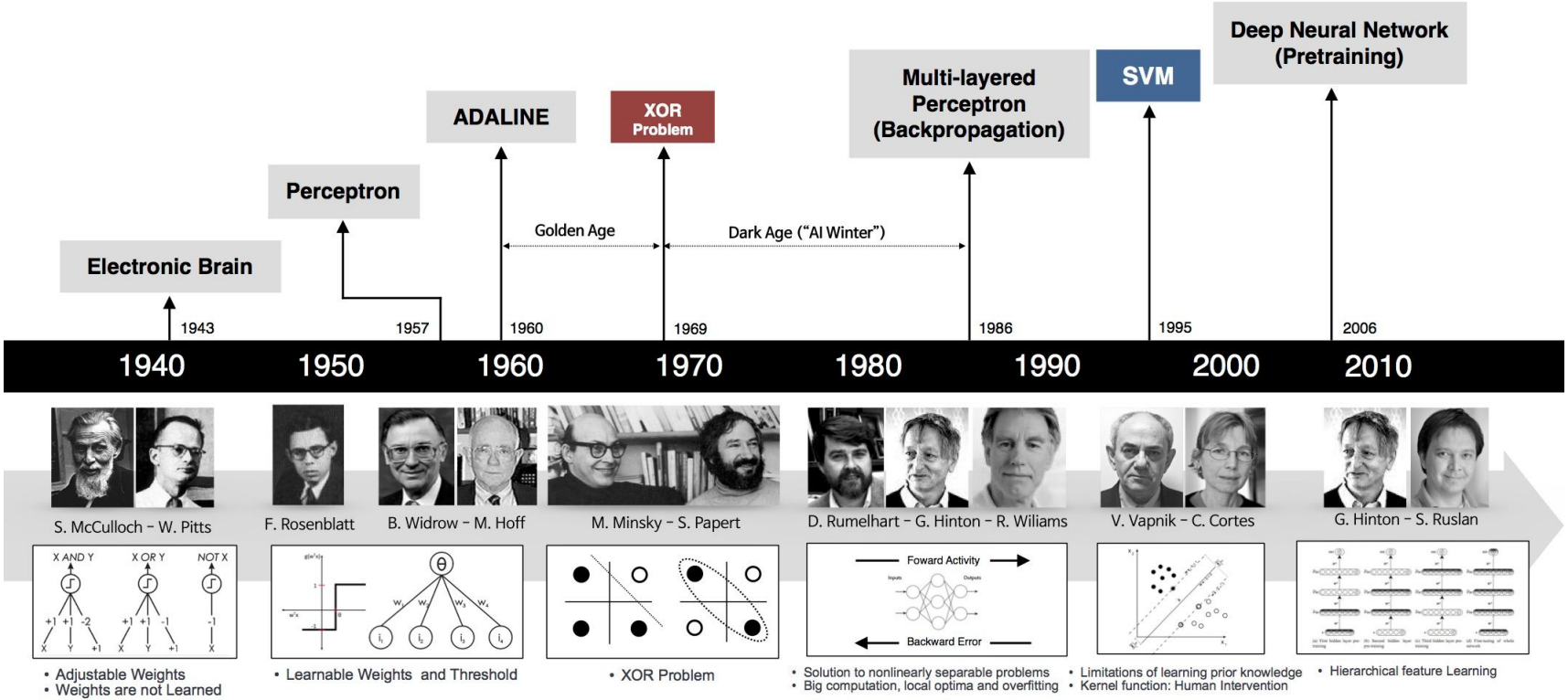
Semana 2

What is Deep Learning?

“A machine learning technique that learns **features and tasks** directly from data”.

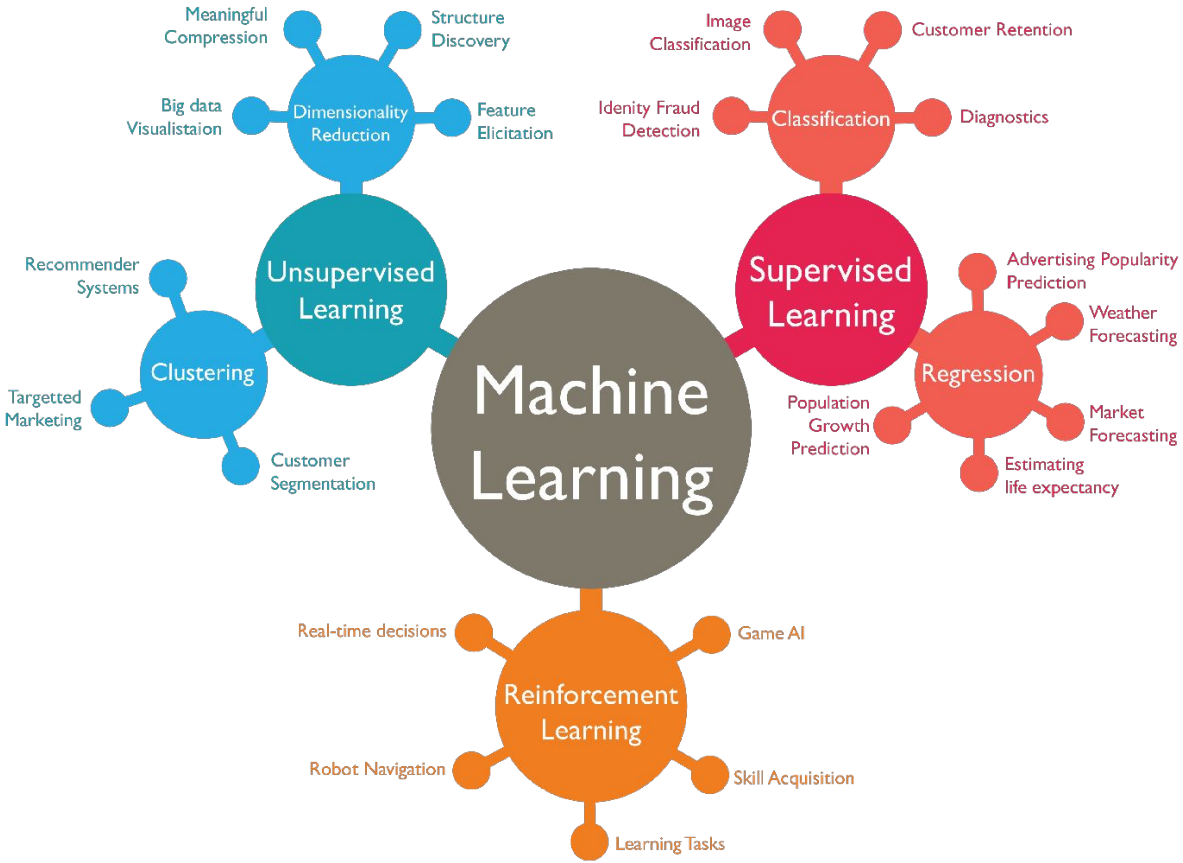
Data can be images, text, sound ...





source: https://beamandrew.github.io/deeplearning/2017/02/23/deep_learning_101_part1.html

Métodos de Aprendizagem



Aplicando Machine Learning

1 - Defina seu problema: motivação, descrição, problemas similares, benefícios da solução;

2 - Prepare seus dados: como preparar (seleção)? , pré-processamento, *features selection;*

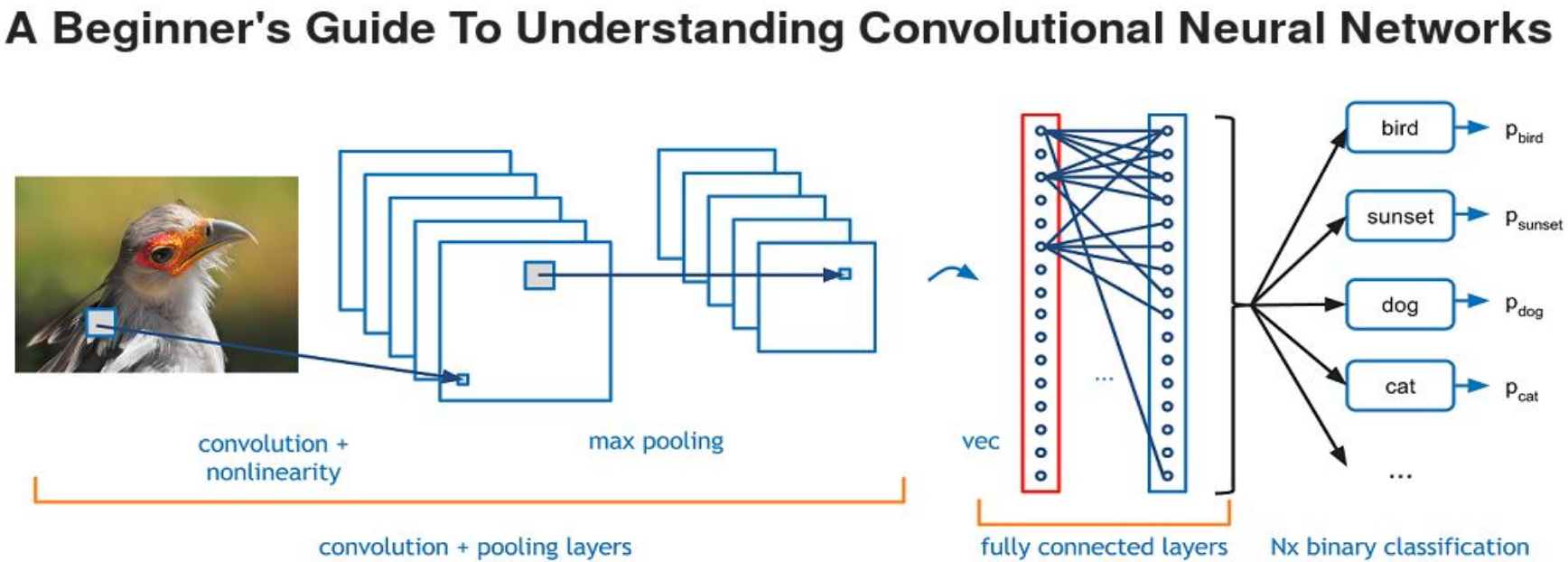
3 - Escolha a abordagem "algoritmo": performance/accuracy, classificação/regressão/clusterização;

4 - Obtendo bons resultados e como melhorá-los (*Algorithm Tuning*);

5 - Como apresentar seus resultados?

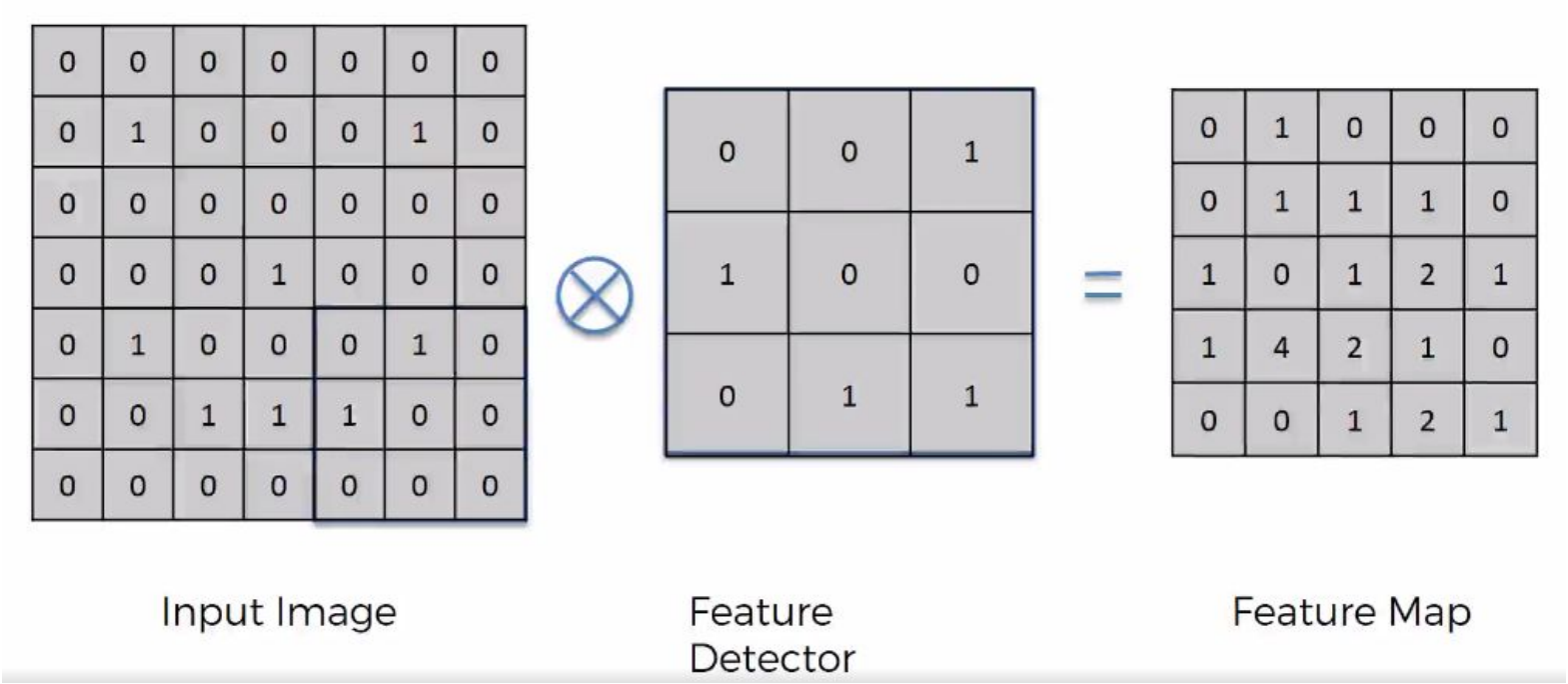
source: https://machinelearningmastery.com/start-here/

CNN



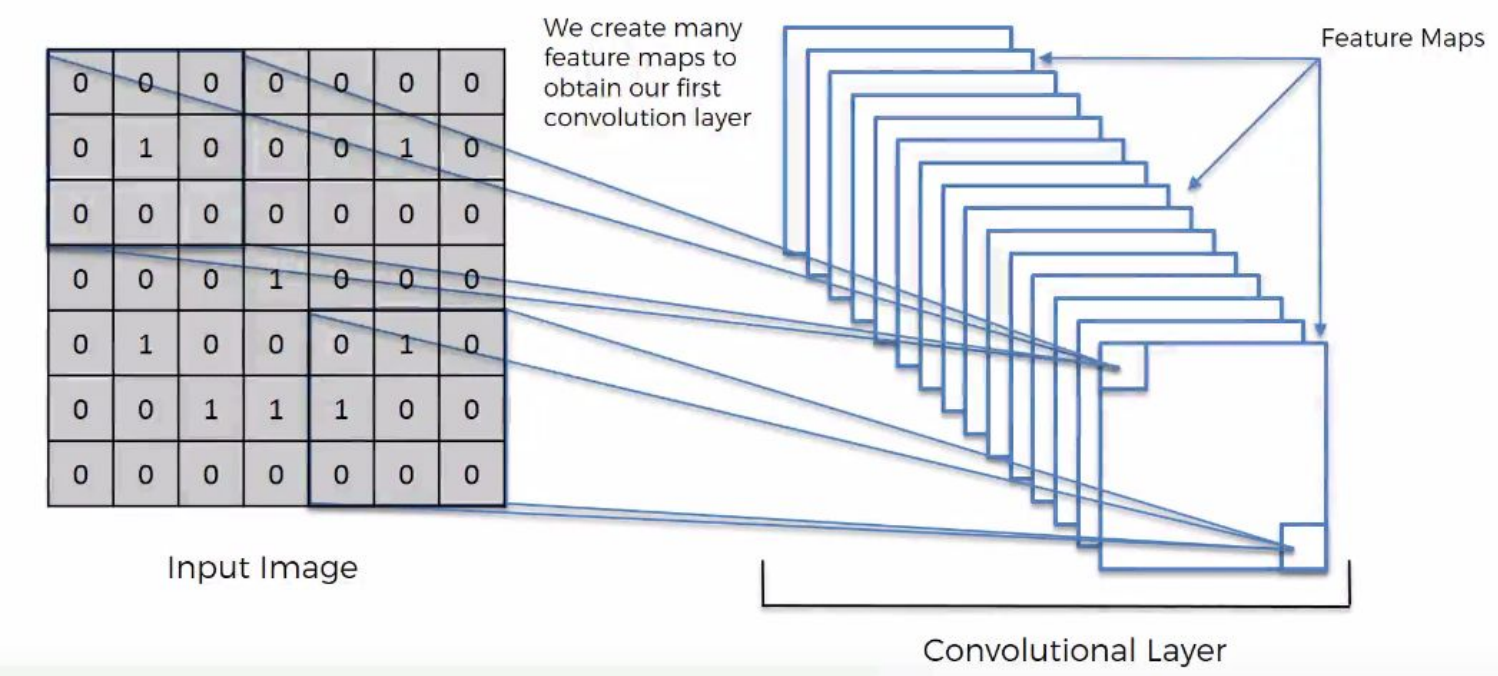
source: https://adeshpande3.github.io/adeshpande3.github.io/A-Beginner's-Guide-To-Understanding-Convolutional-Neural-Networks/

Convolution Layer



source: http://arun-aiml.blogspot.com.br/2017/07/convolutional-neural-networks.html

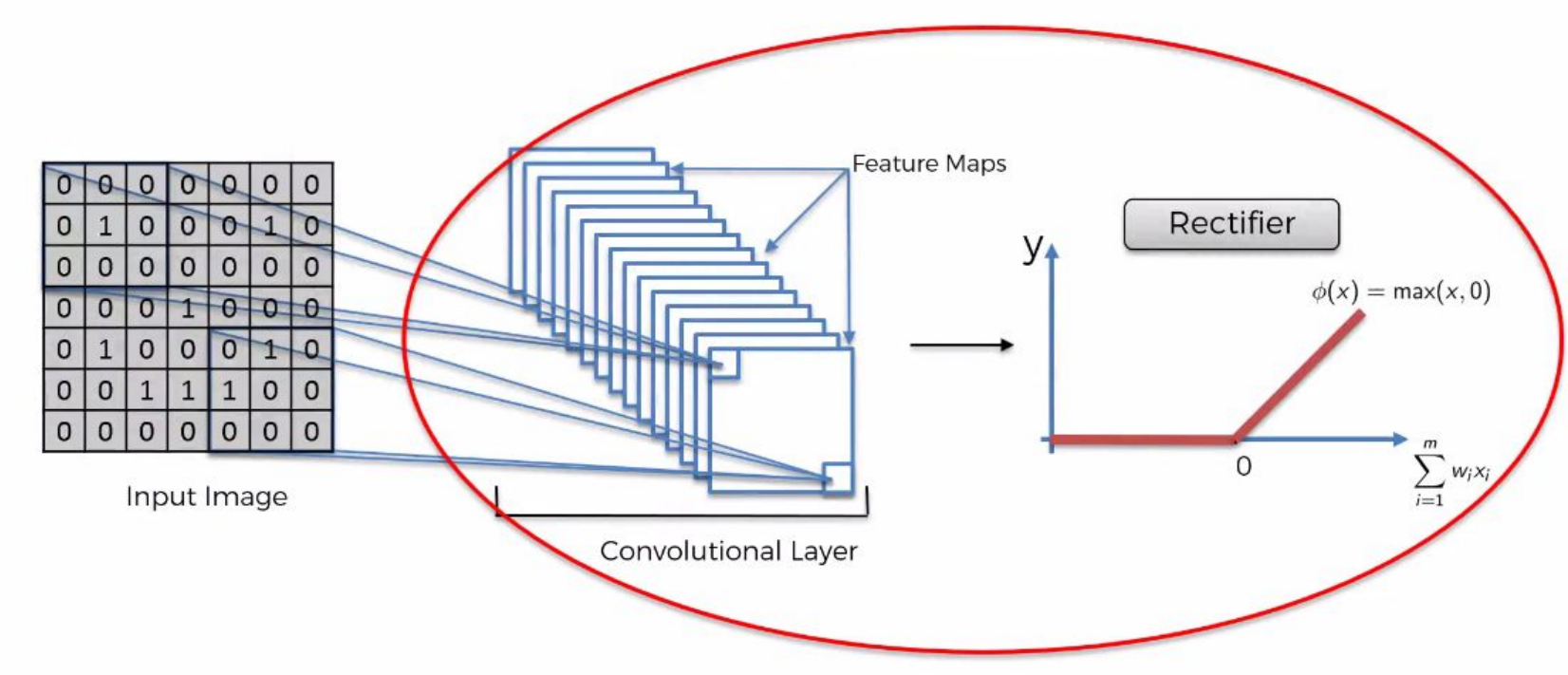
Convolution Layer



* Diferentes filtros detectam diferentes características.

source: http://arun-aiml.blogspot.com.br/2017/07/convolutional-neural-networks.html

Convolution Layer + ReLU (Rectifield Linear Unit)



source: http://arun-aiml.blogspot.com.br/2017/07/convolutional-neural-networks.html

Convolution Layer + ReLU (Rectifield Linear Unit)

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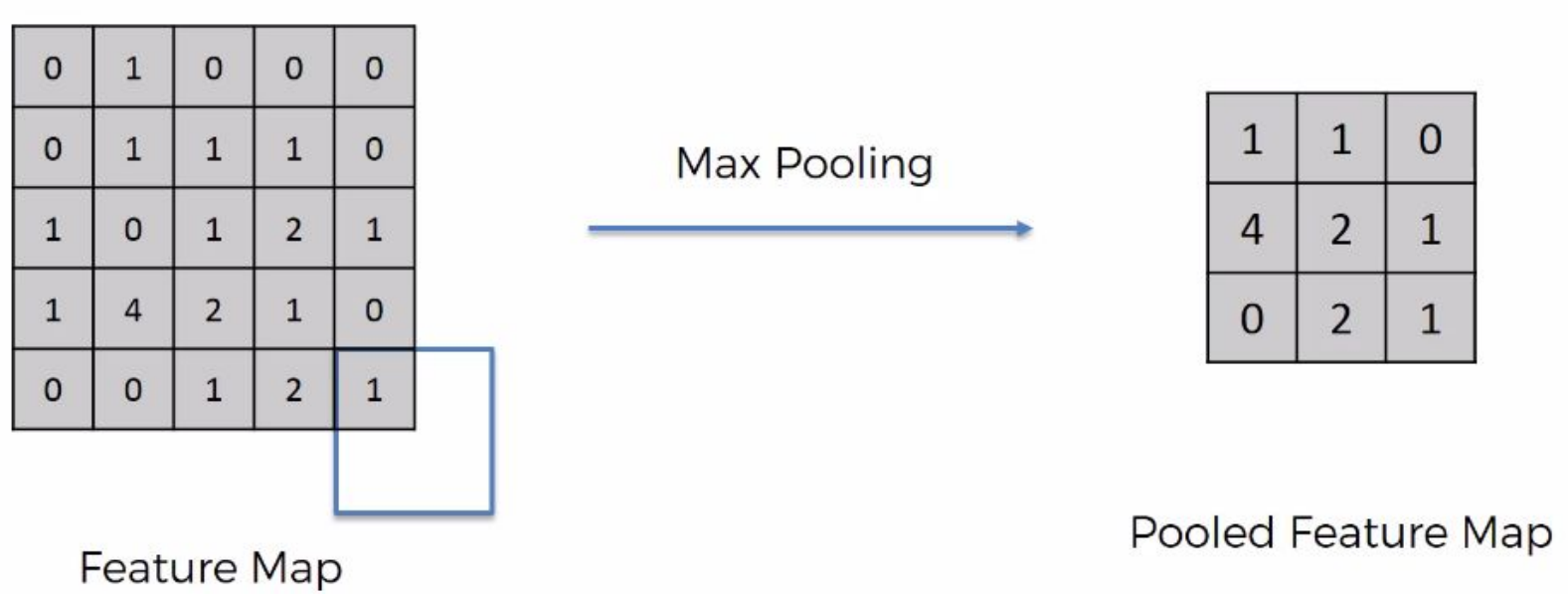
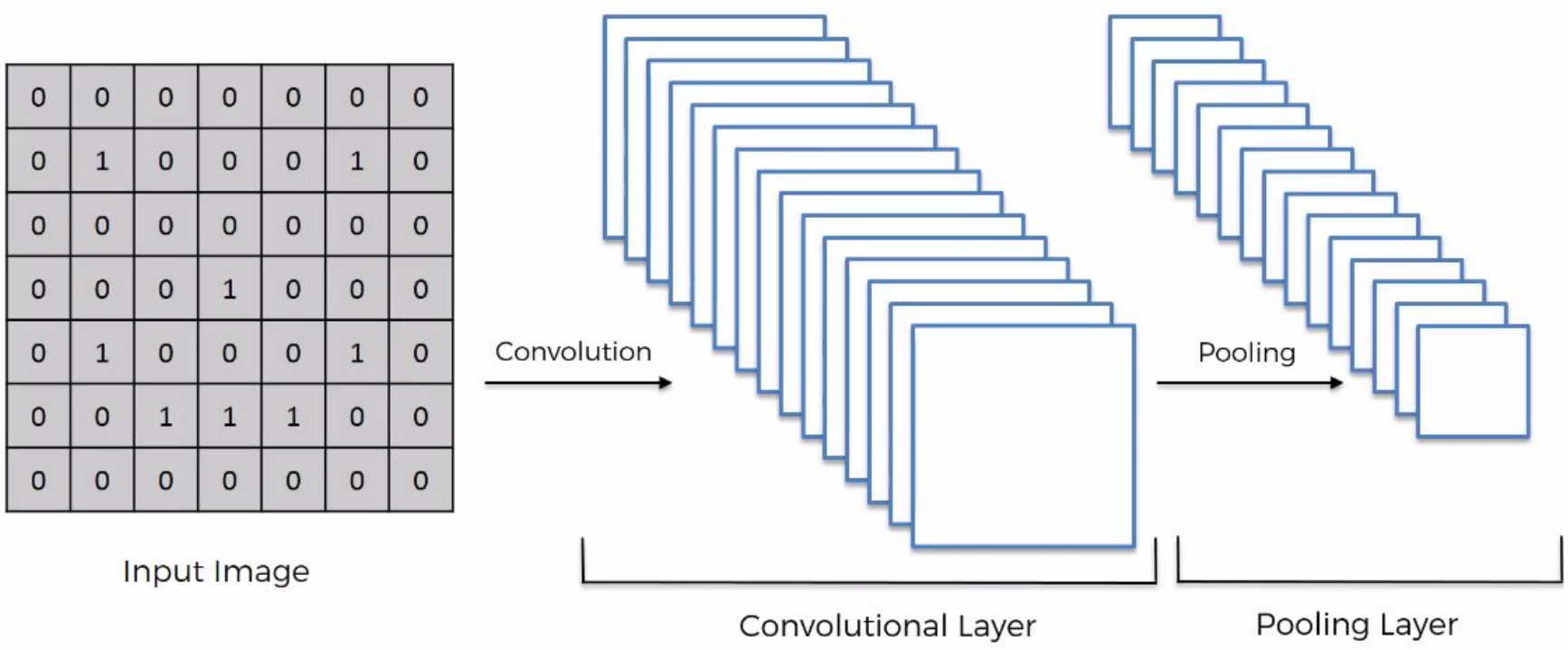
Max/Average/Sum Pooling (downsampling)

- Mantém a informação para diferentes “posições” da imagem
- Reduz o tamanho do mapa de características
- Prevenção contra *overfitting*



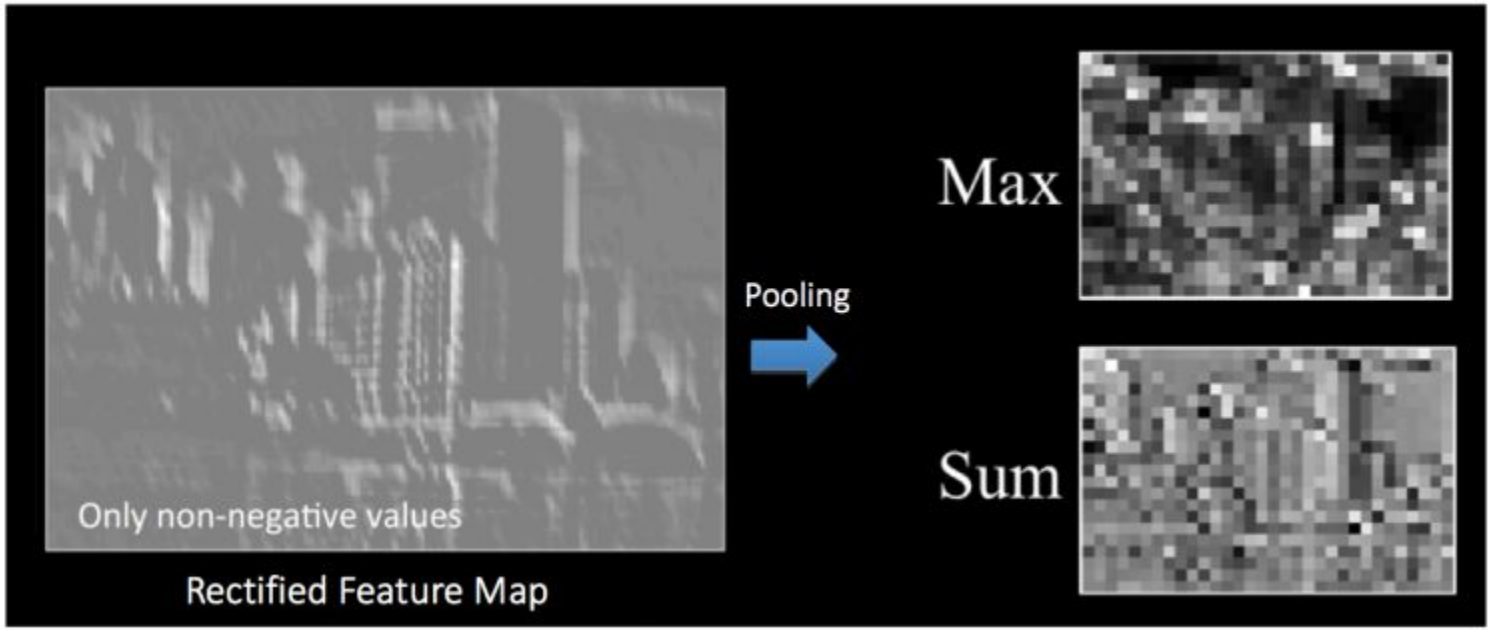
source: http://arun-aiml.blogspot.com.br/2017/07/convolutional-neural-networks.html

Max Pooling (subsampling or downsampling)



source: http://arun-aiml.blogspot.com.br/2017/07/convolutional-neural-networks.html

Efeito do *Max Pooling*



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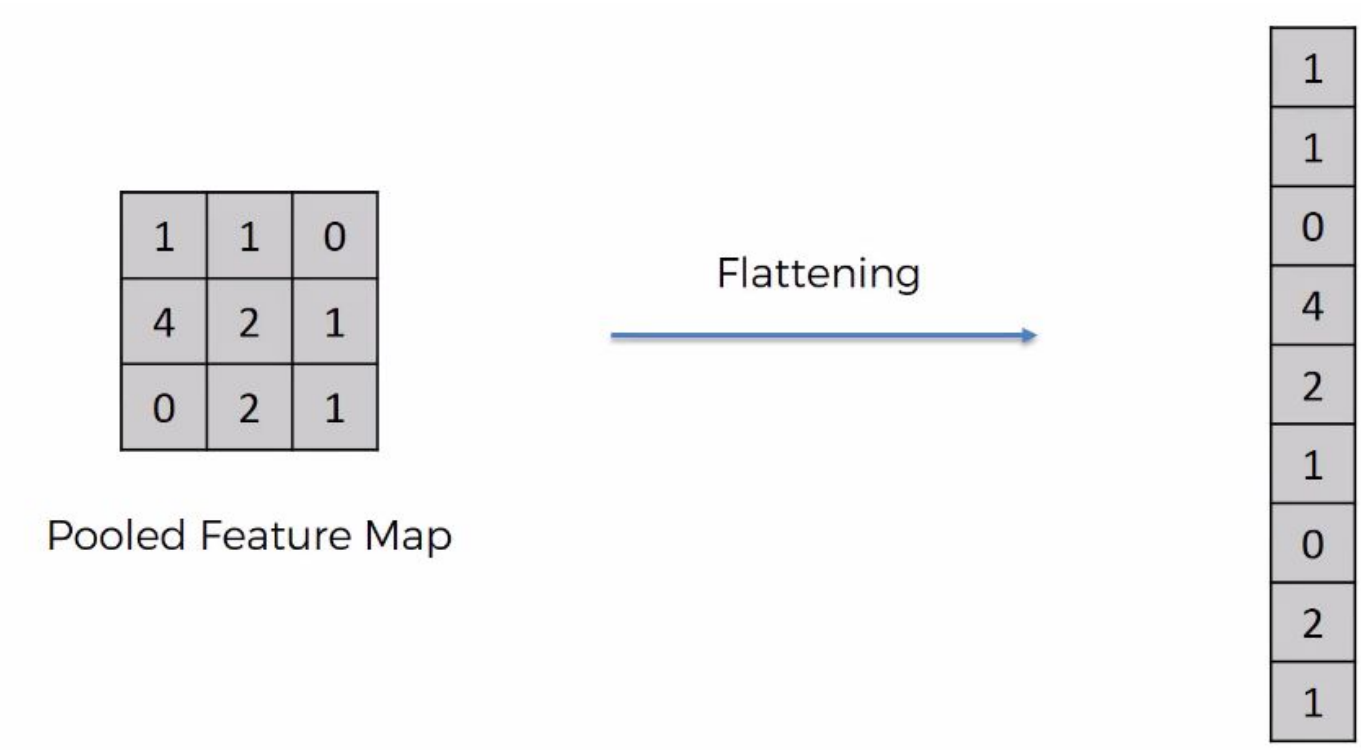
Flattening



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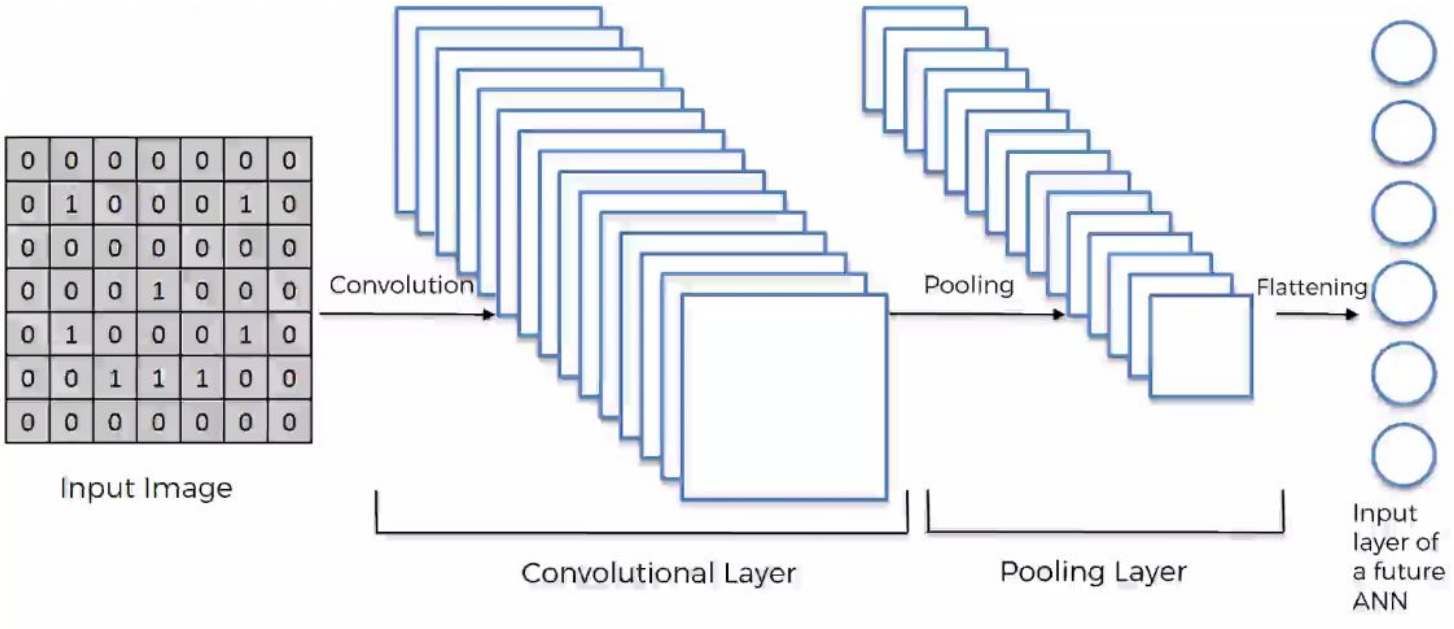

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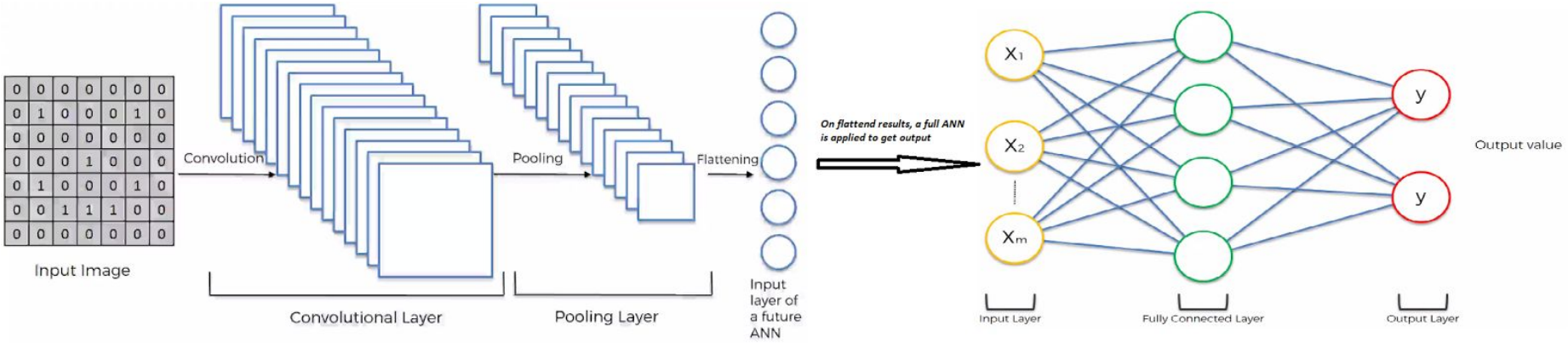
Full Connection



Softmax & Cross-Entropy ?

source: http://arun-aiml.blogspot.com.br/2017/07/convolutional-neural-networks.html

Próxima semana:

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