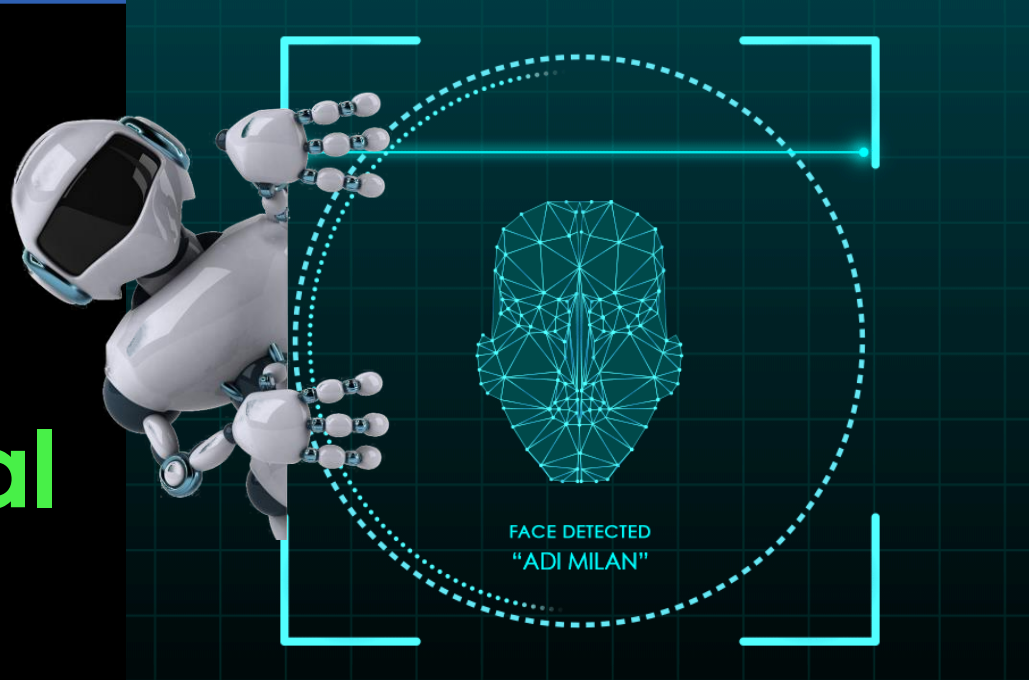


# Introdução à Visão Computacional



**Prof. Dr. Diego Renan Bruno**

Education Tech Lead na DIO

Doutor em Robótica e *Machine Learning* pelo ICMC-USP



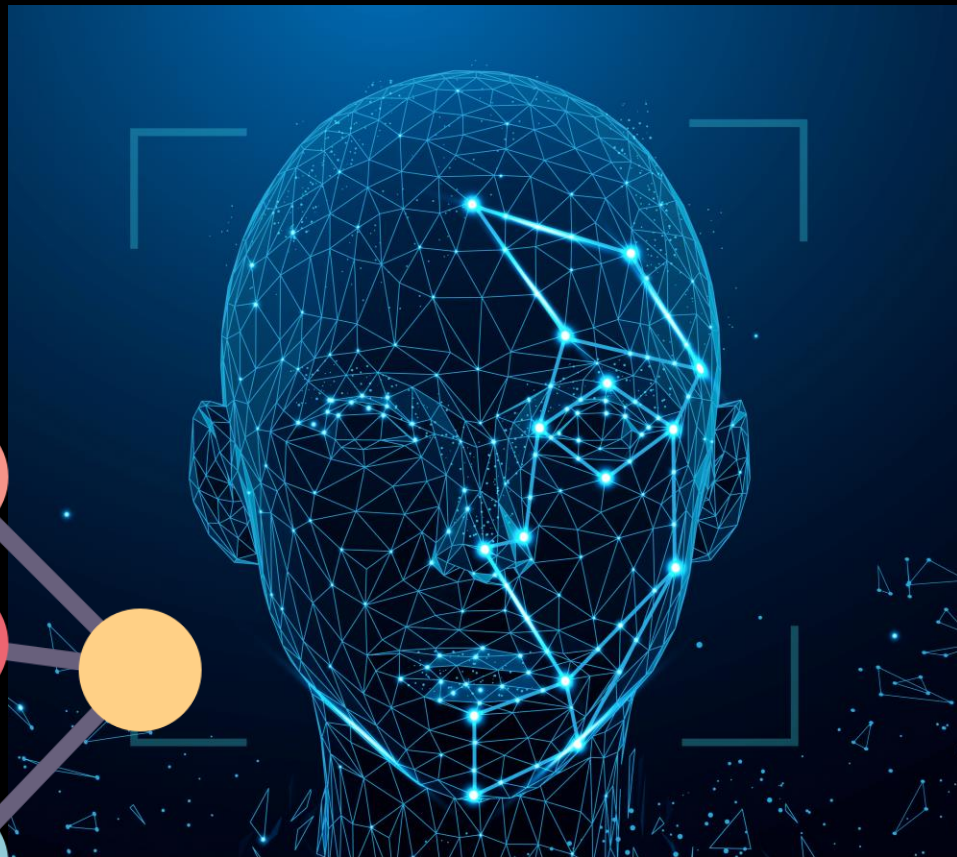
**MACHINE  
LEARNING  
DAY**



OpenCV

# Detecção e Reconhecimento Facial com **Deep Learning**

*Machine Learning*



# O mundo da IA...

IA Geral



IA Restrita



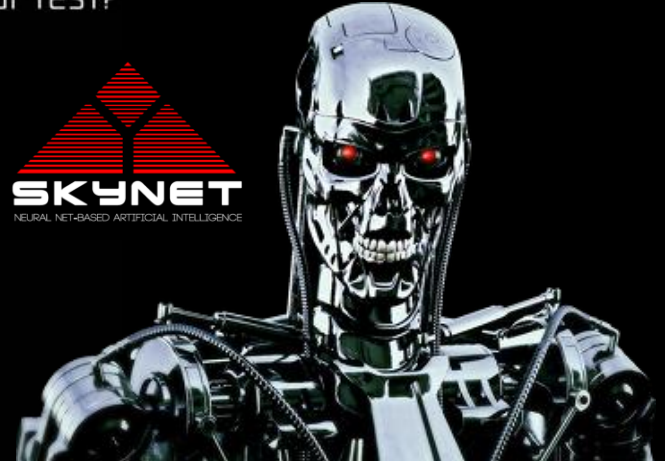
*Machine Learning*

ex machina

WHAT HAPPENS TO ME IF I FAIL YOUR TEST?



ARTIFICIAL INTELLIGENCE



# O que é Visão Computacional?



Sensoriamento:  
Imagens



Processamento  
De Imagens

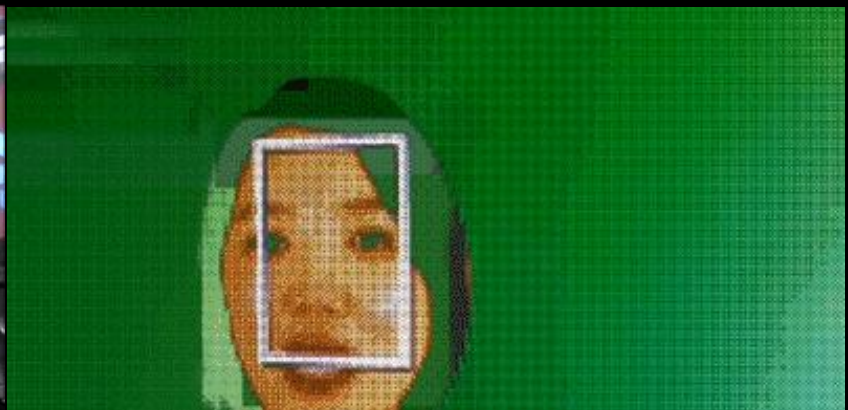
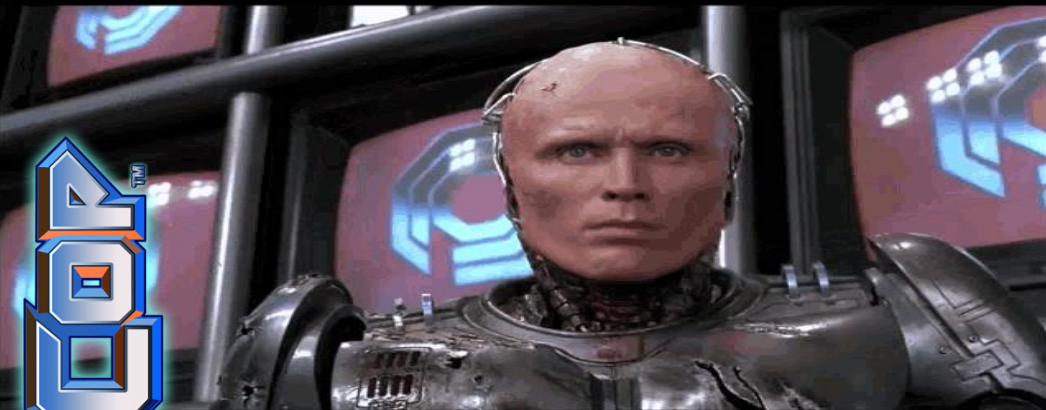


Análise: *Machine Learning*





# Reconhecimento de Pessoas



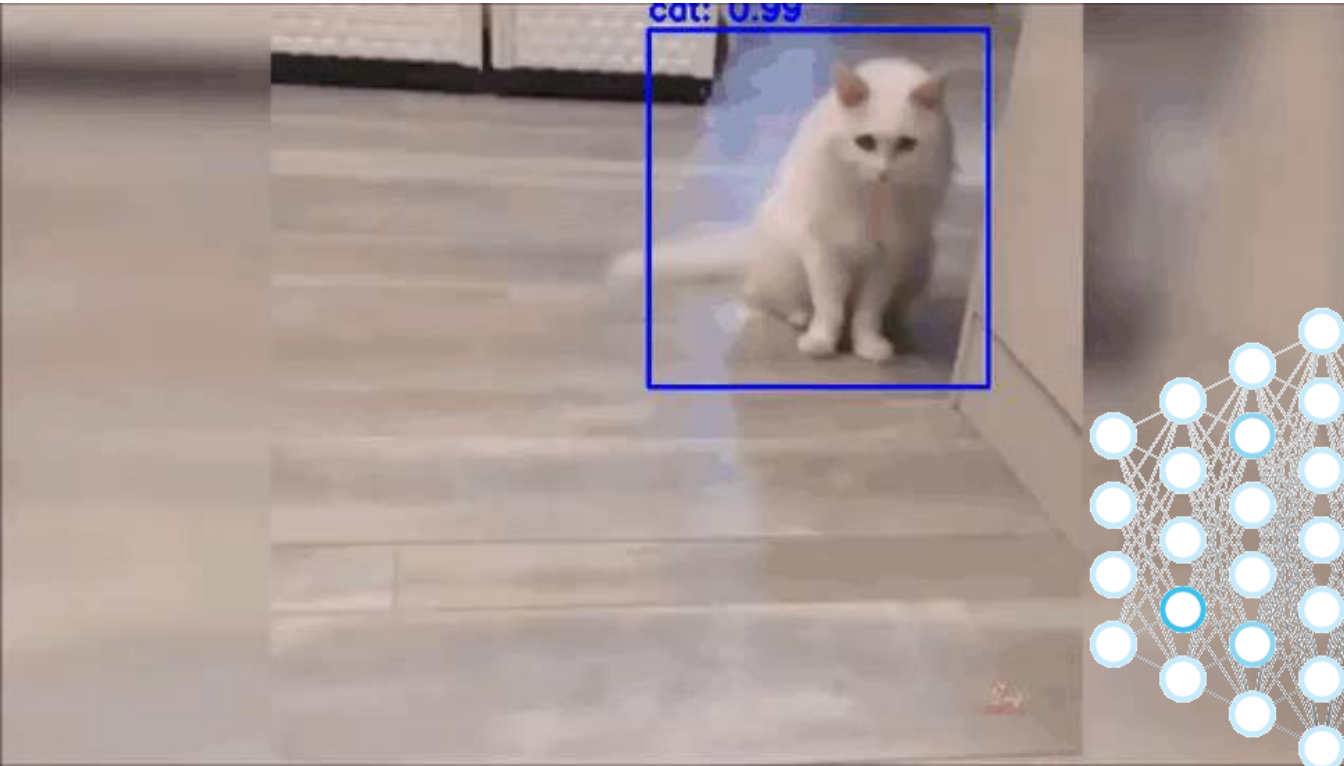
# Posicionamento da câmera

Posição da captura da imagem:



# Detecção em imagens

→ Detecção de objetos:



# Detecção em imagens

→ Detecção de objetos:

**Classification**



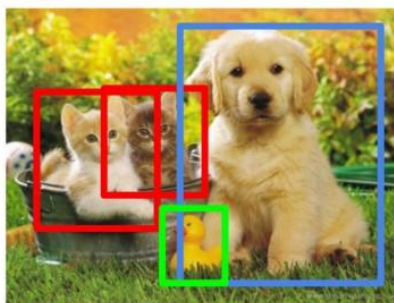
CAT

**Classification  
+ Localization**



CAT

**Object Detection**



CAT, DOG, DUCK

**Instance  
Segmentation**



CAT, DOG, DUCK

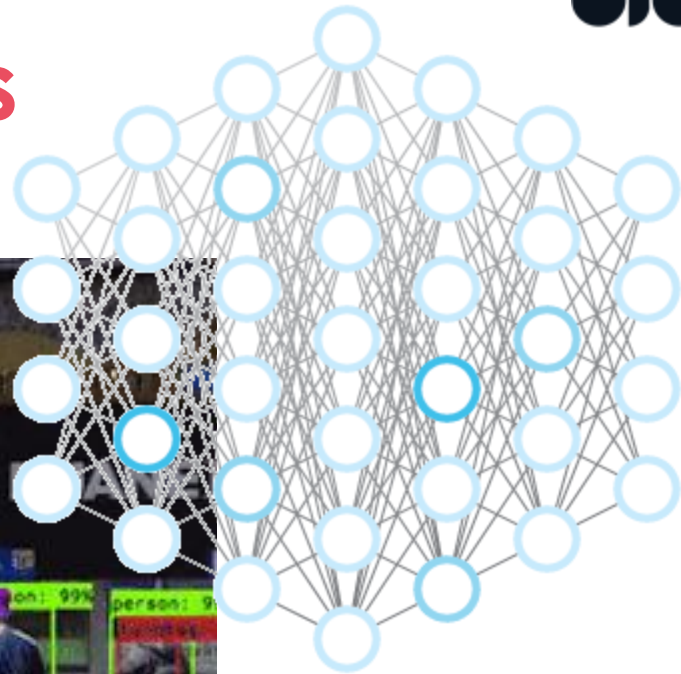
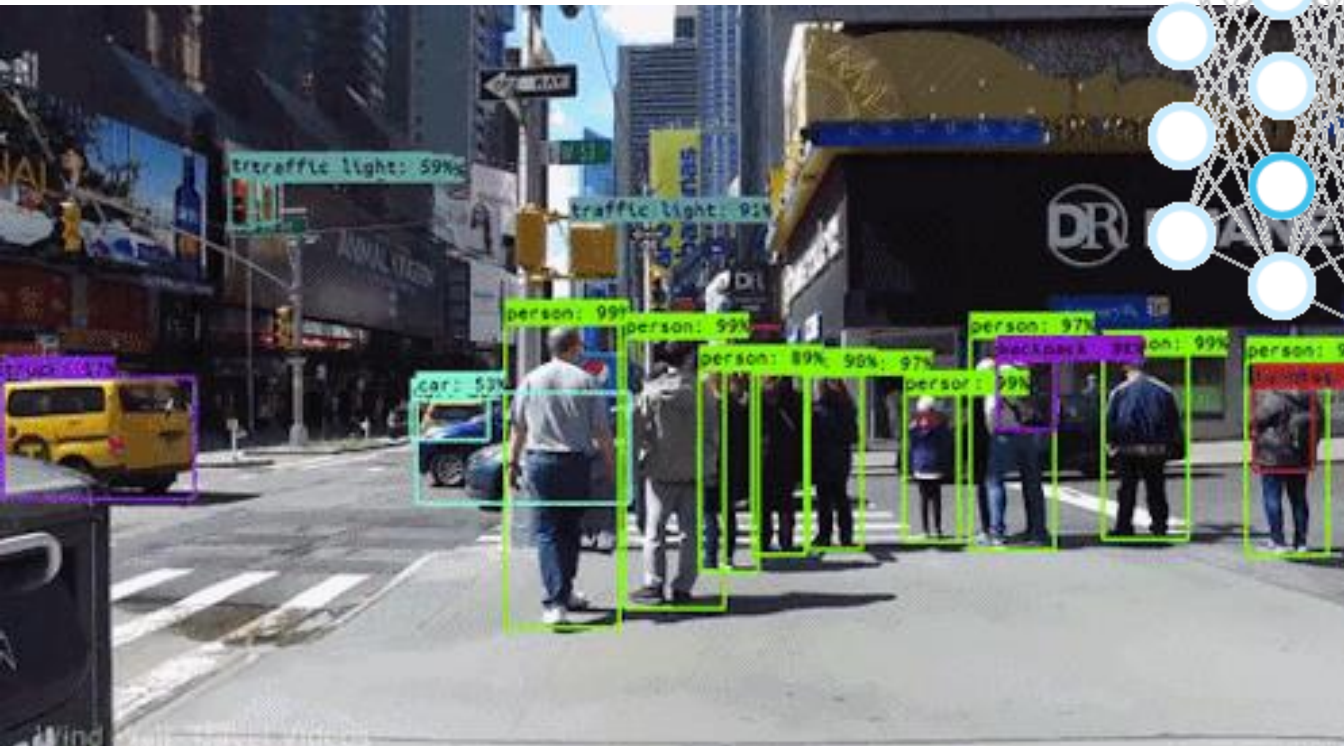
Single object

Multiple objects



# Detecção em imagens

→ Detecção de objetos:



# Detecção de objetos em imagens

→ O objeto deve ser detectado e classificado:



**FACE RECOGNITION IS UNDER WAY...**

# Extração de *Features* da face humana



Imagem Original

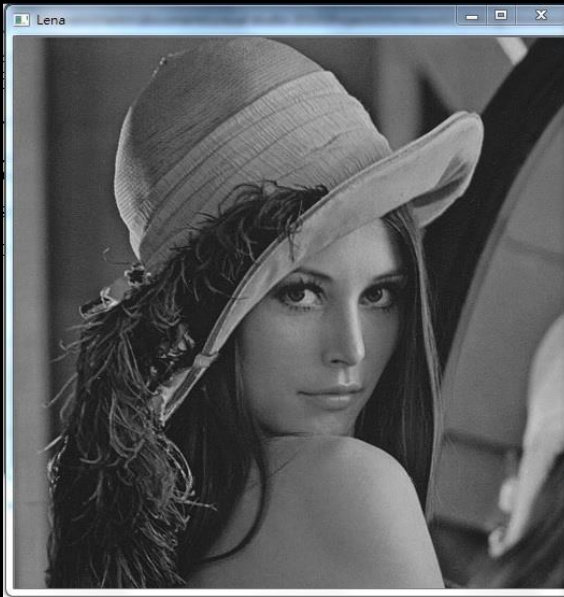
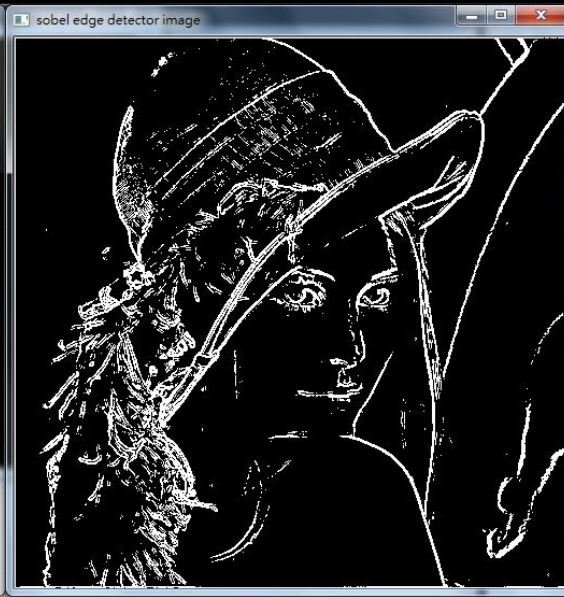


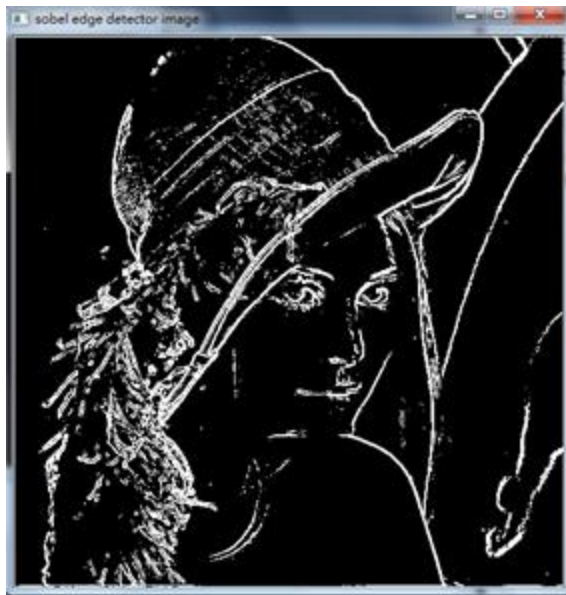
Imagem em tons de cinza



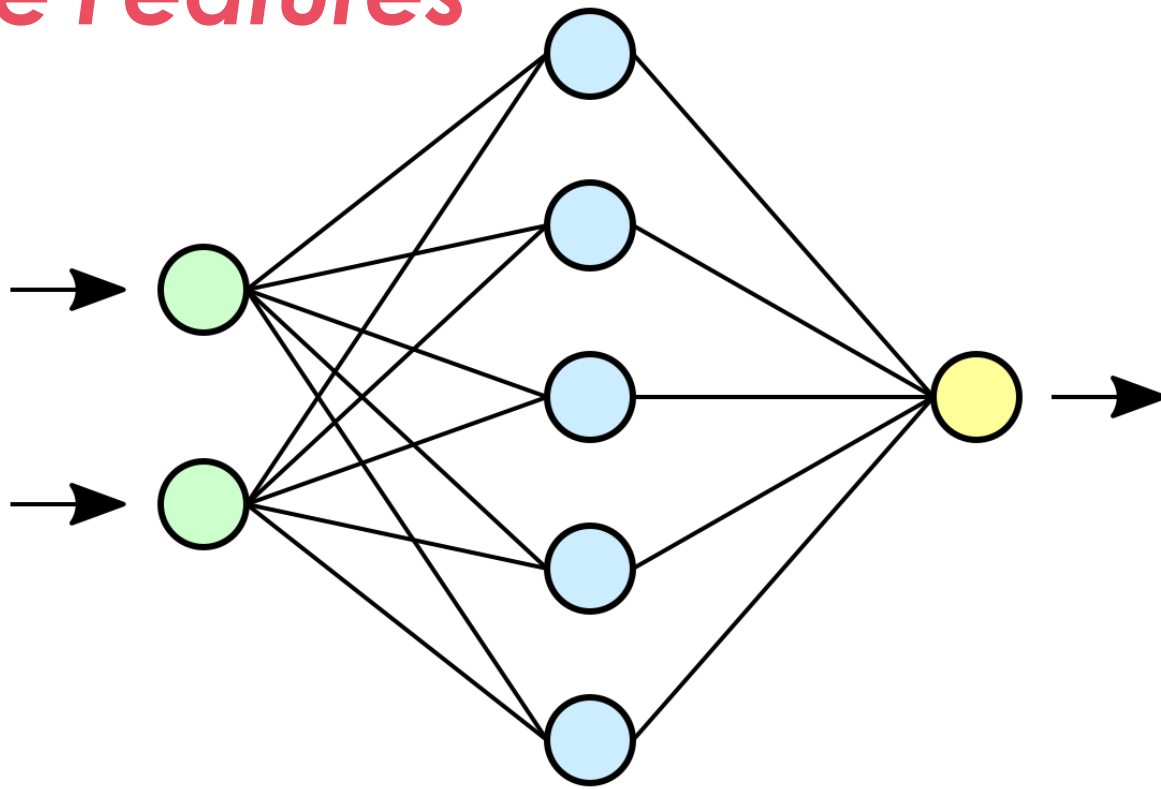
Detecção de bordas

# Extração de *Features*

→ Filtro de bordas:



*Features*

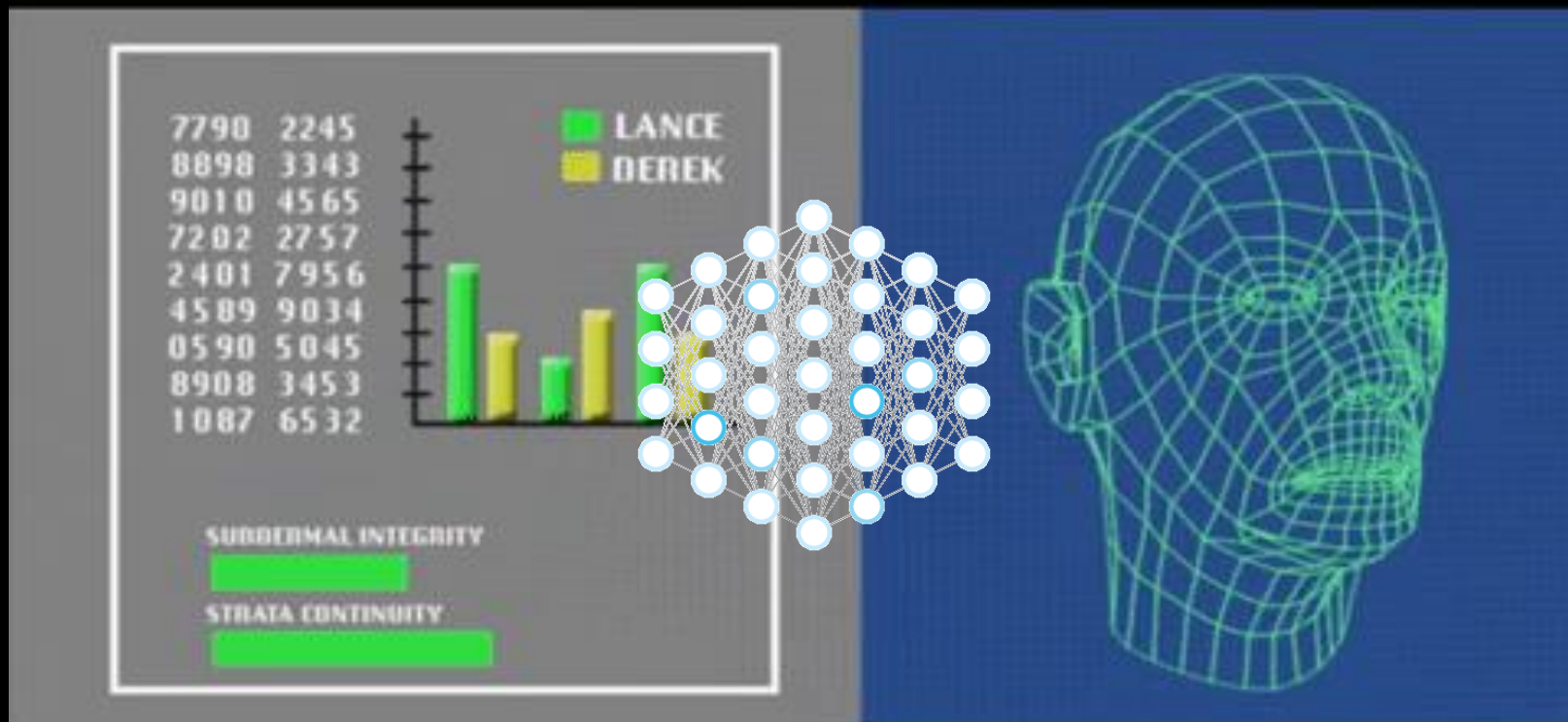


Classificação



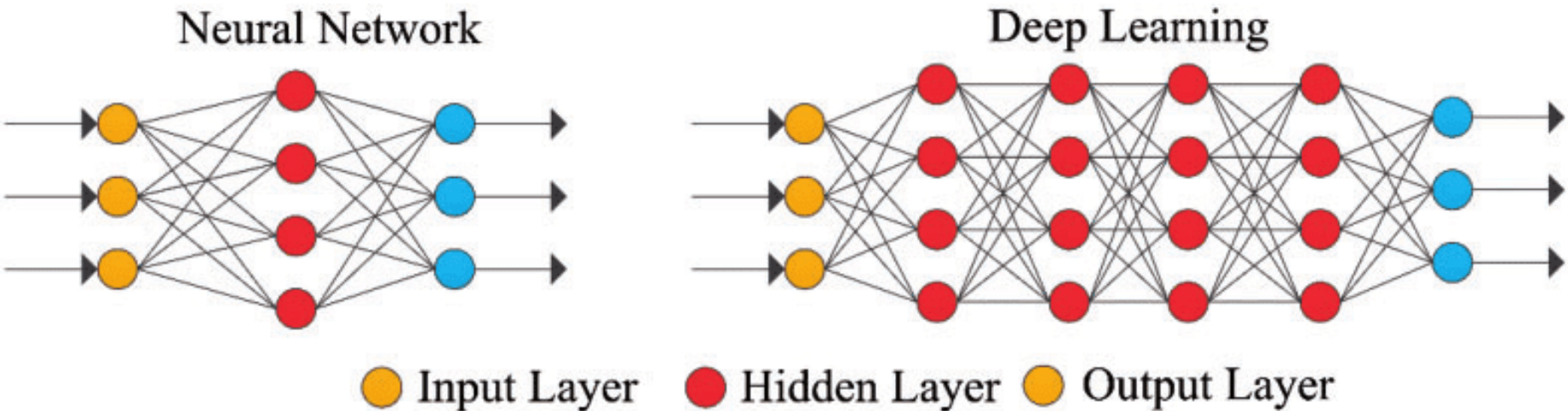
# Extração de *Features* da face humana

## Atualmente com redes de *Deep Learning*



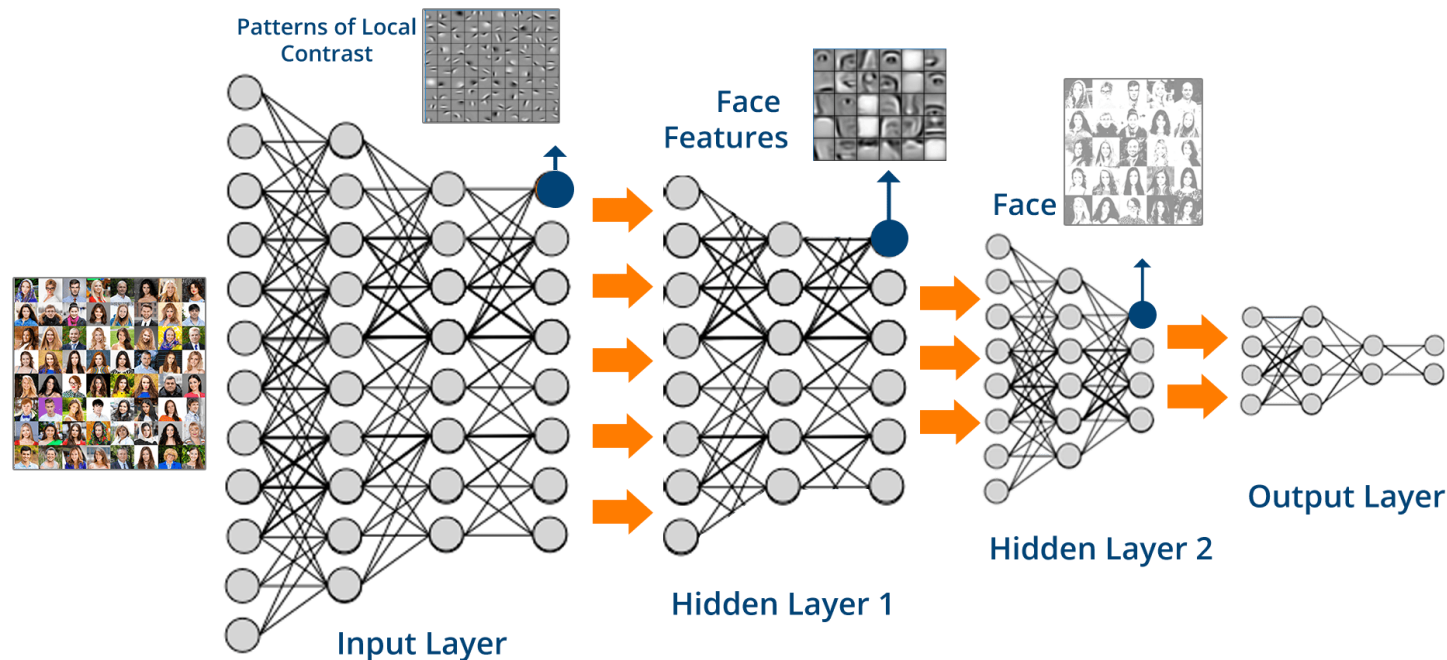
# Aprendizado com *Deep Learning*

→ Extração de *features* automática:



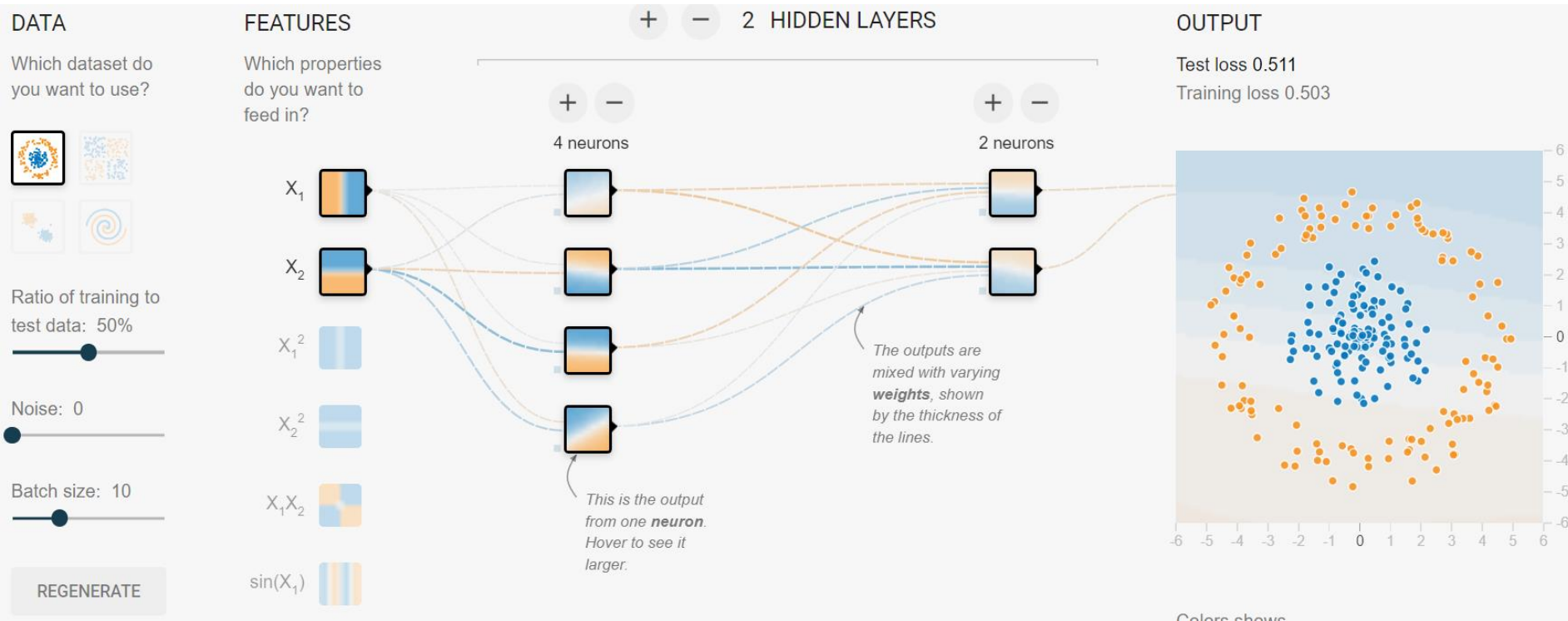
# Aprendizado com *Deep Learning*

→ Extração de *features* automática:



# Playground TensorFlow

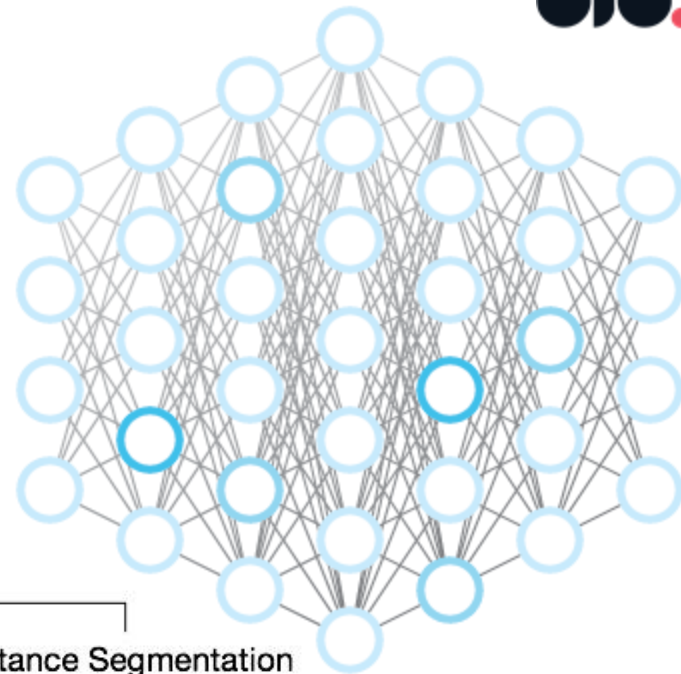
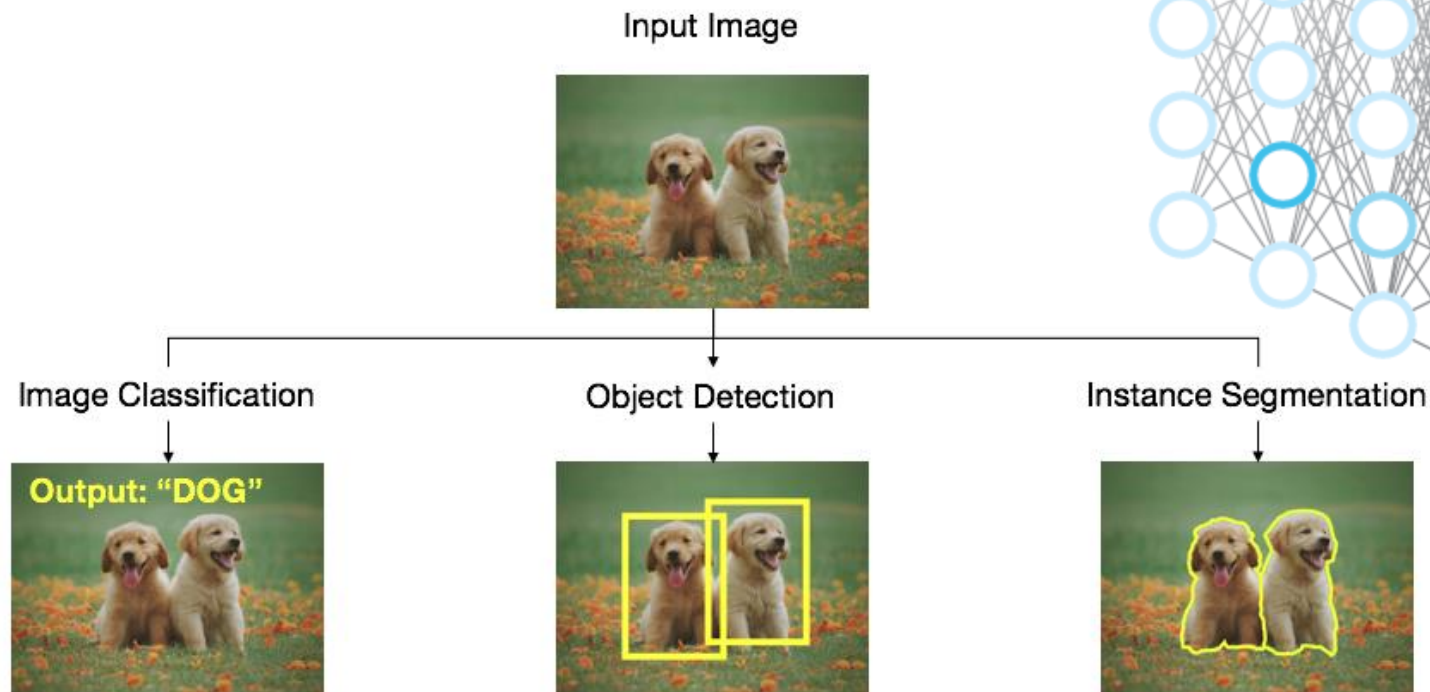
→ Estruturas de Redes de *Deep Learning*:





# Detecção em imagens

→ Detecção de objetos:



→ Detecção

→ Classificação



**Vamos aprender a detectar e reconhecer faces humanas...**

# Detecção de imagens

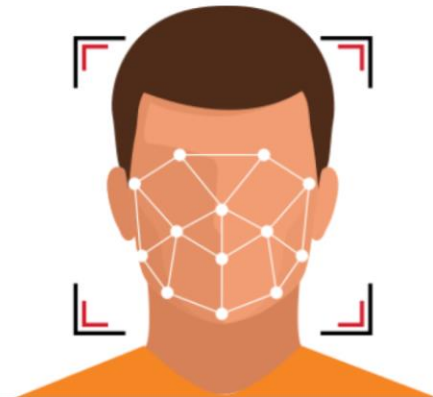
People with no idea about AI, telling me my AI will destroy the world

Me wondering why my neural network is classifying a cat as a dog..



# Como criar o *Dataset*?

→ Criando sua base de dados:





# Base de dados: Curiosidades

→ Rotulação de objetos:



# Base de dados: Curiosidades

→ Rotulação de objetos:



# Obrigado!

*Machine Learning*

Prof. Dr. Diego Bruno



OpenCV