

# Serviços cognitivos da Microsoft para classificação de imagens

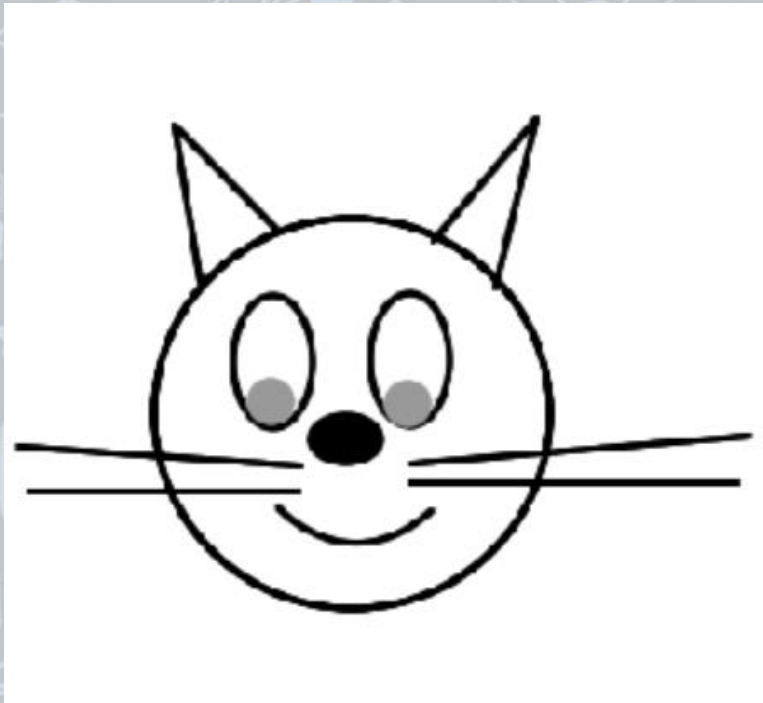
MURILLO GRÜBLER

# Agenda

- Classificação de Imagens
- Serviços Cognitivos
  - Computer Vision
  - Custom Vision
- Demonstração



# Classificação de Imagens

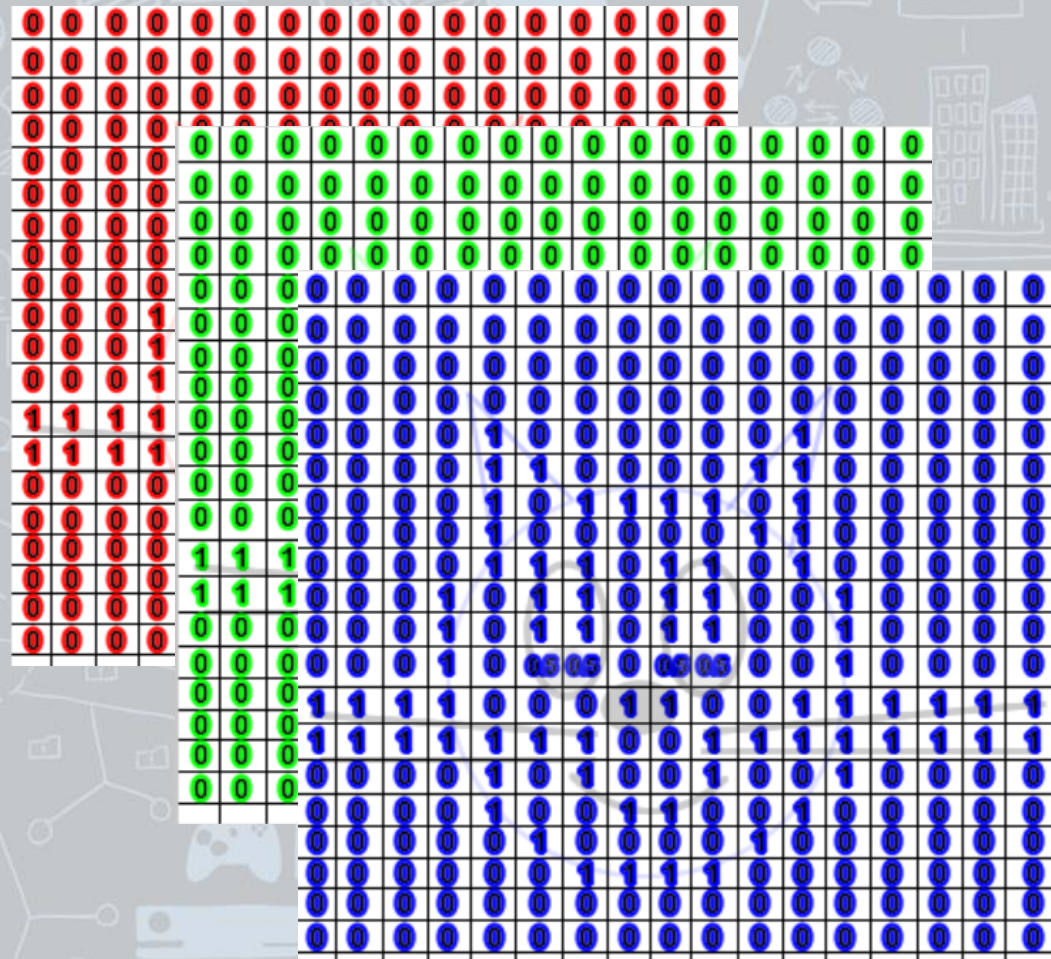
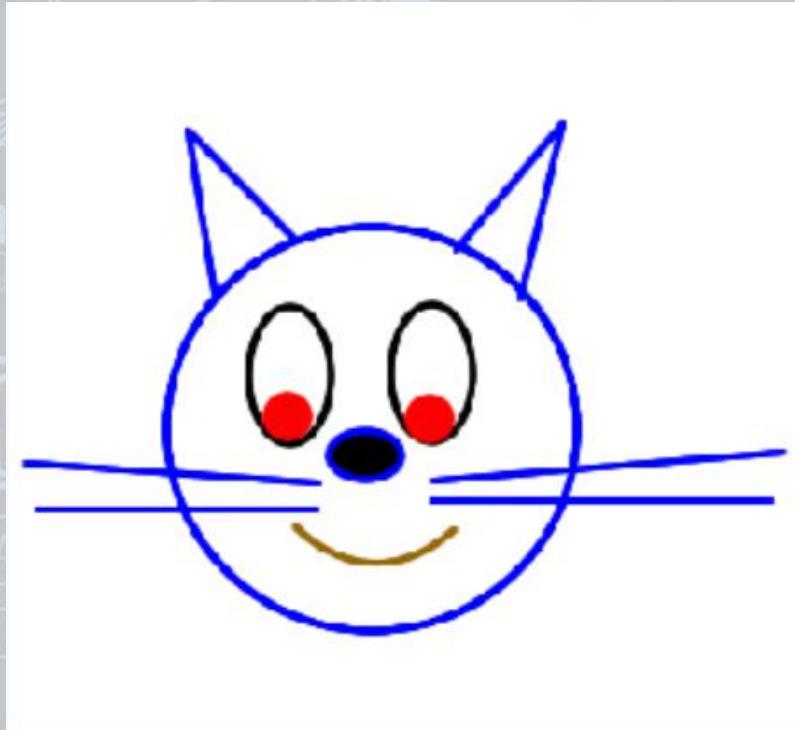


monocromático

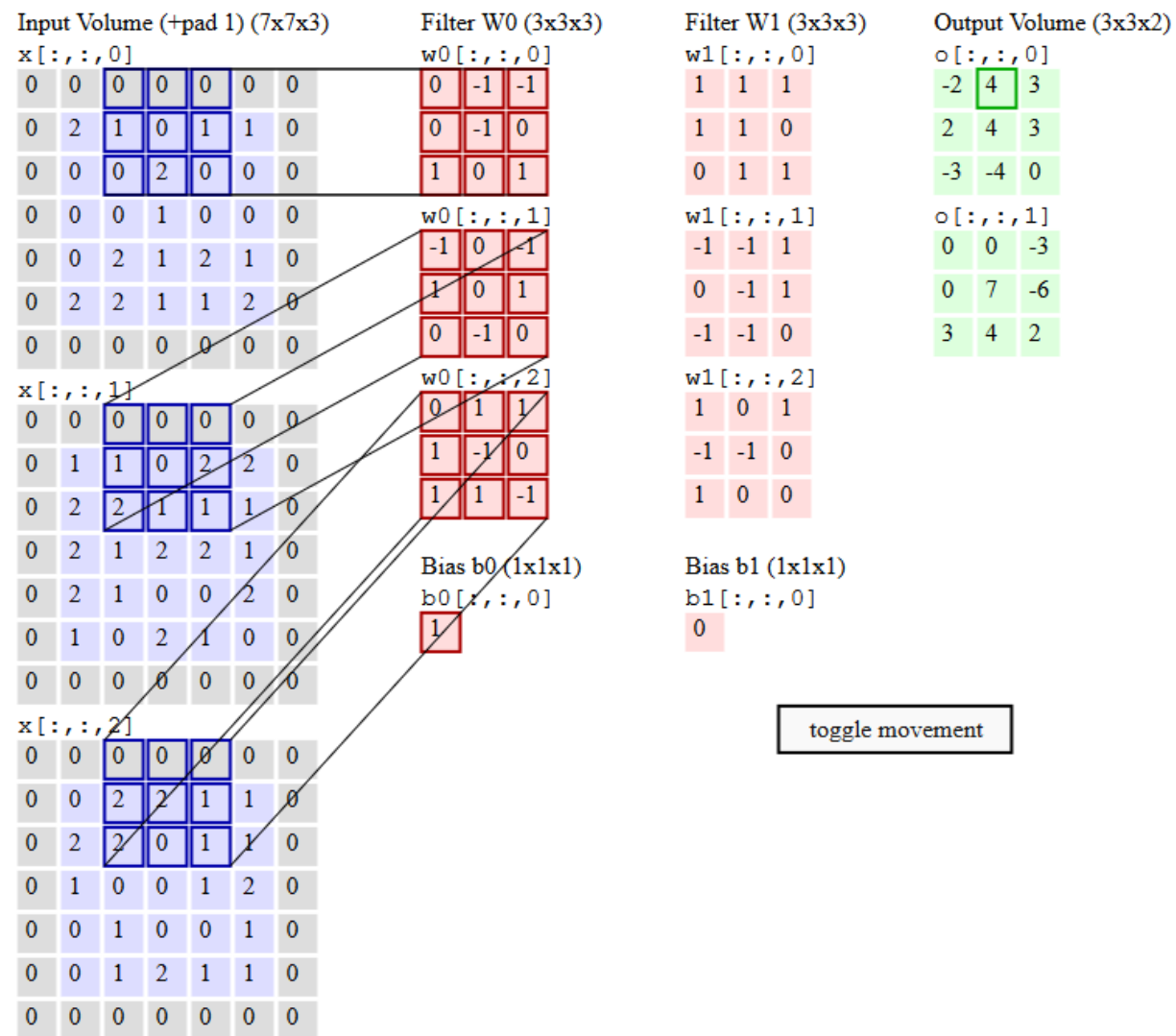
[illegible]



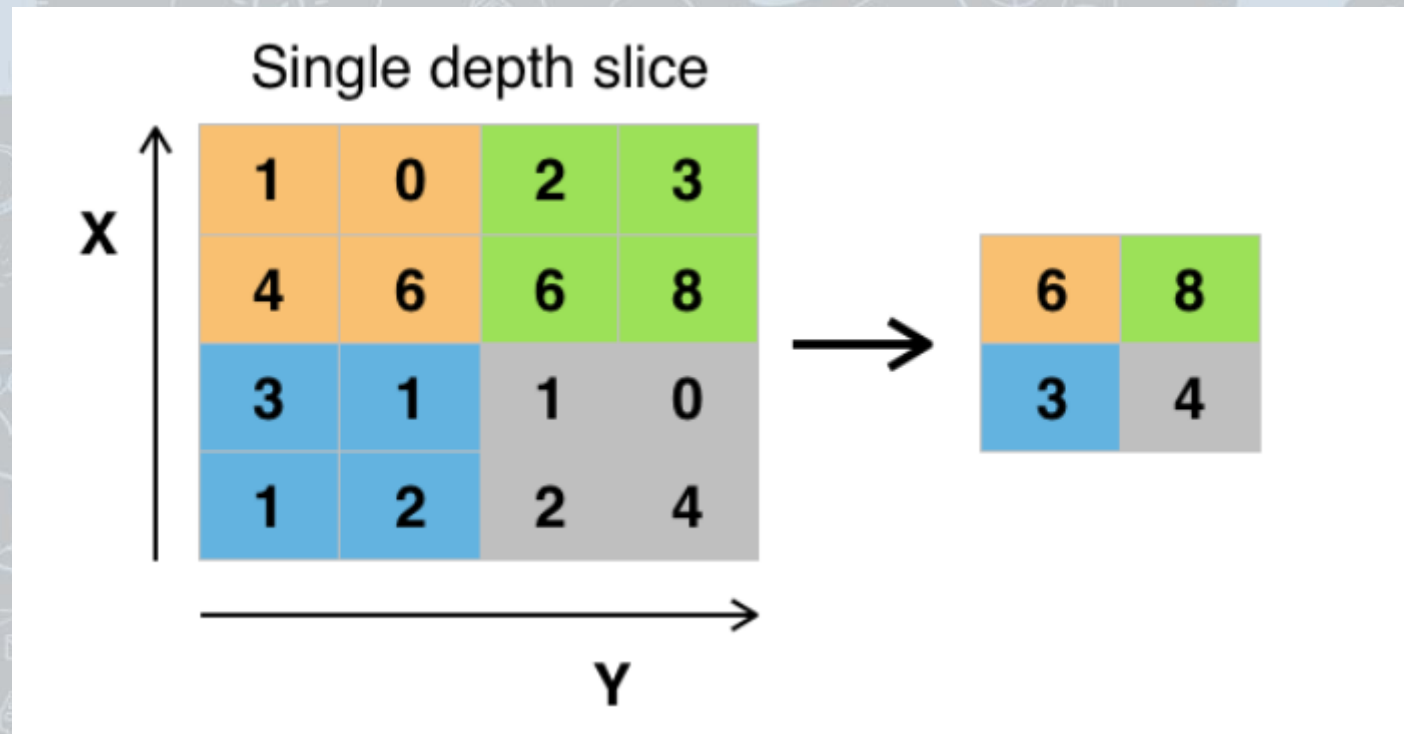
# Classificação de Imagens



# Convolutional Layer

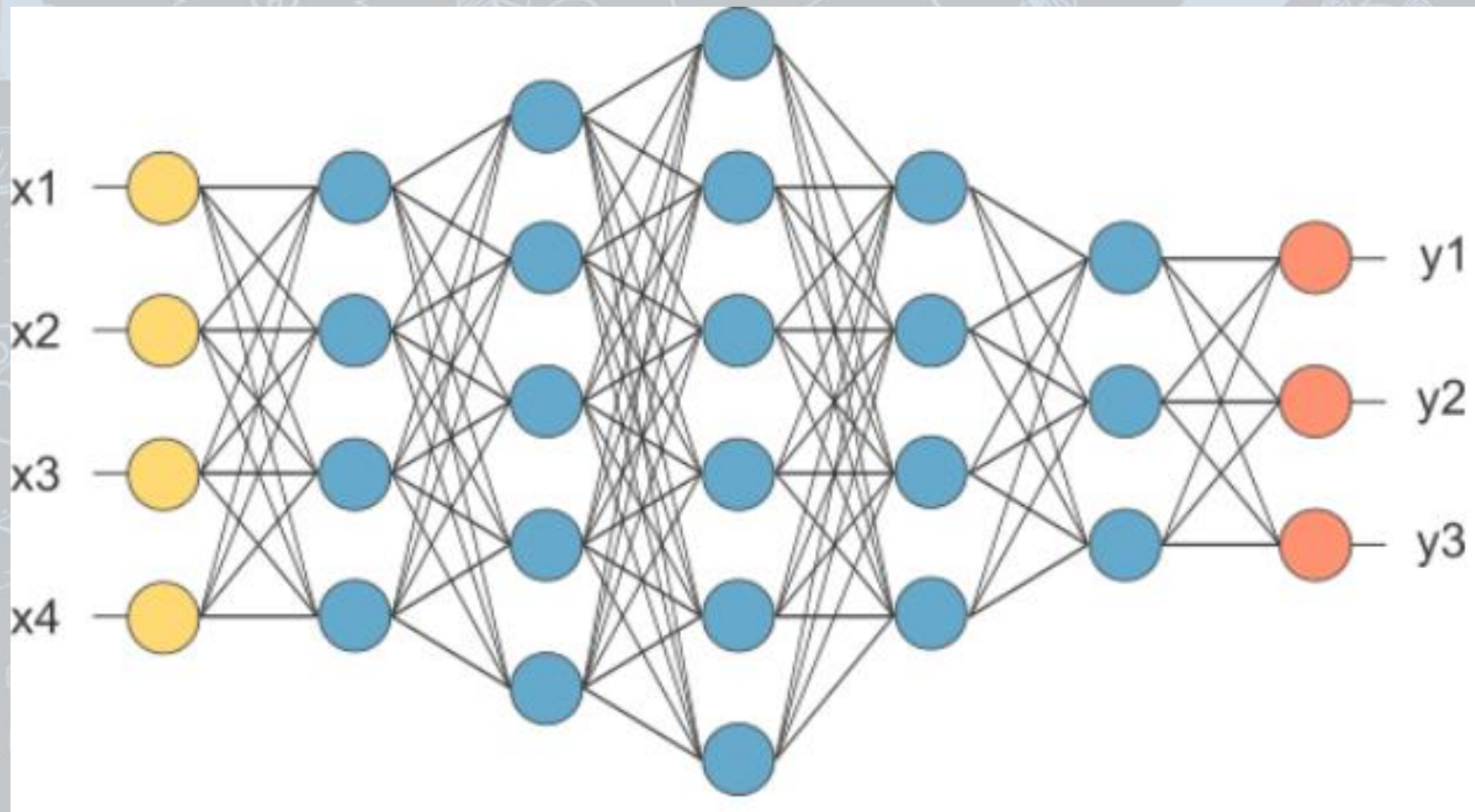


# Pooling Layer





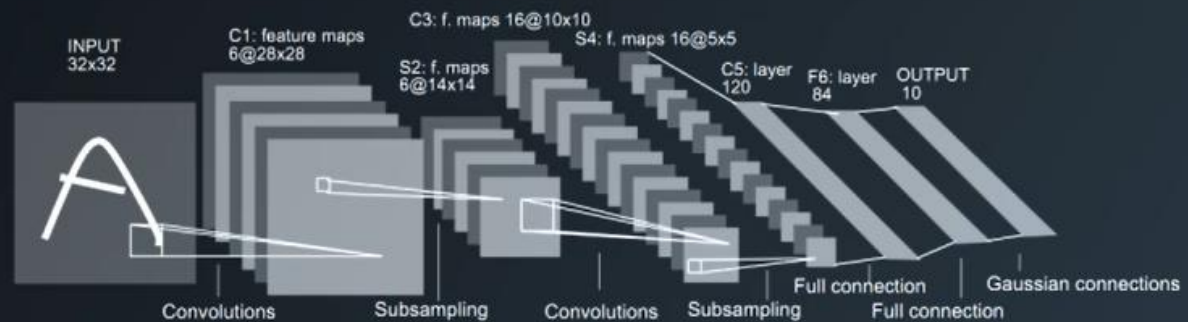
# Fully-connected layer



# Arquitetura CNN

CLASSIFIER  
FULLY CONNECTED  
FULLY CONNECTED  
MAX POOLING  
CONVOLUTION  
MAX POOLING  
CONVOLUTION  
IMAGE

## 'LENET-5' YAN LECUN '98



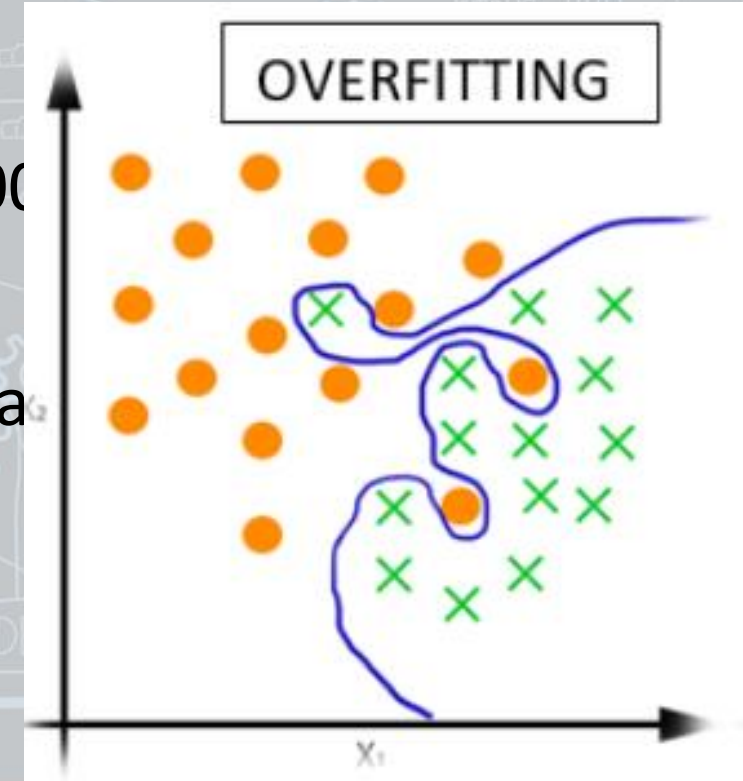


# Porque não utilizar somente Neural Network

Em uma rede neural, todos os nós estão conectados entre si, e todos recebem os valores de entrada;

Imagem:  $800 \times 600 = 480000 * 3 [R,G,B] = 1440000$

A convolução diminui o valor de entrada para a e evitar o overfitting;



# Serviços Cognitivos

- Visão;
- Fala;
- Linguagem;
- Pesquisa.





# Serviços Cognitivos

- Visão;
- Fala;
- Linguagem;
- Pesquisa.

- **Visão;**
- Fala;
- Linguagem;
- Pesquisa.



# Integrações

- Biblioteca disponível no NuGet para aplicações .Net;
- REST API.



# Computer Vision da Microsoft

1. Criar um projeto de Pesquisa Visual Computacional no Azure;
  1. Selecionar plano;
  2. Selecionar localização;
2. Selecione a chave.





```
[ { "age": 11, "gender": "Male", "faceRectangle": { "left": 113, "top": 314, "width": 222, "height": 222 } }, { "age": 11, "gender": "Female", "faceRectangle": { "left": 1200, "top": 632, "width": 215, "height": 215 } }, { "age": 41, "gender": "Male", "faceRectangle": { "left": 514, "top": 223, "width": 205, "height": 205 } }, { "age": 37, "gender": "Female",
```



## Tags

mountain outdoor car  
road ocean beach water  
background front sitting  
driving surfing yellow  
parked motorcycle black  
orange riding board  
man white mirror people  
plane

## Categories

trans\_car | 0.99609375

## Caption

a car with a mountain in the background | 0.926429002694176



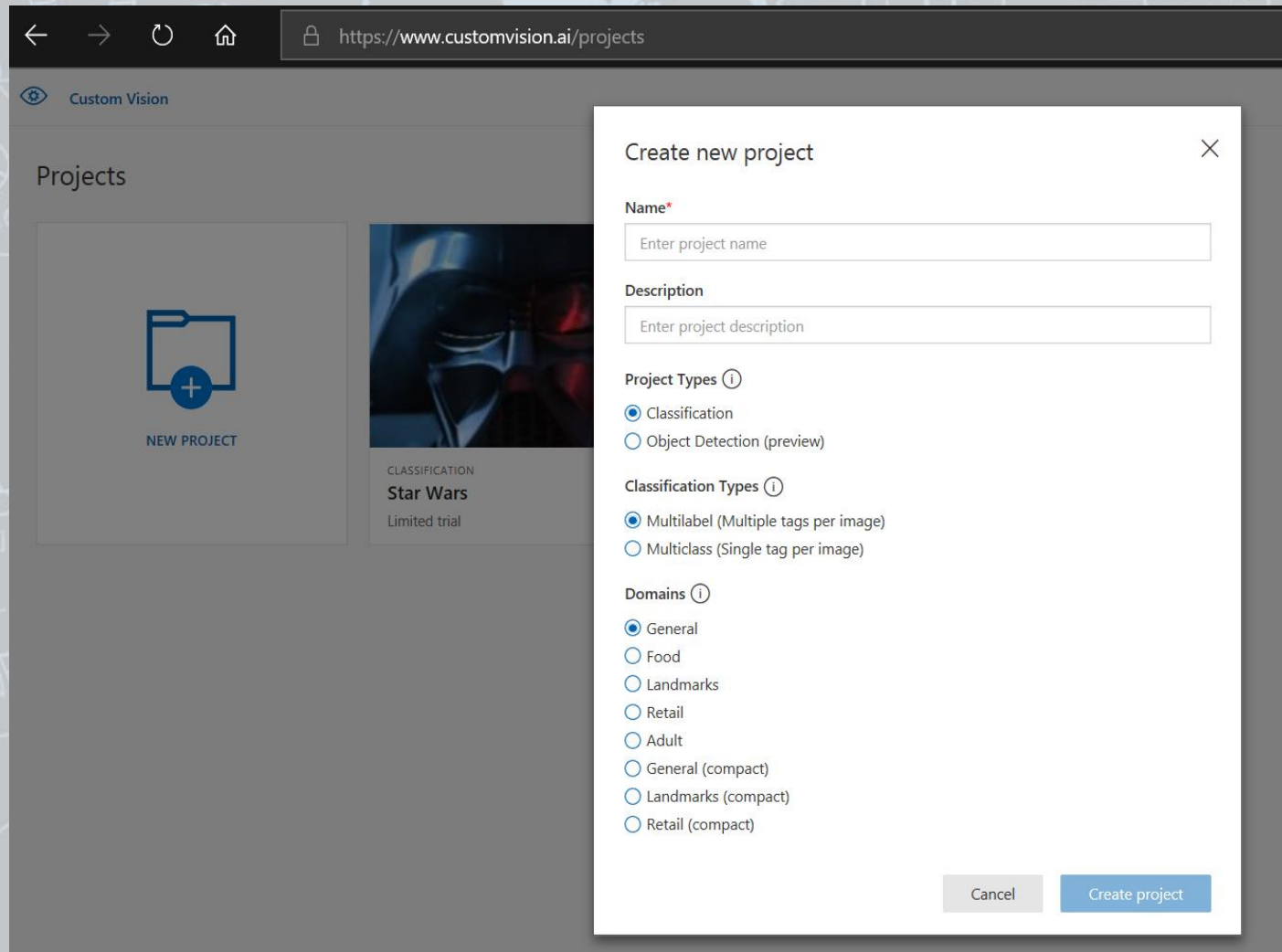
# Custom Vision da Microsoft

1. Criar um projeto;
2. Carregue as imagens para a plataforma;
3. Rotule as imagens;
4. Treine o modelo.



# Criar um projeto

- [www.customvision.ai](https://www.customvision.ai)



Custom Vision

Projects

NEW PROJECT

CLASSIFICATION  
**Star Wars**  
Limited trial

Create new project

Name\*

Enter project name

Description

Enter project description

Project Types ⓘ

☒ Classification

☐ Object Detection (preview)

Classification Types ⓘ

☒ Multilabel (Multiple tags per image)

☐ Multiclass (Single tag per image)

Domains ⓘ

☒ General

☐ Food

☐ Landmarks

☐ Retail

☐ Adult

☐ General (compact)

☐ Landmarks (compact)

☐ Retail (compact)

Cancel Create project

# Carregue as imagens

Food

Training Images Performance Predictions Train Quick Test

Filter

Iteration

Workspace

Tags

Tagged Untagged

Showing: all tagged images

Search for

- ☐ Alface 16
- ☐ Arroz 16
- ☐ Carne 17
- ☐ Fritas 17
- ☐ Ovo 15
- ☐ Tomate 15

Add images Delete Select all

Image upload

Upload Preview Uploading Summary

1 image will be added...

Upload 1 file



# Rotule as imagens

Food

Filter

Iteration

Workspace

Tags

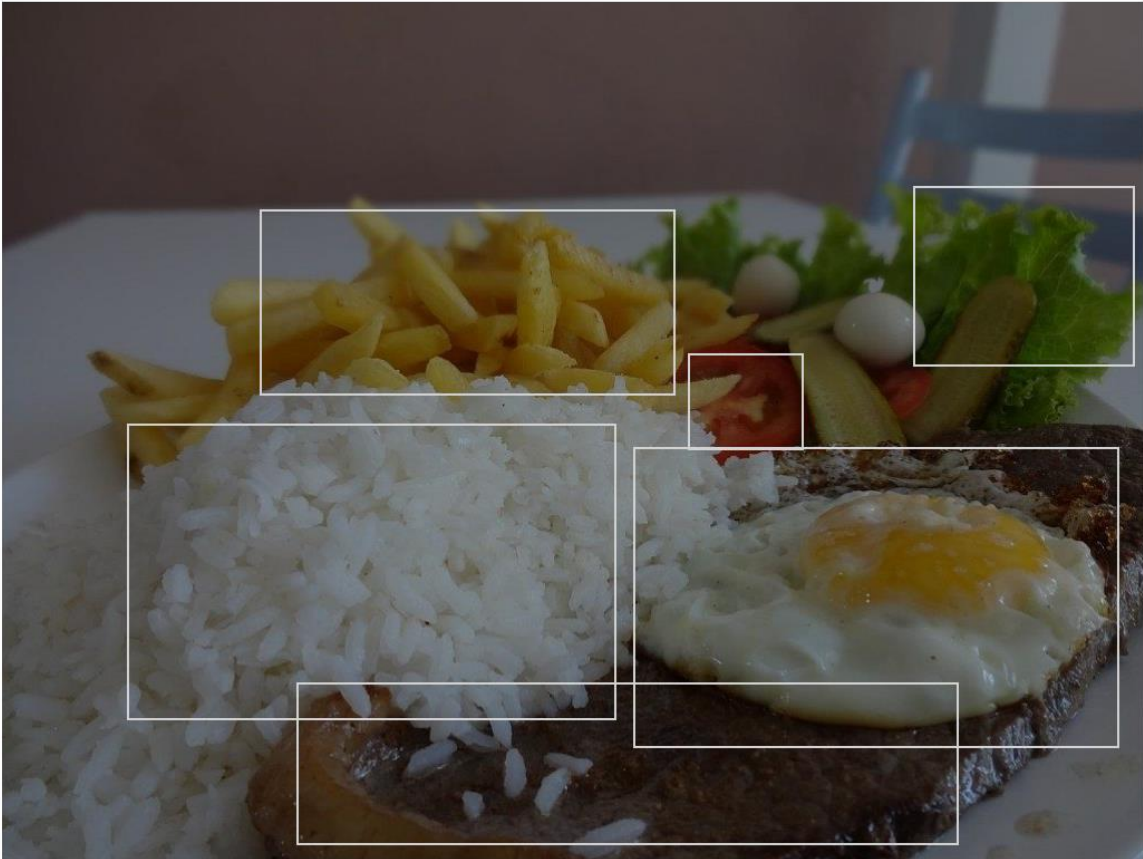
Tagged

Showing: all untagged

Image Detail

Undo Changes

Regions Shown



My Objects

Fritas X

Ovo X

Tomate X

Arroz X

Carne X

Alface X

Get started

# Treine o modelo

Star Wars

Iterations

Probability Threshold: 50% ⓘ

Iteration 6

Trained on: 31/12/2017  
with General domain

Iteration 5

Trained on: 31/12/2017  
with General domain

Iteration 4

Trained on: 31/12/2017  
with General domain

Iteration 3

Trained on: 31/12/2017  
with General domain

Iteration 2

Trained on: 31/12/2017  
with General domain

Iteration 1

Trained on: 31/12/2017  
with General domain

Prediction URL ✓ Make default Delete Export

Iteration 6

Finished training on **31/12/2017 18:54:33** using **General** domain  
Classification type: **Multilabel (Multiple tags per image)**

Precision ⓘ

88.4%

Recall ⓘ

85.3%

Performance Per Tag

Tag	Precision	Recall
kylo-ren	89.3%	79.6%
darth-vader	87.7%	91.2%

# Avaliação

- **Precision**: Se uma tag for prevista pelo seu modelo, qual a probabilidade de isso estar certo?

Modelo retornou nos testes: **Fritas, Arroz, Carne;**

Imagem com as tags originais: **Frias, Arroz, Feijão, Tomate;**

Resultado:  $2/3 = 0,67$



# Avaliação

- **Recall**: Das tags que devem ser previstas corretamente, qual porcentagem seu modelo encontrou corretamente?

Modelo retornou nos testes: **Fritas, Arroz, Carne;**

Imagem com as tags originais: **Frias, Arroz, Feijão, Tomate;**

Resultado:  $2/4 = 0,5$

# Classificando

Star Wars

Filter

Iteration

Workspace

Tags

Tagged

Showing: all tagged images

Search for

☐ darth-vader 58

☐ kylo-ren 58

Quick Test




Image URL

→

or

Browse local files

File formats accepted: jpg, png, bmp

File size should not exceed: 4mb

Predictions

Tag	Probability
darth-vader	99.9%
kylo-ren	0%

1 2 >

Get started

# Detectando objetos

Food

Filter

Iteration

Workspace

Tags

Tagged

Showing: all tagged im

Search for

Alface 16

Arroz 16

Carne 17

Fritas 17

Ovo 15

Tomate 15

Quick Test

Regions Shown

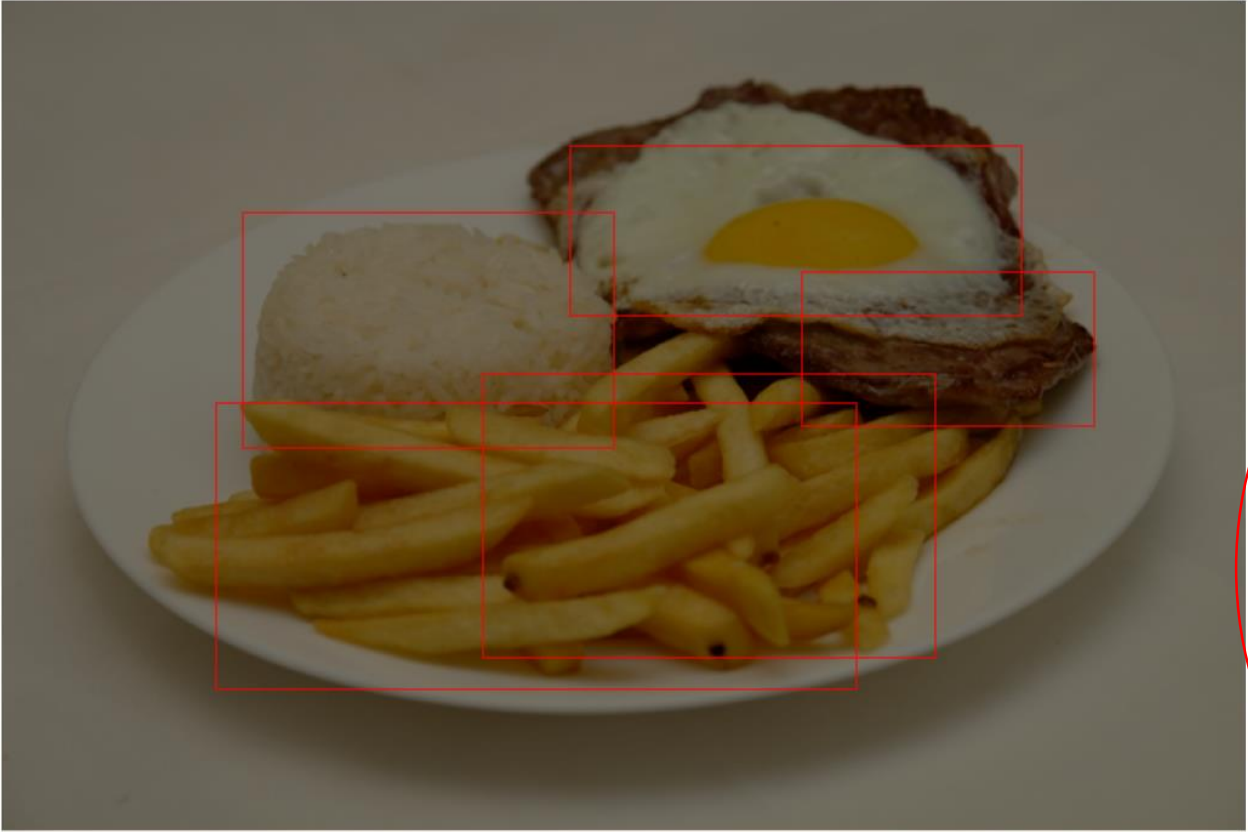


Image URL

→

or

Browse local files

File formats accepted: jpg, png, bmp

File size should not exceed: 4mb

Predicted Object Filter

Probability Threshold: 15% ⓘ

Tag	Probability
Arroz	97.1%
Ovo	94.8%
Fritas	80.9%
Carne	61%
Fritas	43.3%

Get started







Dúvidas???

# Referências

- <https://medium.com/brasil-ai/entendendo-o-funcionamento-de-uma-rede-neural-artificial-4463fcf44dd0>
- <https://medium.com/brasil-ai/classificando-imagens-com-o-custom-vision-da-microsoft-c6ee54aba953>
- <https://medium.com/brasil-ai/analizando-imagens-com-computer-vision-api-da-microsoft-520ef28d8eaf>
- <http://cs231n.github.io/convolutional-networks/>



# Contato

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