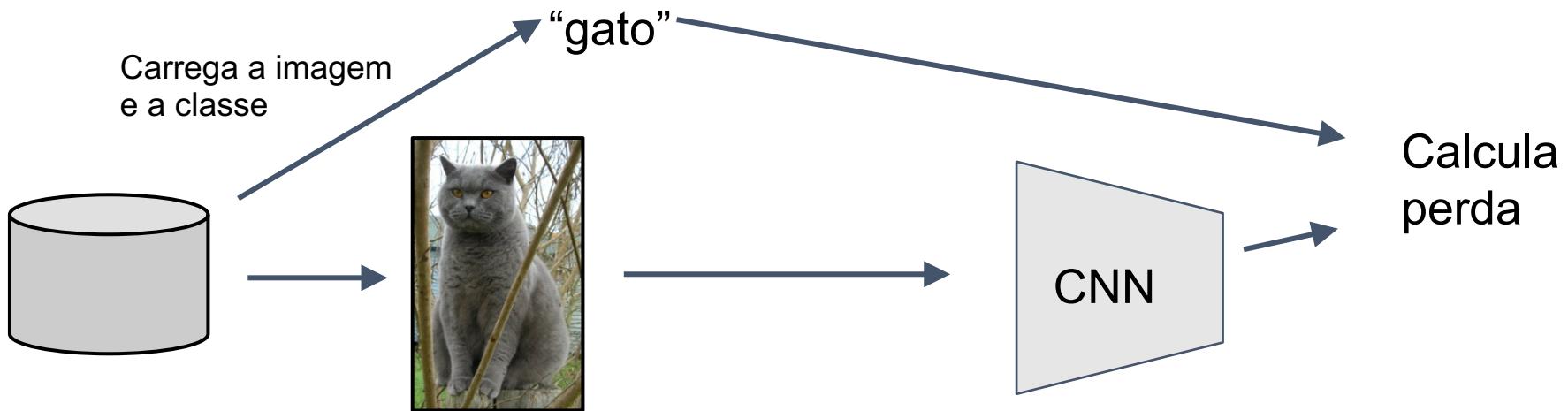
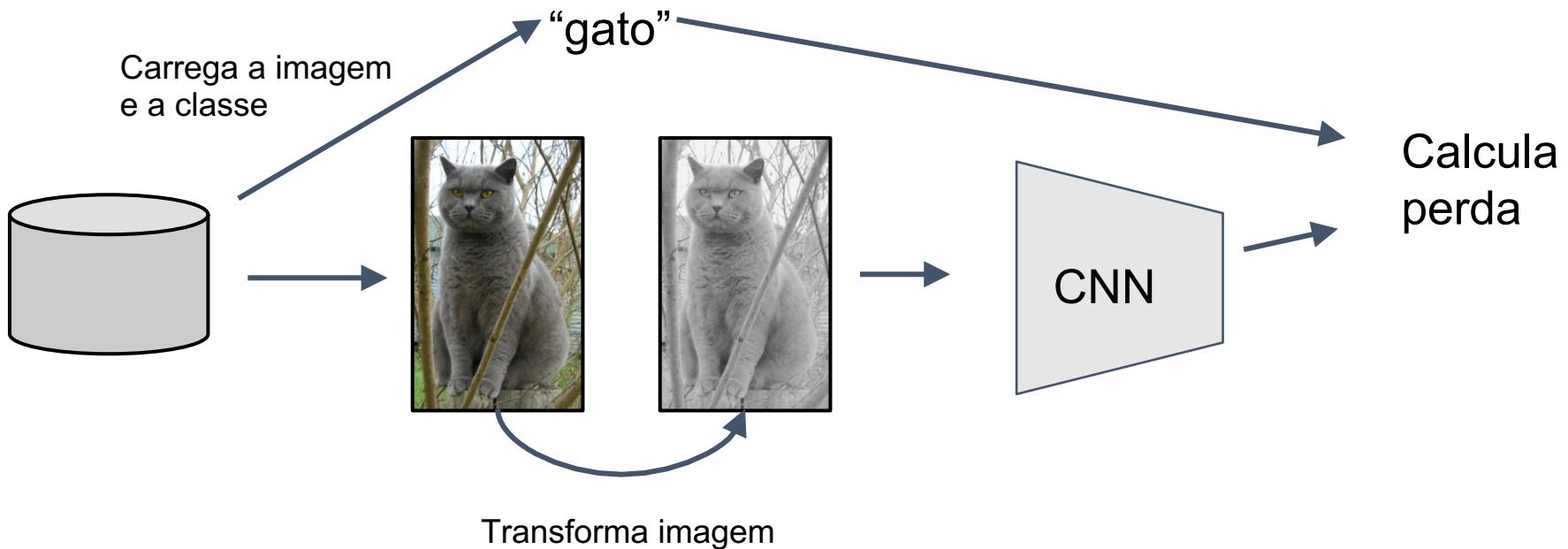


Aumento de Dados

Aumento de Dados

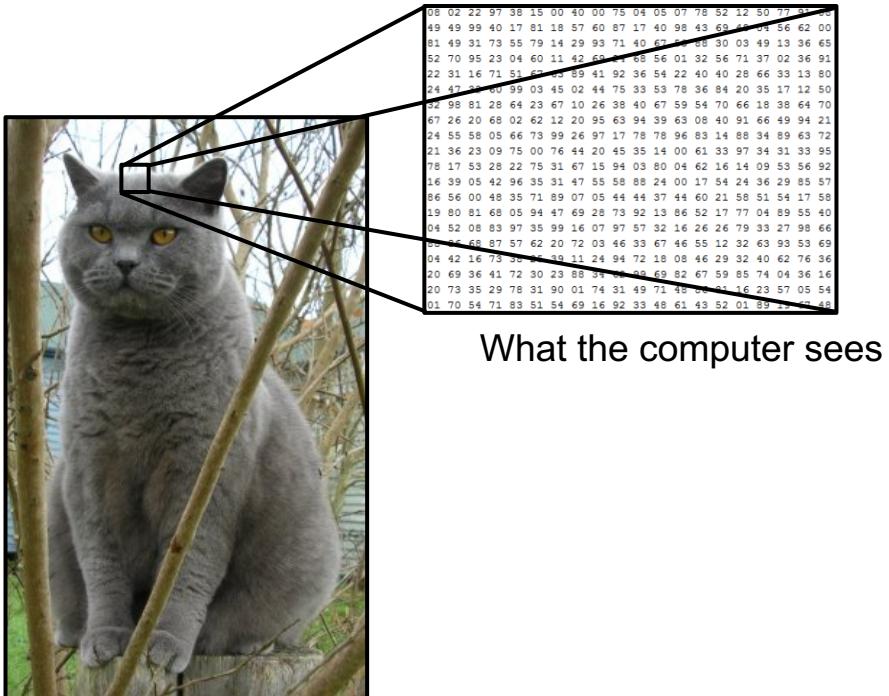


Aumento de Dados



Aumento de Dados

- Muda a imagem sem mudar a classe
- Treina nas imagens transformadas
- MUITO utilizado



Aumento de Dados

Espelhamento horizontal



Aumento de Dados

Combinações aleatórias de:

- Translação
- Rotação
- Mudança da cor
- Shearing,

Aumento de Dados

```
(x_train, y_train), (x_test, y_test) = cifar10.load_data()
y_train = np_utils.to_categorical(y_train, num_classes)
y_test = np_utils.to_categorical(y_test, num_classes)

datagen = ImageDataGenerator(
    featurewise_center=True,
    featurewise_std_normalization=True,
    rotation_range=20,
    width_shift_range=0.2,
    height_shift_range=0.2,
    horizontal_flip=True)

# compute quantities required for featurewise normalization
# (std, mean, and principal components if ZCA whitening is applied)
datagen.fit(x_train)

# fits the model on batches with real-time data augmentation:
model.fit_generator(datagen.flow(x_train, y_train, batch_size=32),
                    steps_per_epoch=len(x_train) / 32, epochs=epochs)

# here's a more "manual" example
for e in range(epochs):
    print('Epoch', e)
    batches = 0
    for x_batch, y_batch in datagen.flow(x_train, y_train, batch_size=32):
        model.fit(x_batch, y_batch)
        batches += 1
        if batches >= len(x_train) / 32:
            # we need to break the loop by hand because
            # the generator loops indefinitely
            break
```

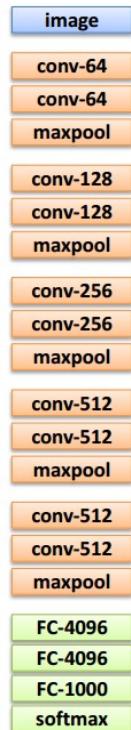
Transferência de Aprendizado

Transferência de Aprendizado em CNNs

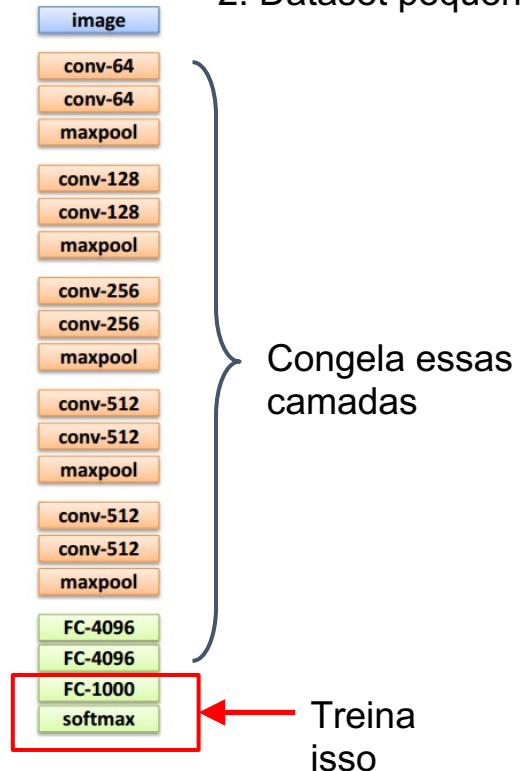


1. Treina na ImageNet

Transferência de Aprendizado em CNNs



2. Dataset pequeno:

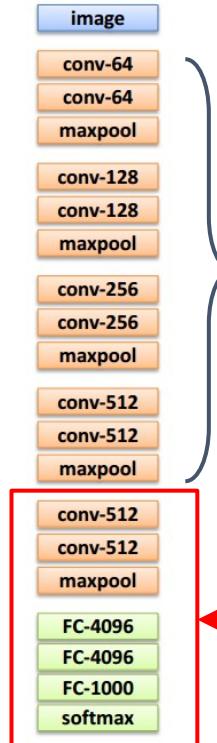


Transferência de Aprendizado em CNNs



Congela essas camadas

Treina isso



Mais dados = retreina mais camadas

Congela essas camadas

Treina isso

Segmentação usando CNNs

Tarefas de Visão Computacional

Classificação



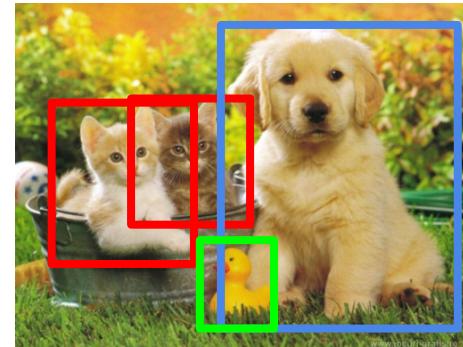
GATO

Classificação + Localização



GATO

Detecção de Objetos



GATO, CACHORRO, PATO

Segmentação



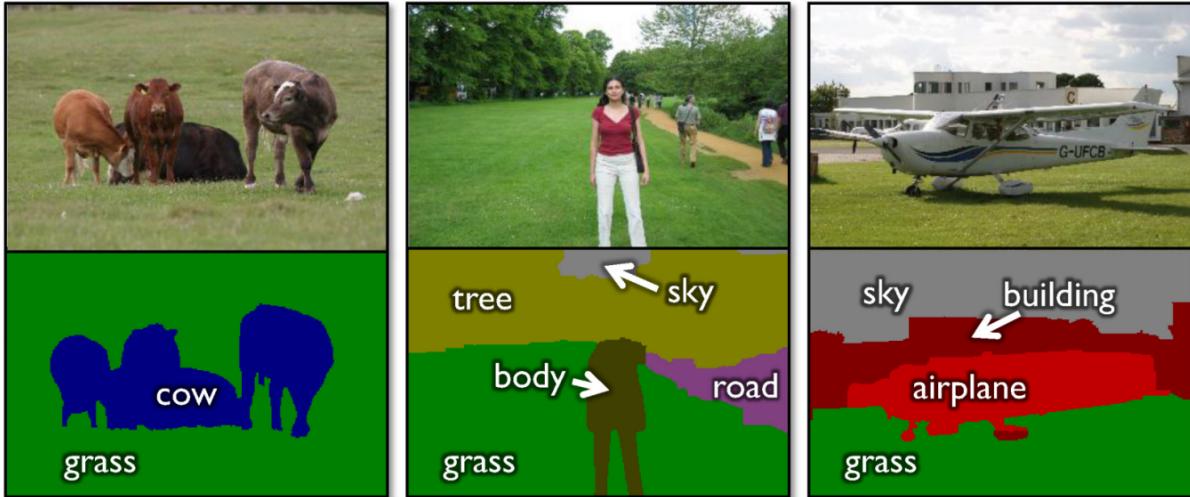
GATO, CACHORRO, PATO

Objeto único

Múltiplos objetos

Segmentação

Classifica cada pixel!



object classes	building	grass	tree	cow	sheep	sky	airplane	water	face	car
bicycle	flower	sign	bird	book	chair	road	cat	dog	body	boat

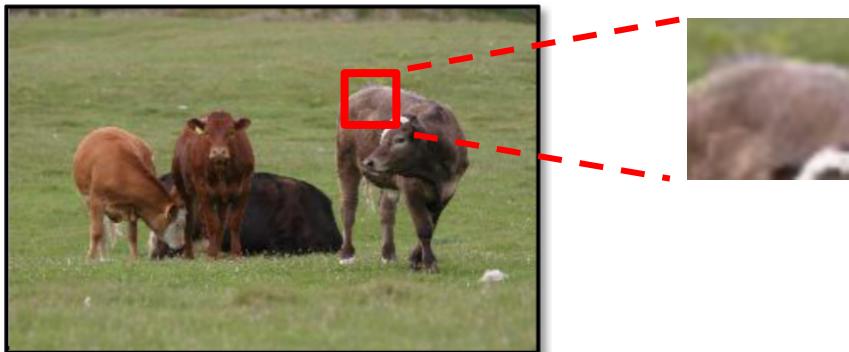
Figure credit: Shotton et al, "TextonBoost for Image Understanding: Multi-Class Object Recognition and Segmentation by Jointly Modeling Texture, Layout, and Context", IJCV 2007

Segmentação

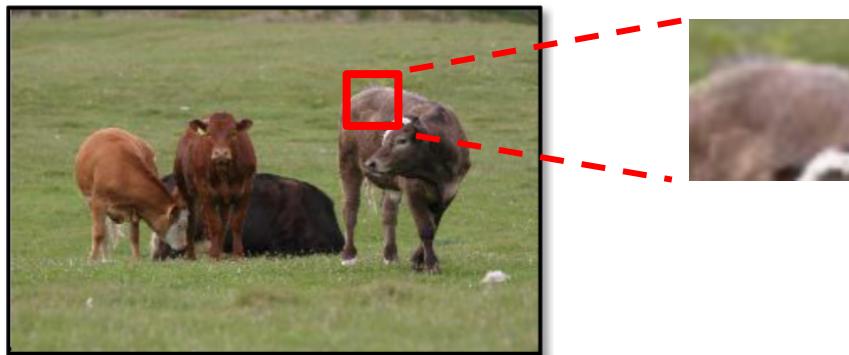


Segmentação

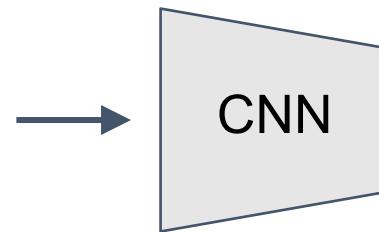
Extrai
patch



Segmentação

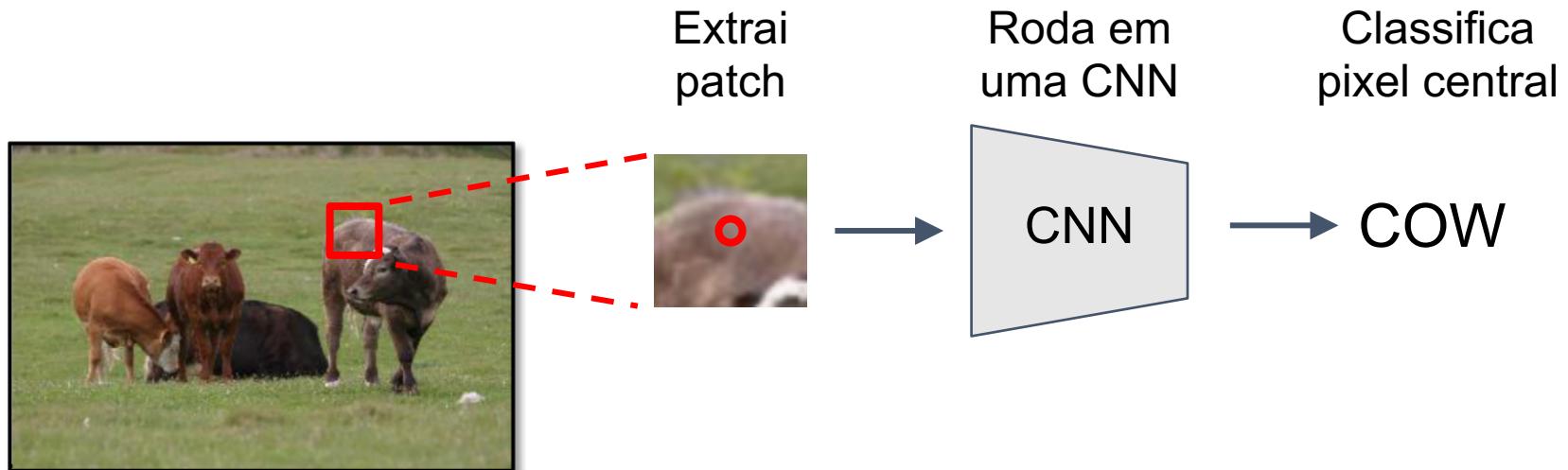


Extrai
patch

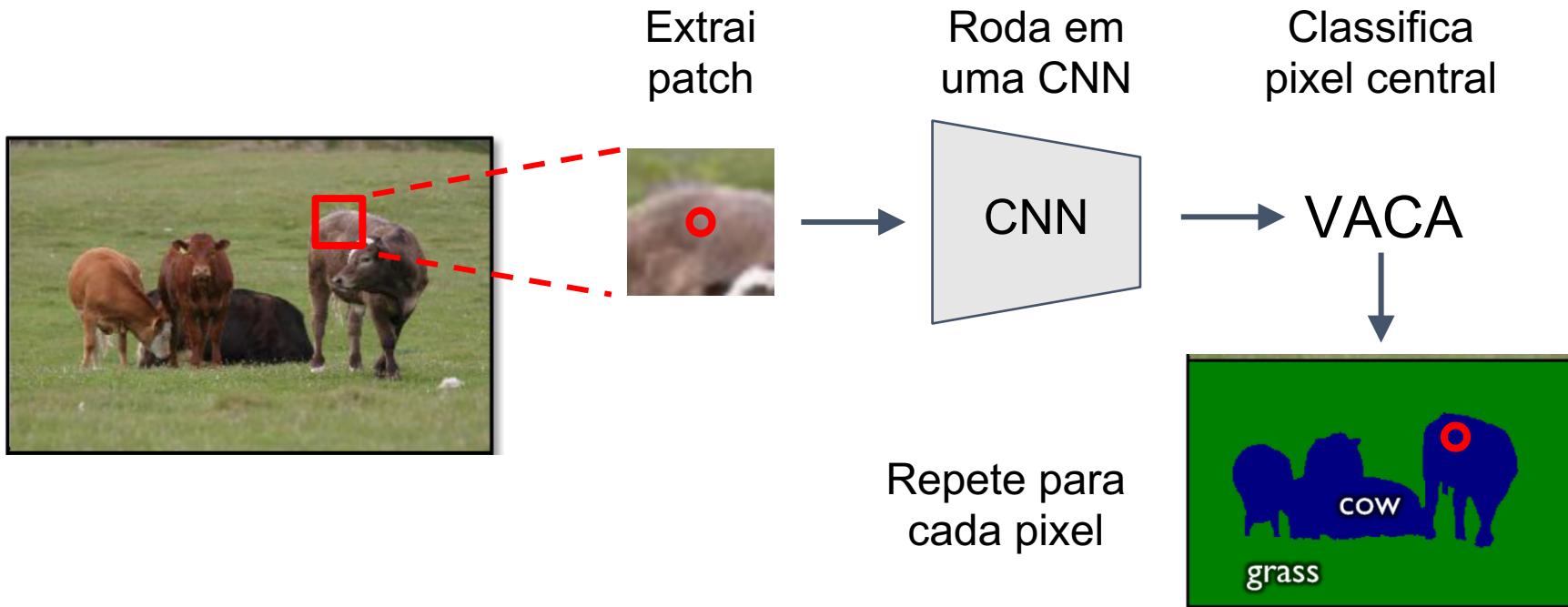


Roda em
uma CNN

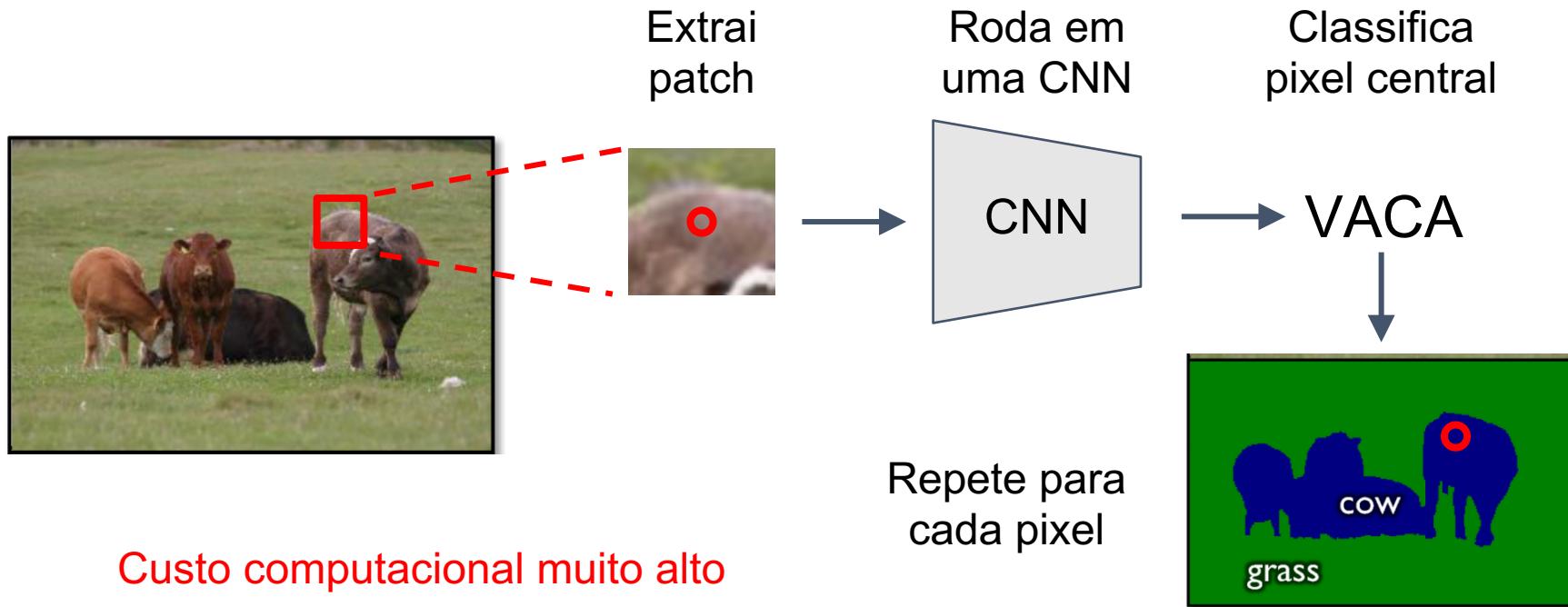
Segmentação



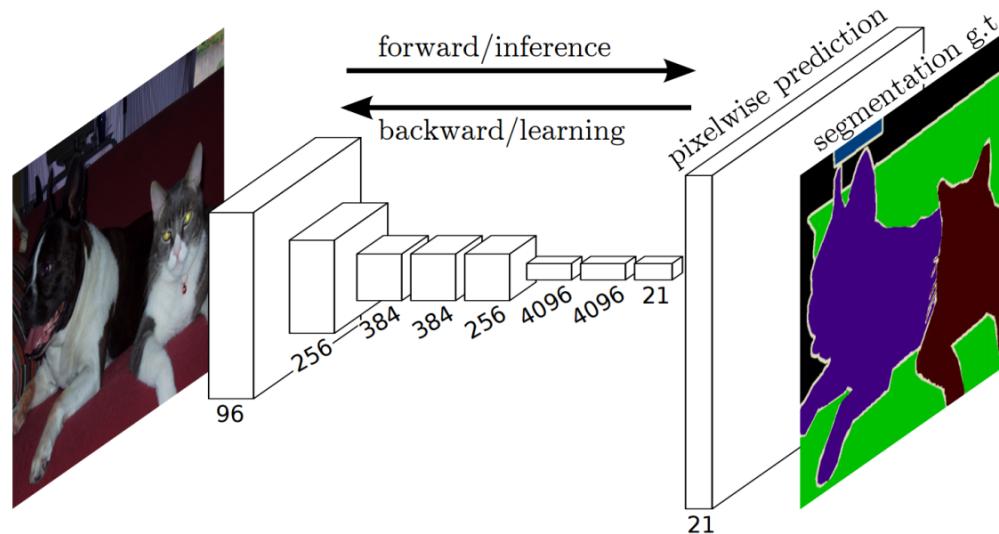
Segmentação



Segmentação



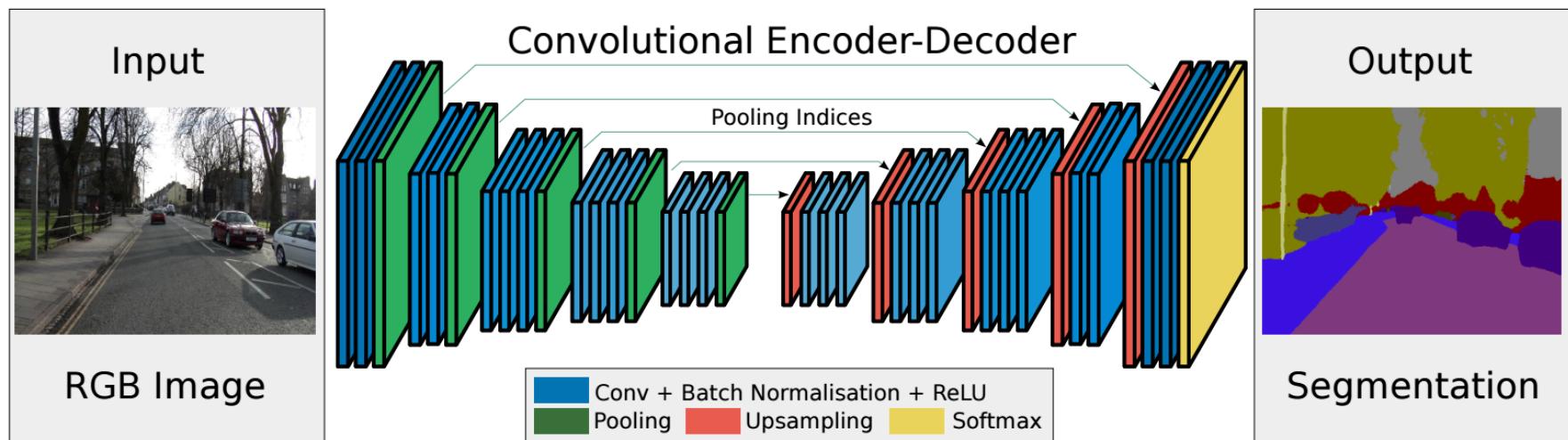
Segmentação: Upsampling



Long, Shelhamer, and Darrell, “Fully Convolutional Networks for Semantic Segmentation”, CVPR 2015

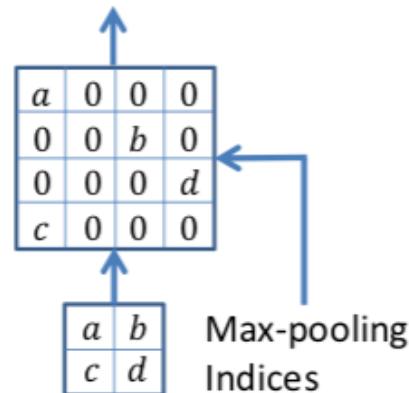
Segmentação: Upsampling

SegNet



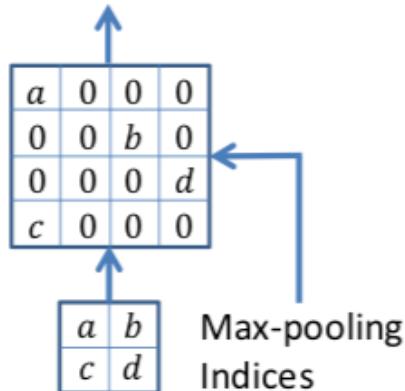
Segmentação: Upsampling

Max Upsampling



Segmentação: Upsampling

Max Upsampling



Keras:

`UpSampling2D(size=(2, 2))`

Datas Importantes

22/11: Dúvidas do trabalho

29/11: Entrega do trabalho

06/12: PO