

# Análisis de Datos y Aprendizaje Máquina con Tensorflow 2.0: Redes neuronales convolucionales

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## Modelos pre-entrenados VGG-19/NASNetLarge

- Objetivo: Utilizar una red pre-entrenada para reconocimiento de objetos. Se comprobará el desempeño de algunas arquitecturas como VGG-19 y NASNetLarge.

<https://keras.io/applications/>

- VGG-19 es una red neuronal convolucional de 19 capas de profundidad Fully Connected Layer que puede clasificar imágenes en 1000 categorías. La red se desarrolló por Visual Geometry Group (VGG) y está entrenada en el dataset 'ImageNet'.

- <https://arxiv.org/abs/1409.1556>
- <http://www.robots.ox.ac.uk/~vgg/>

- NASNetLarge es una red también entrenada en 'ImageNet' que ha obtenido buenos resultados

- <https://arxiv.org/abs/1707.07012>

```
In [1]: import numpy as np
import tensorflow as tf
from tensorflow import keras
from tensorflow.keras.preprocessing.image import img_to_array, ImageDataGenerator, array_to_img

from tensorflow.keras.preprocessing import image
```

## VGG19

- Cada red debe importar 'decode\_predictions'

```
In [2]: from tensorflow.keras.applications.vgg19 import VGG19
from tensorflow.keras.applications.vgg19 import decode_predictions, preprocess_input
```

```
In [3]: vgg = VGG19(include_top=True, weights='imagenet')
```

```
In [4]: from IPython.display import display, Image
```

## Leer Imágenes

```
In [5]: display(Image(filename='hp.jpg'))
```



## Función para leer imágenes

```
In [6]: def load_img(path):  
        img = tf.io.read_file(path)  
        img = tf.image.decode_image(img, channels=3)  
        img = tf.image.convert_image_dtype(img, tf.float32)  
        shape = tf.cast(tf.shape(img)[:1], tf.float32)  
  
        return img[tf.newaxis, :]
```

```
In [7]: x = load_img('hp.jpg')  
        x = preprocess_input(x*255)  
  
        x = tf.image.resize(x, (224, 224))  
  
        features = vgg(x)
```

- 5 primeras etiquetas

```
In [8]: predicted_top_5 = decode_predictions(features.numpy())[0]  
        [(class_name, prob) for (number, class_name, prob) in predicted_top_5]
```

```
Out[8]: [('hippopotamus', 0.99999416),
         ('armadillo', 3.4112575e-06),
         ('hog', 1.3947839e-06),
         ('American_coot', 1.827417e-07),
         ('warthog', 1.8164341e-07)]
```

```
In [9]: display(Image(filename='pr.jpg'))
```



```
In [10]: x = load_img('pr.jpg')

         x = preprocess_input(x*255)

         x = tf.image.resize(x, (224, 224))
```

```
features = vgg(x)
```

- 5 primeras etiquetas

```
In [11]: predicted_top_5 = decode_predictions(features.numpy())[0]
         [(class_name, prob) for (number, class_name, prob) in predicted_top_5]
```

```
Out[11]: [('rock_python', 0.8633698),
          ('boa_constrictor', 0.09225663),
          ('night_snake', 0.021874327),
          ('hognose_snake', 0.011194411),
          ('king_snake', 0.008277133)]
```

## NASNetLarge

- Se modifica 'target\_size'

```
In [12]: from tensorflow.keras.applications.nasnet import NASNetLarge
         from tensorflow.keras.applications.nasnet import decode_predictions, preprocess_input
```

```
In [13]: nas = NASNetLarge(include_top=True, weights='imagenet')
```

## Imagen 1

```
In [14]: x = load_img('hp.jpg')
```

```
x = preprocess_input(x*332)
```

```
x = tf.image.resize(x, (331, 331))
```

```
features = nas(x)
```

```
In [15]: predicted_top_5 = decode_predictions(features.numpy())[0]
        [(class_name, prob) for (number, class_name, prob) in predicted_top_5]
```

```
Out[15]: [('hippopotamus', 0.9321972),
          ('face_powder', 0.00037513342),
          ('dugong', 0.00031095117),
          ('switch', 0.00026751906),
          ('chimpanzee', 0.00022761109)]
```

## Imagen 2

```
In [16]: x = load_img('pr.jpg')
```

```
x = preprocess_input(x*332)
```

```
x = tf.image.resize(x, (331, 331))
```

```
features = nas(x)
```

```
In [17]: predicted_top_5 = decode_predictions(features.numpy())[0]
        [(class_name, prob) for (number, class_name, prob) in predicted_top_5]
```

```
Out[17]: [('rock_python', 0.85519165),
          ('boa_constrictor', 0.028593719),
          ('night_snake', 0.012484011),
          ('horned_viper', 0.0012726327),
          ('king_snake', 0.0011572422)]
```

- Cada red parece dar diferentes probabilidades a las imágenes
- Explorar y comparar otros modelos pre-entrenados