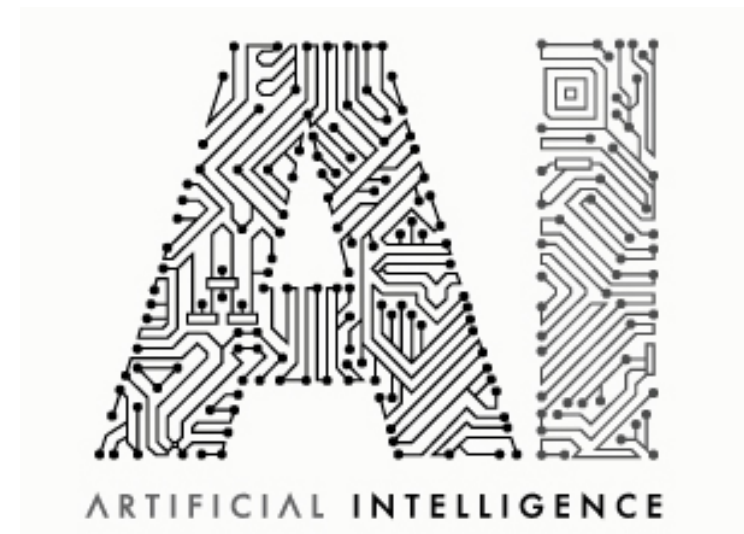


Inteligencia Artificial y Segmentación. Aplicación al territorio.





ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.

MACHINE LEARNING

Machine learning begins to flourish.

DEEP LEARNING

Deep learning breakthroughs drive AI boom.



1950's

Since an early deep learning,

arXiv:1409.1556v6 [cs.CV] 10 Apr 2015

Published as a conference paper at ICLR 2015

VERY DEEP CONVOLUTIONAL NETWORKS FOR LARGE-SCALE IMAGE RECOGNITION

Karen Simonyan^{*} & Andrew Zisserman^{*}
Visual Geometry Group, Department of Engineering Science, University of Oxford
{karen, az}@robots.ox.ac.uk

ABSTRACT

In this work we investigate the effect of the convolutional network depth on its accuracy in the large-scale image recognition setting. Our main contribution is a thorough evaluation of networks of increasing depth using an architecture with very small (3×3) convolution filters, which shows that a significant improvement on the prior-art configurations can be achieved by pushing the depth to 16-19 weight layers. These findings were the basis of our ImageNet Challenge 2014 submission, where our team secured the first and the second places in the localisation and classification tracks respectively. We also show that our representations generalize well to other datasets, where they achieve state-of-the-art results. We have made our two best-performing ConvNets publicly available to facilitate further research on the use of deep visual representations in computer vision.

1 INTRODUCTION

Convolutional networks (ConvNets) have recently enjoyed a great success in large-scale image and video recognition (Krizhevsky et al., 2012; Zeiler & Fergus, 2013; Simonyan et al., 2014; Sermanet et al., 2014), which has become possible due to the large public image recognition sets, such as ImageNet (Deng et al., 2009), and high-performance computing systems, such as GPUs or large-scale distributed clusters (Dean et al., 2012). In particular, an important role in the advance of deep visual recognition architectures has been played by the ImageNet LargeScale Visual Recognition Challenge (ILSVRC) (Daudrechy et al., 2014), which has served as a testbed for a few generations of large-scale image classification systems, from high-dimensional shallow feature encodings (Parsian et al., 2010) to the winner of ILSVRC-2011 to deep ConvNets (Krizhevsky et al., 2012) (the winner of ILSVRC-2015).

With ConvNets becoming more of a commodity in the computer vision field, a number of attempts have been made to improve the original architecture of Krizhevsky et al. (2012) in a bid to achieve better accuracy. For instance, the best-performing submissions to the ILSVRC-2015 (Zeiler & Fergus, 2013; Sermanet et al., 2014) utilized smaller receptive window size and smaller stride of the first convolutional layer. Another line of improvements dealt with training and testing the networks densely over the whole image and over multiple scales (Sermanet et al., 2014; Howard, 2014). In this paper, we address another important aspect of ConvNet architecture design – its depth. In this end, we fix other parameters of the architecture, and steadily increase the depth of the network by adding more convolutional layers, which is feasible due to the use of very small (3×3) convolution filters in all layers.

As a result, we come up with significantly more accurate ConvNet architectures, which not only achieve the state-of-the-art accuracy on ILSVRC classification and localisation tasks, but are also applicable to other image recognition datasets, where they achieve excellent performance even when used as part of a relatively simple pipeline (e.g. deep features classified by a linear SVM without fine-tuning). We have released our two best-performing models¹ to facilitate further research.

The rest of the paper is organized as follows. In Sect. 2, we describe our ConvNet configurations. The details of the image classification training and evaluation are then presented in Sect. 3, and the

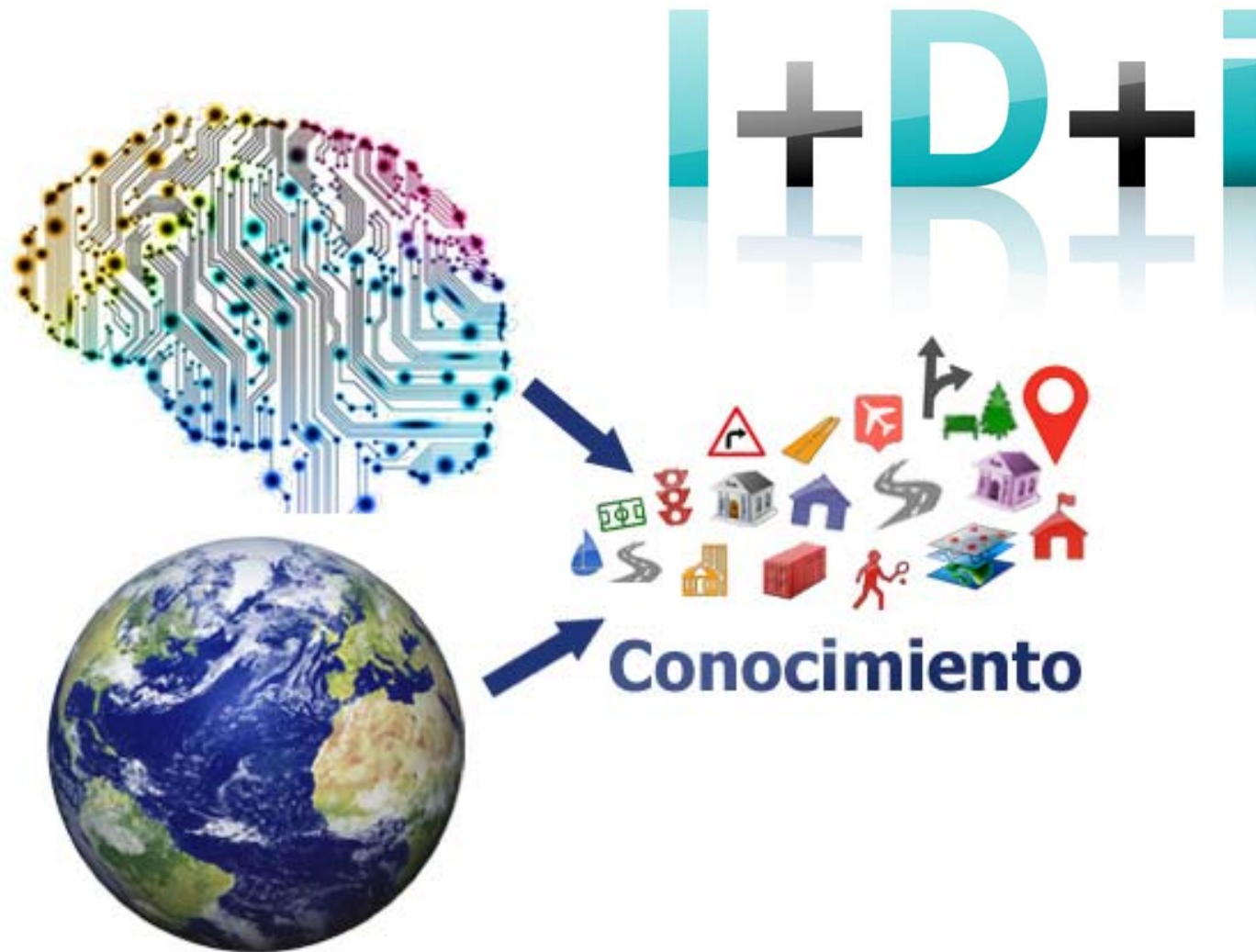
^{*}Current affiliation: Google DeepMind. ^{*}Current affiliation: University of Oxford and Google DeepMind
¹http://www.robots.ox.ac.uk/vgg/research/very_deep/

2010's

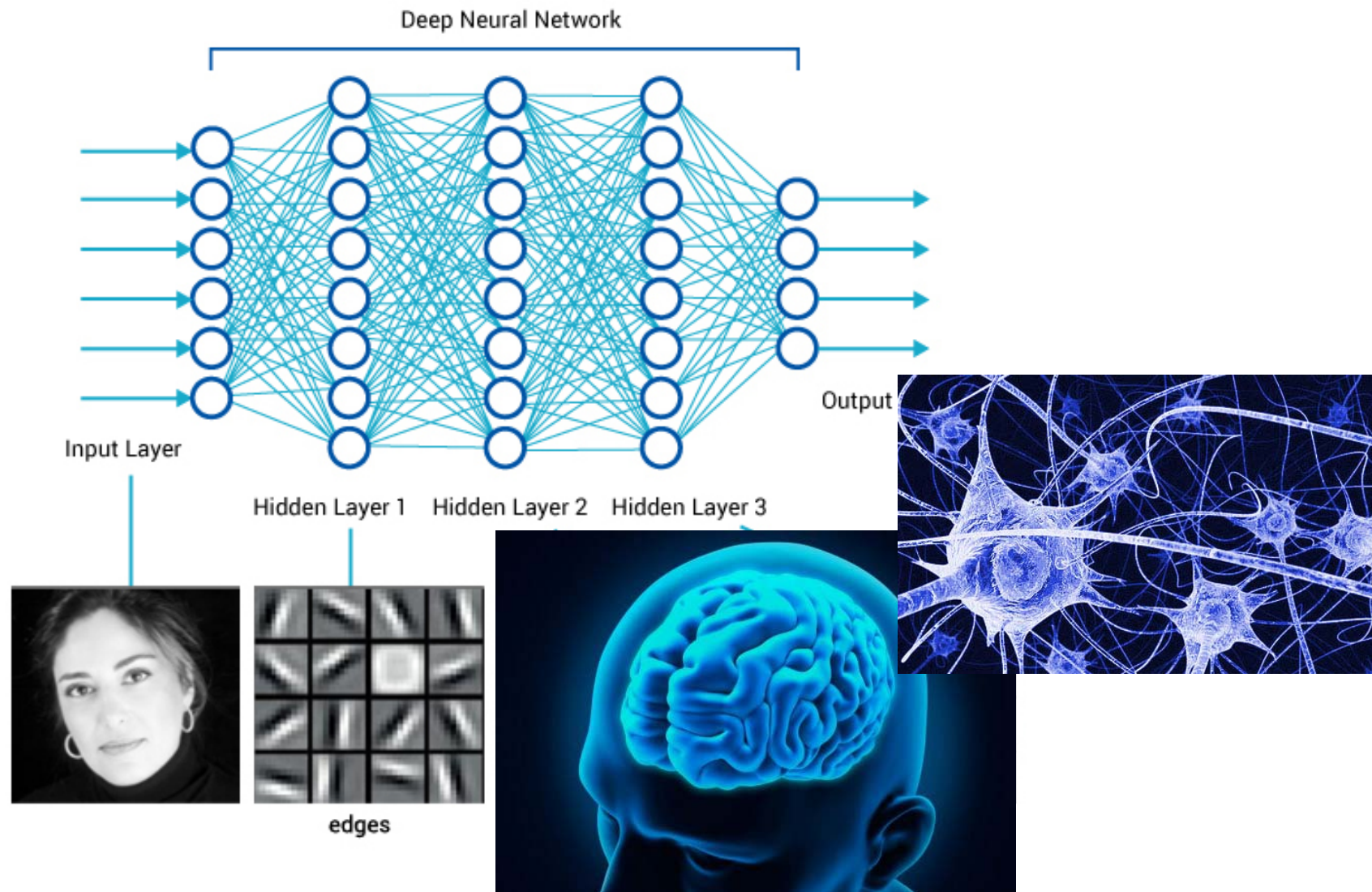
2015

Artificial intelligence – first machine learning, then deep learning breakthroughs.

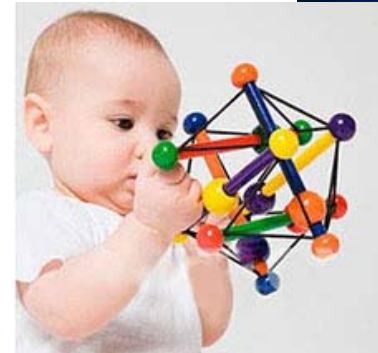
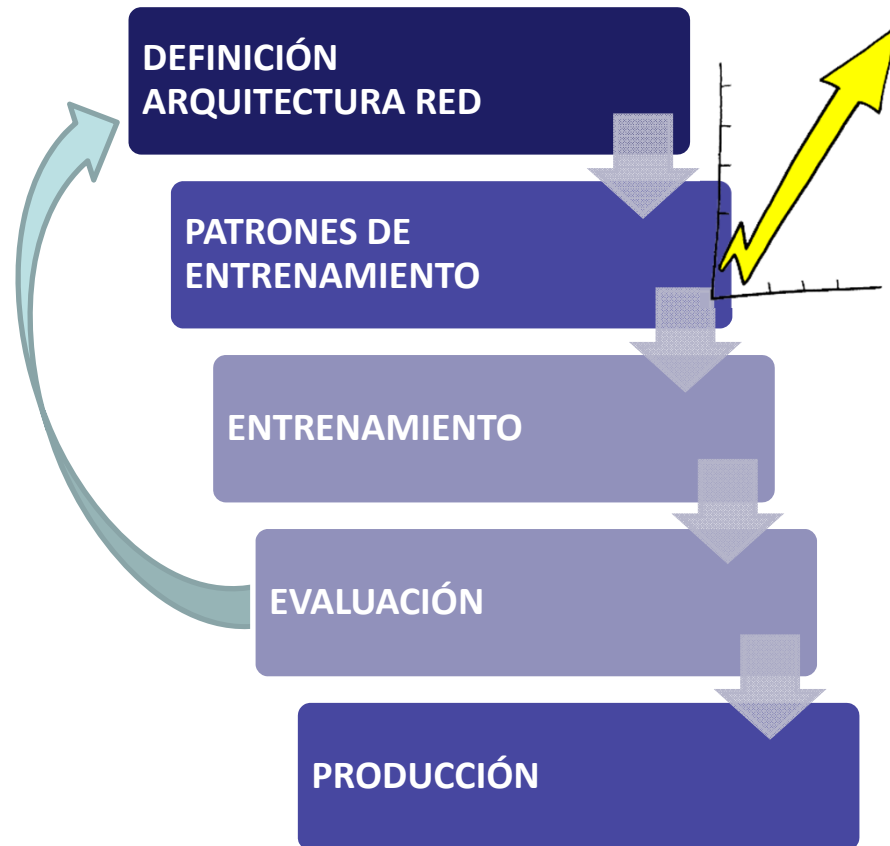




Redes Neuronales (deep learning)...



Flujo de trabajo IA



ADN



APRENDIZAJE

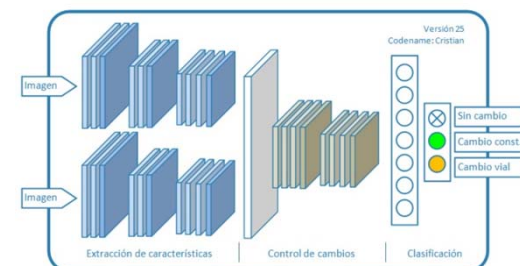
Proyectos IA



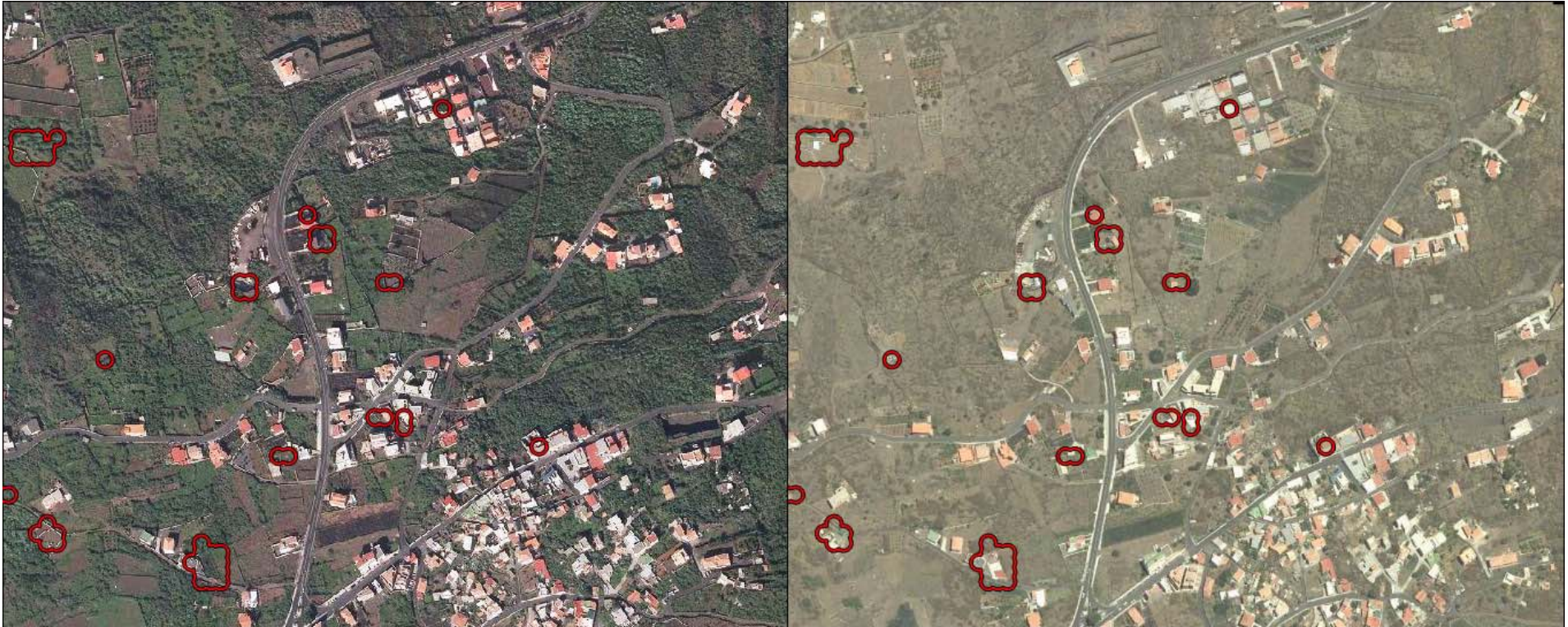
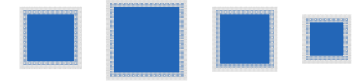
Piloto I+D



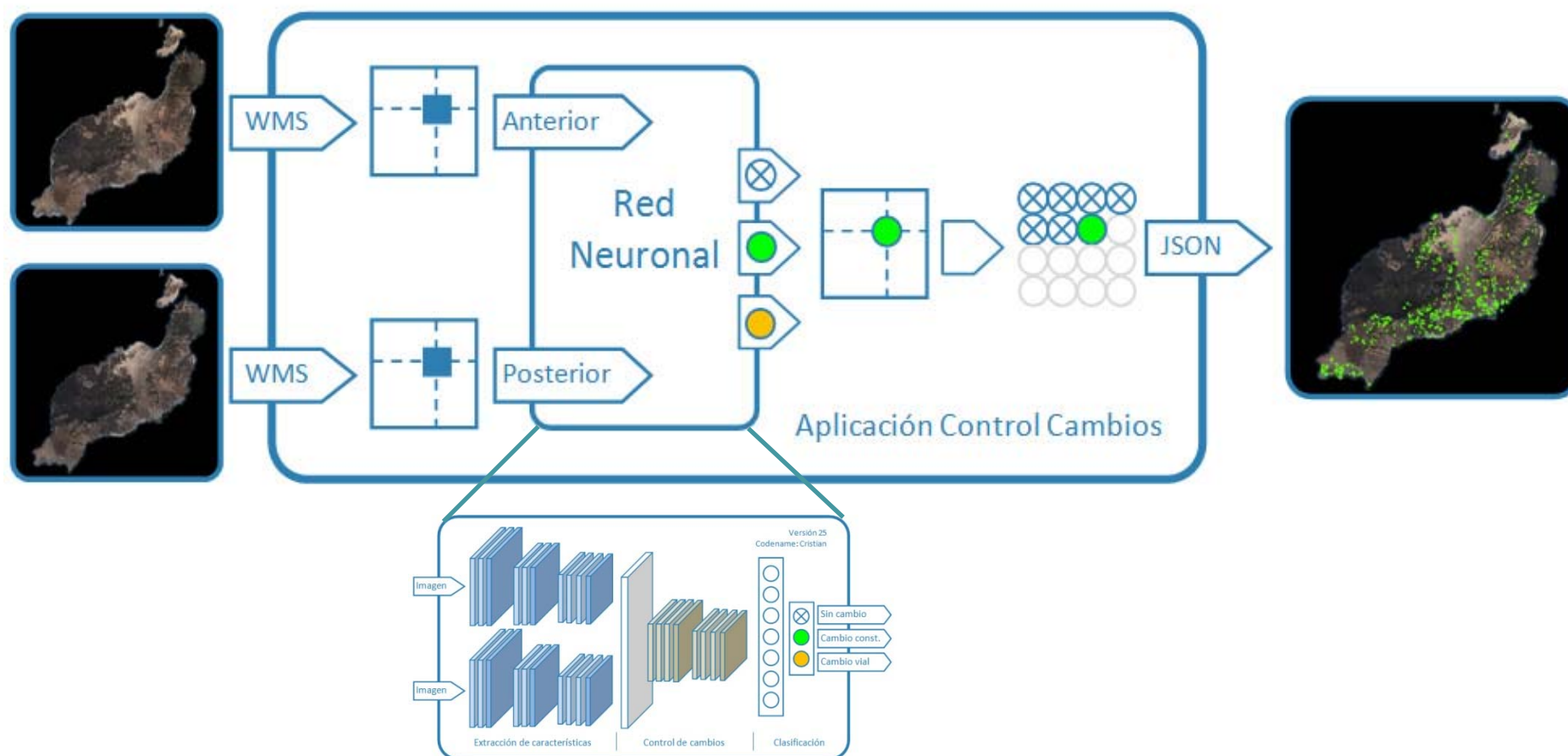
- Control de cambios en Ortofotos
- Mejora de resolución en imágenes
- Segmentación
 - Medio ambiente
 - Agricultura
- Futuro...



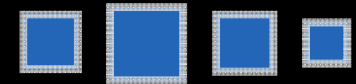
Detección de cambios en Ortofotos



Desarrollo => Producción



Ejemplos control de cambios



Líneas de trabajo: Mejora resolución



Mapas de Canarias

Cartográfica de Canarias S.A. (GRAFCAN)

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17 GNSS
Todas las islas

Información y estado actual de las antenas

CALENDARIO

« **Noviembre** »

L	M	M	J	V	S	D
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

TWEETS

Tweets por [@GRAFCAN](#)

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Inteligencia Artificial aplicada al incremento de resolución de imágenes SENTINEL2

Publicado el Vie, 10/11/2017 - 10:19

IDECanarias cuenta con un nuevo servicio de imágenes satélite que hemos denominado **SENTINEL2 Super Resolution**. Las nuevas imágenes satélite publicadas se han generado partiendo de imágenes capturadas por el satélite Sentinel2 (perteneciente al proyecto europeo Copernicus) sobre las que se aplica un algoritmo basado en **inteligencia artificial** que mejora notablemente su resolución y por tanto su calidad visual.

En el [visor](#) de IDECanarias podemos comparar la imagen del año 2016 del Sentinel2 que no tiene ningún tratamiento y que es de 10 metros/pixel, con la nueva imagen generada del año 2017 empleando la técnica de *Super-Resolution* cuya resolución obtenida es de 5 metros/pixel. Podemos emplear la herramienta de doble ventana para realizar una comparativa entre ambas (pinchar [aquí](#)).

En el siguiente ejemplo se puede observar la mejora que experimentan las imágenes cuando aplicamos esta técnica, permitiendo obtener detalles de la imagen que no eran visibles en la original y permitiendo a nuestros usuarios utilizar más "zoom" para acercarse a las imágenes.



SIGUENOS EN ...



SERVICIOS



250.000 desde **1960**
fotogramas

- [Consulta de fototeca](#)
- [PDF con firma digital](#)
- [Validación firma digital](#)

GOOGLE ANALYTICS SUMMARY

Noticias

- Actualización de las vistas de SIGPAC en MAPA (noviembre 2017)

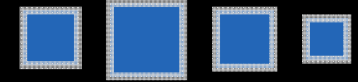


Mejora resolución imágenes Sentinel2 => 5m/pixel



<http://visor.grafcan.es>

Comparativa



S2 original 10m/pixel



Photoshop (conservar detalles 2.0)
5m/pixel

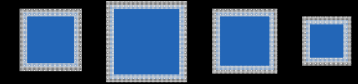


GRAFCAN mejora resolución IA
5m/pixel

Aplicación (entrenamiento):

- Bandas individuales
- RGB+IR
- Multiespectral
- 20m=>10m, 10m=>5m

Mejora resolución imágenes (Ortofotos)



Segmentación...



Classification



CAT

**Classification
+ Localization**



CAT



**Instance
Segmentation**

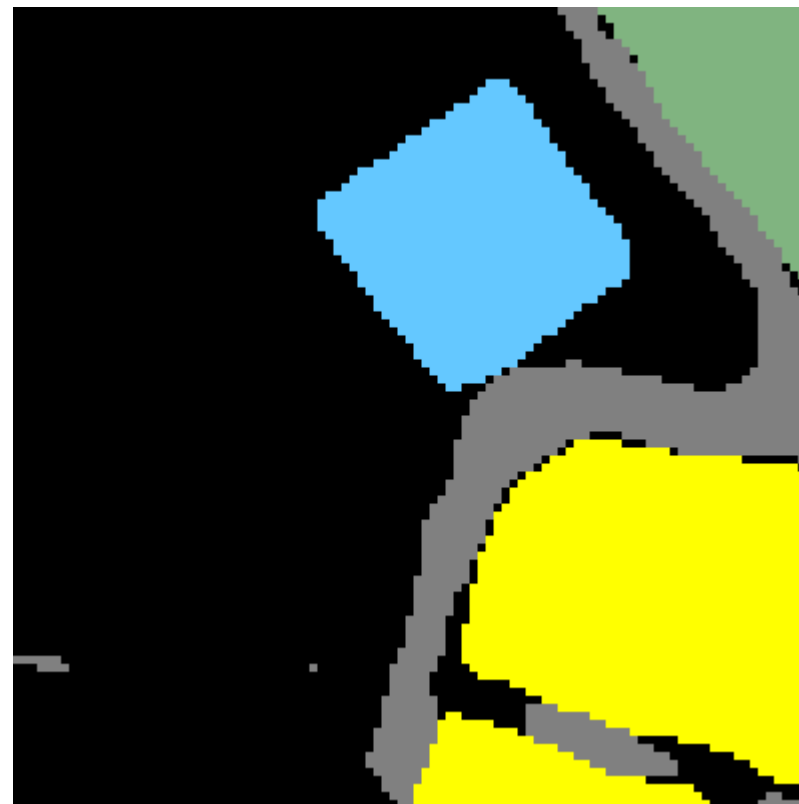


CAT, DOG, DUCK

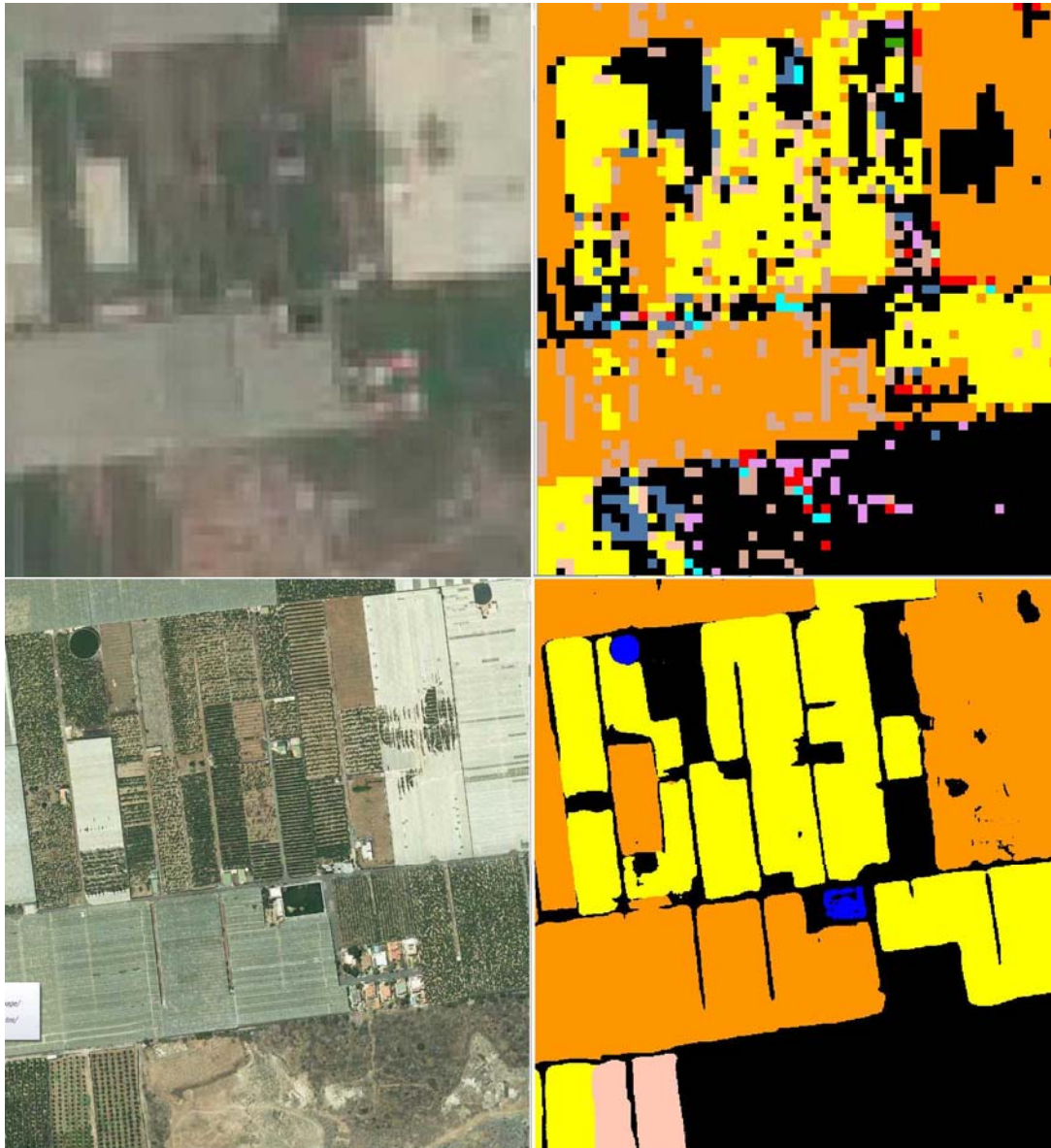


Segmentación sobre Ortofotos

Proceso de aprendizaje Red Neuronal de Segmentación



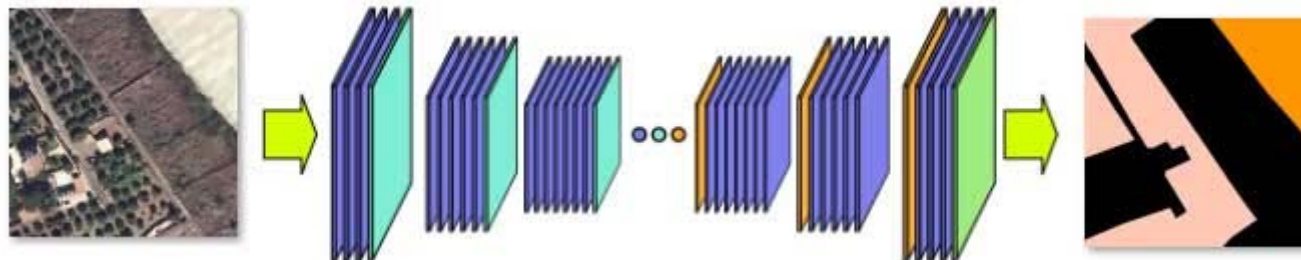
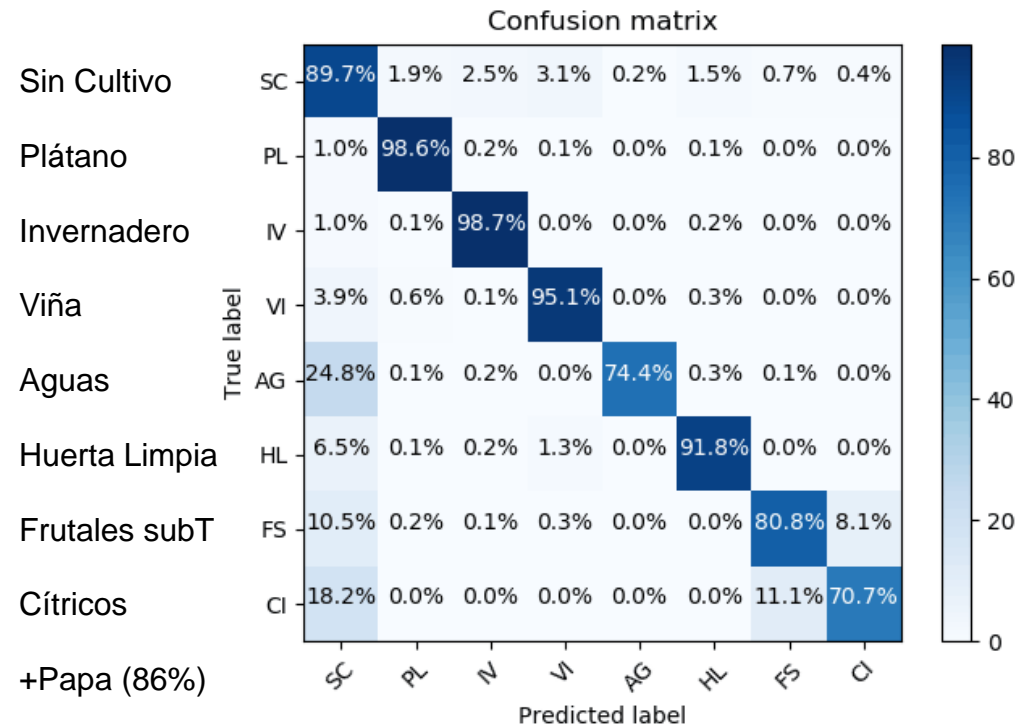
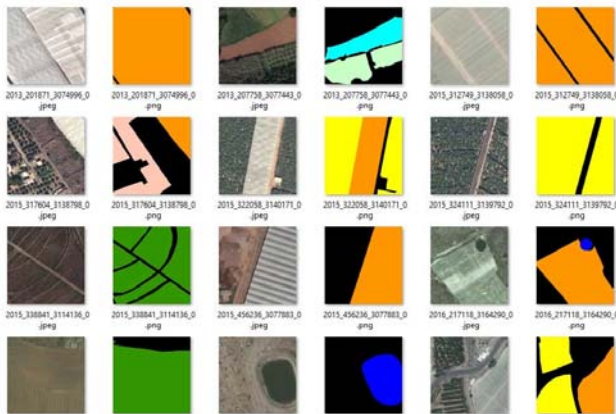
Comparativa de tecnologías



Sentinel2
(Teledetección)
[Bands(10)+ Lidar(4)]

Segmentación IA
(Deep Learning)
[Ortofoto RGB]

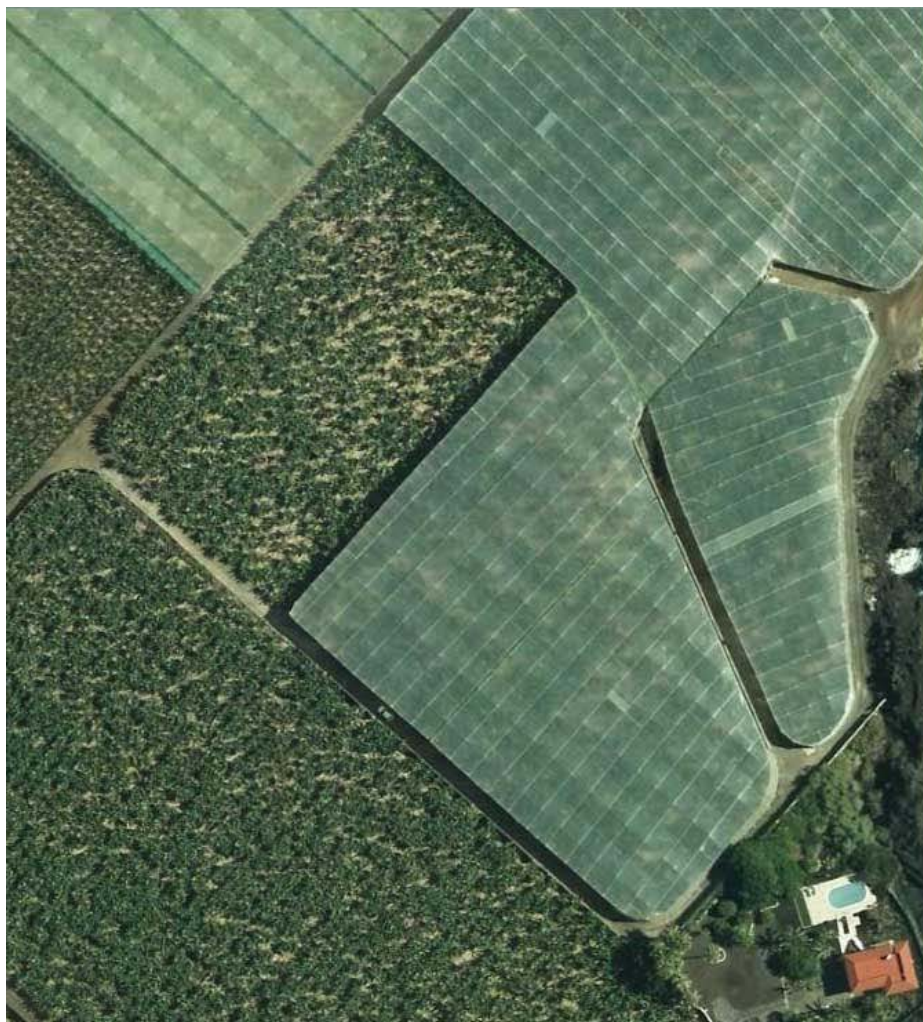
Redes neuronales de segmentación



Ejemplos



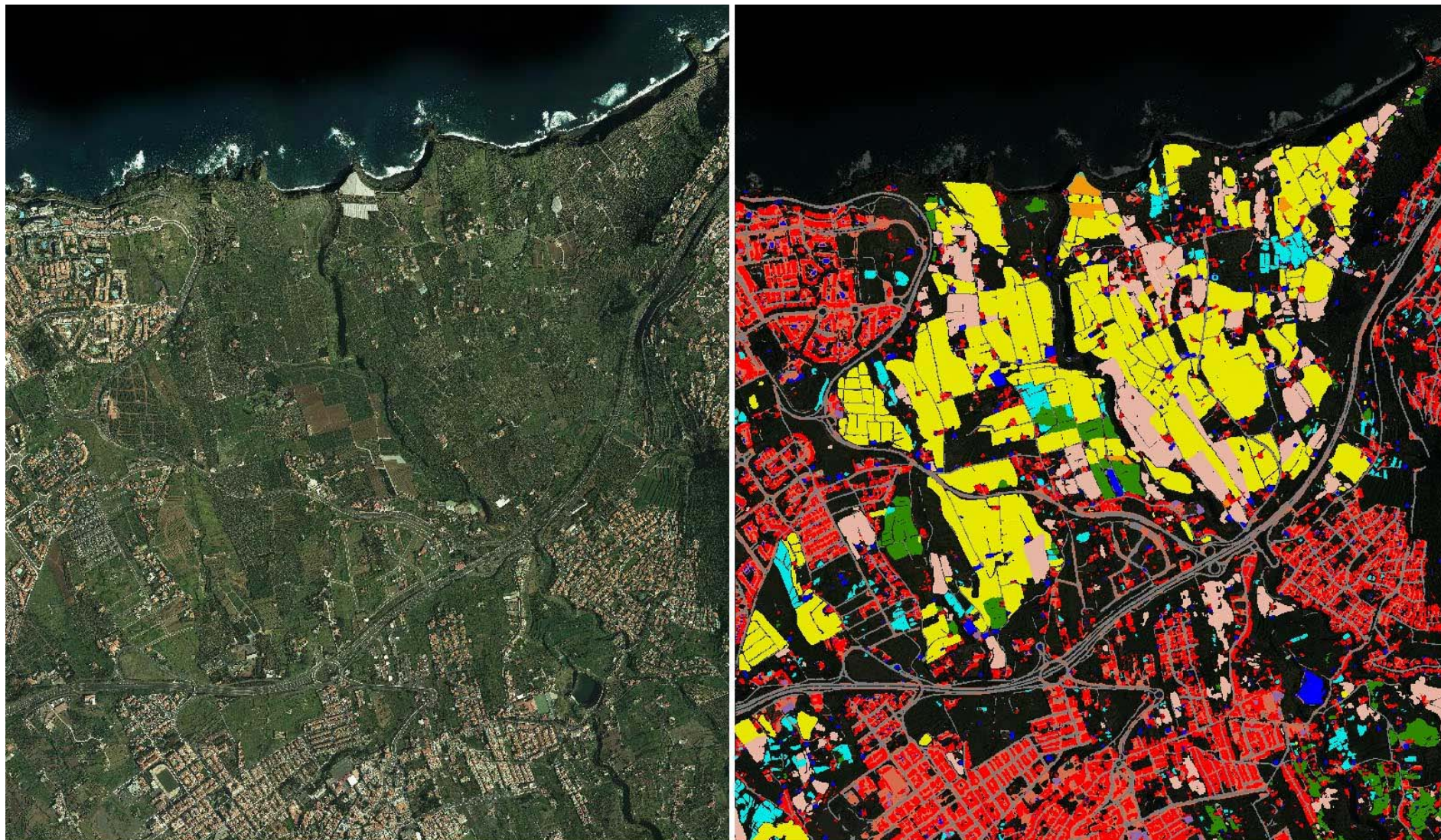
Ejemplos



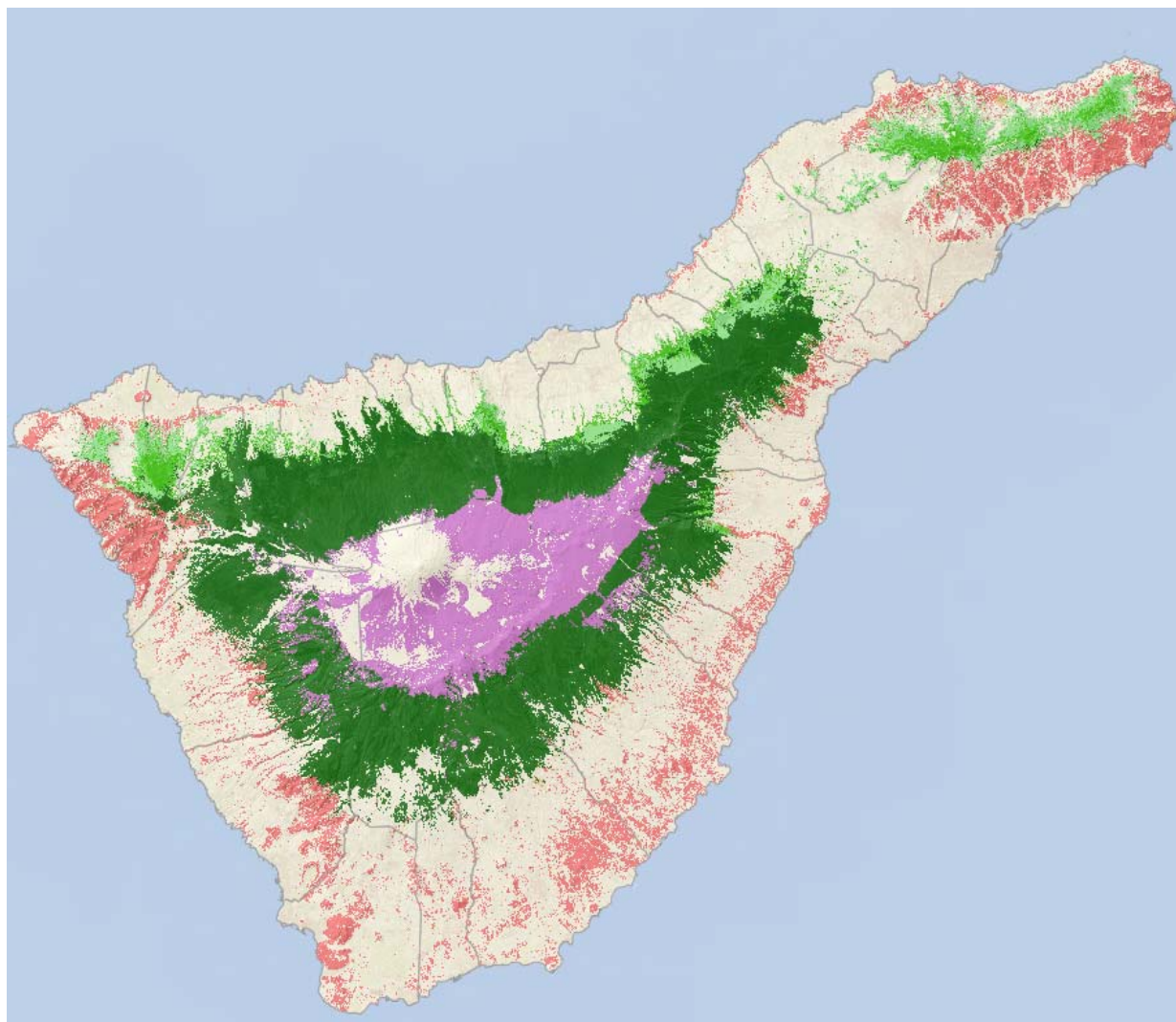
Ejemplos



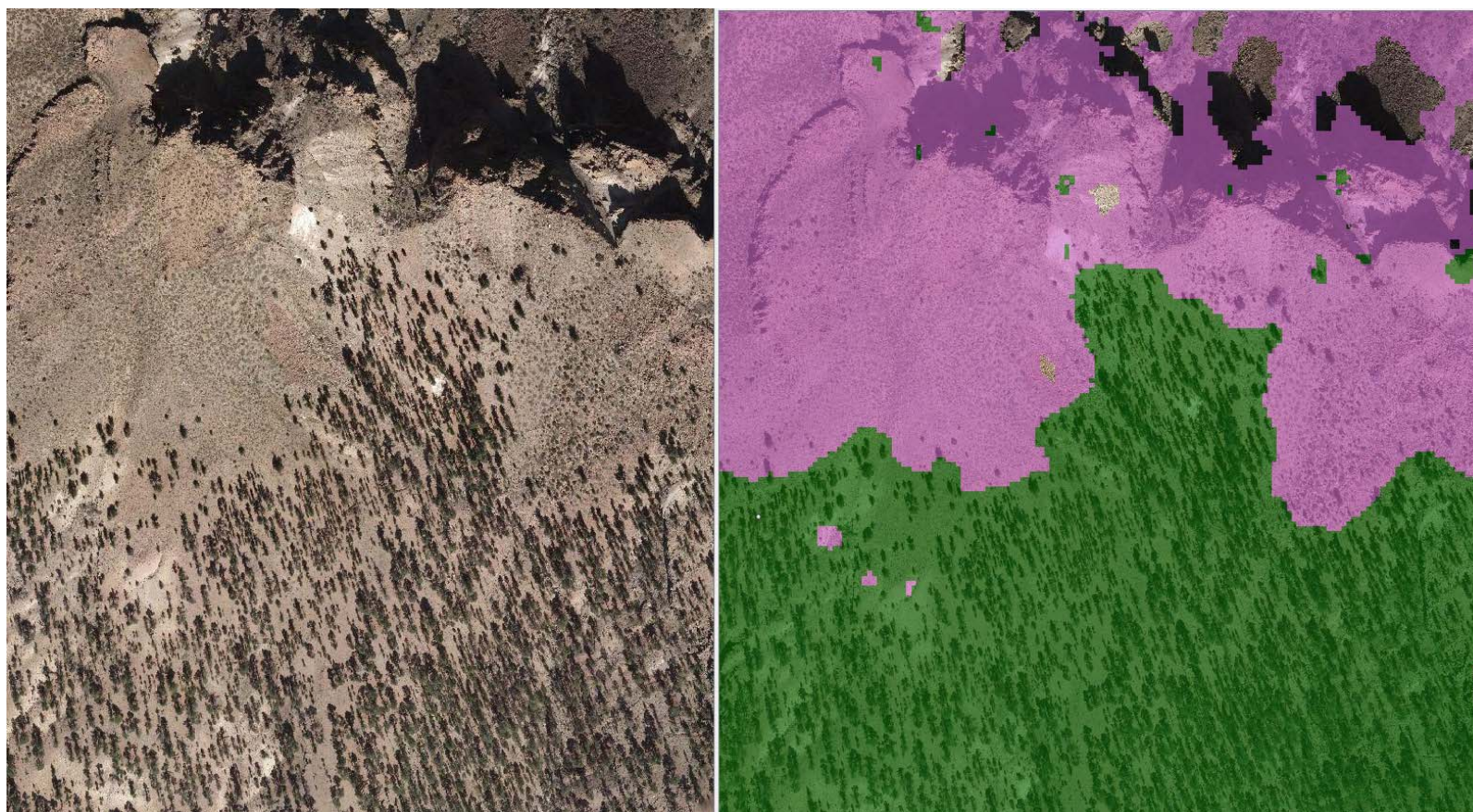
Ejemplos



Segmentación: Hábitats...

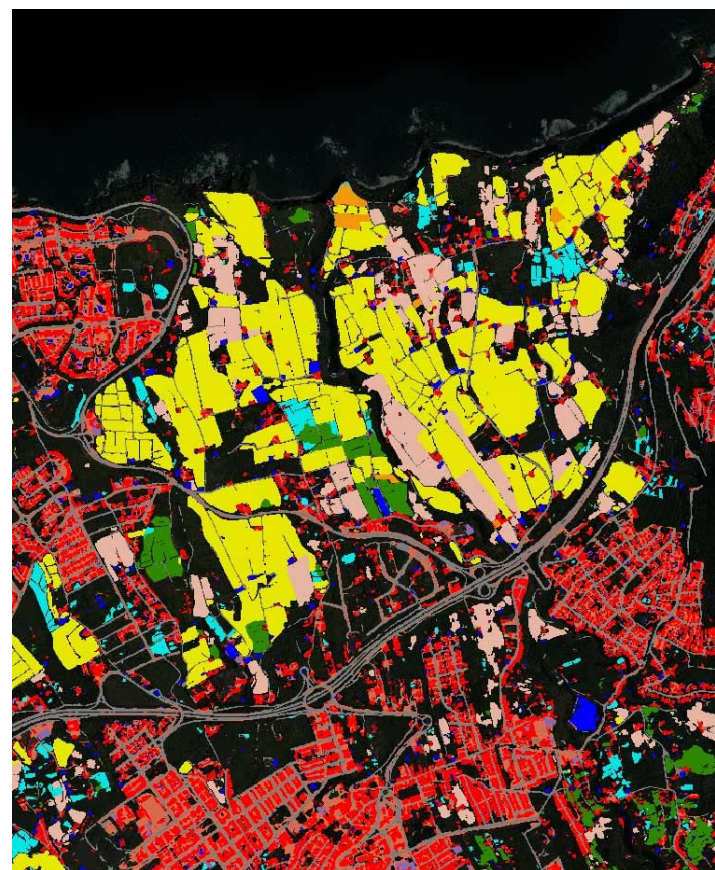
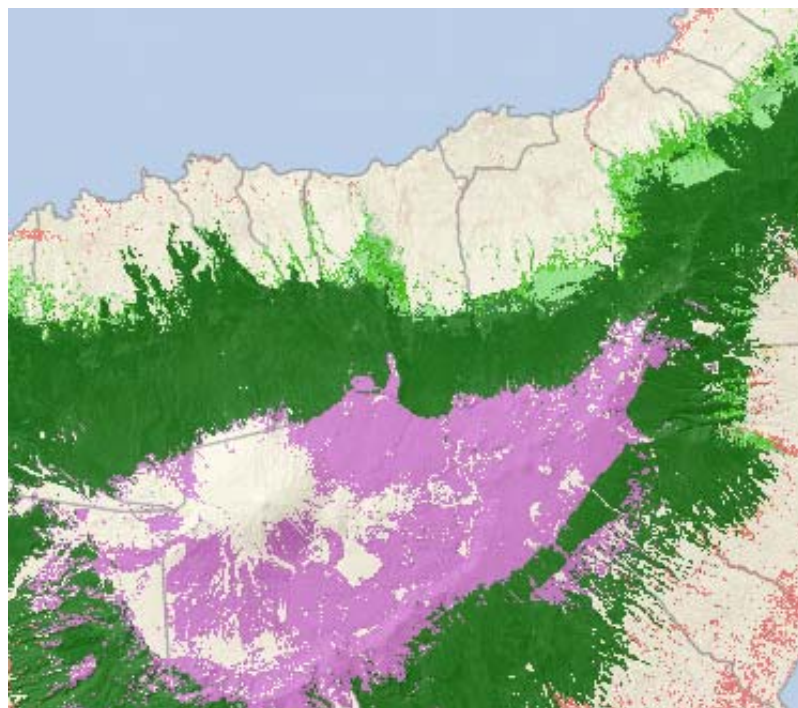


Segmentación: Hábitats...

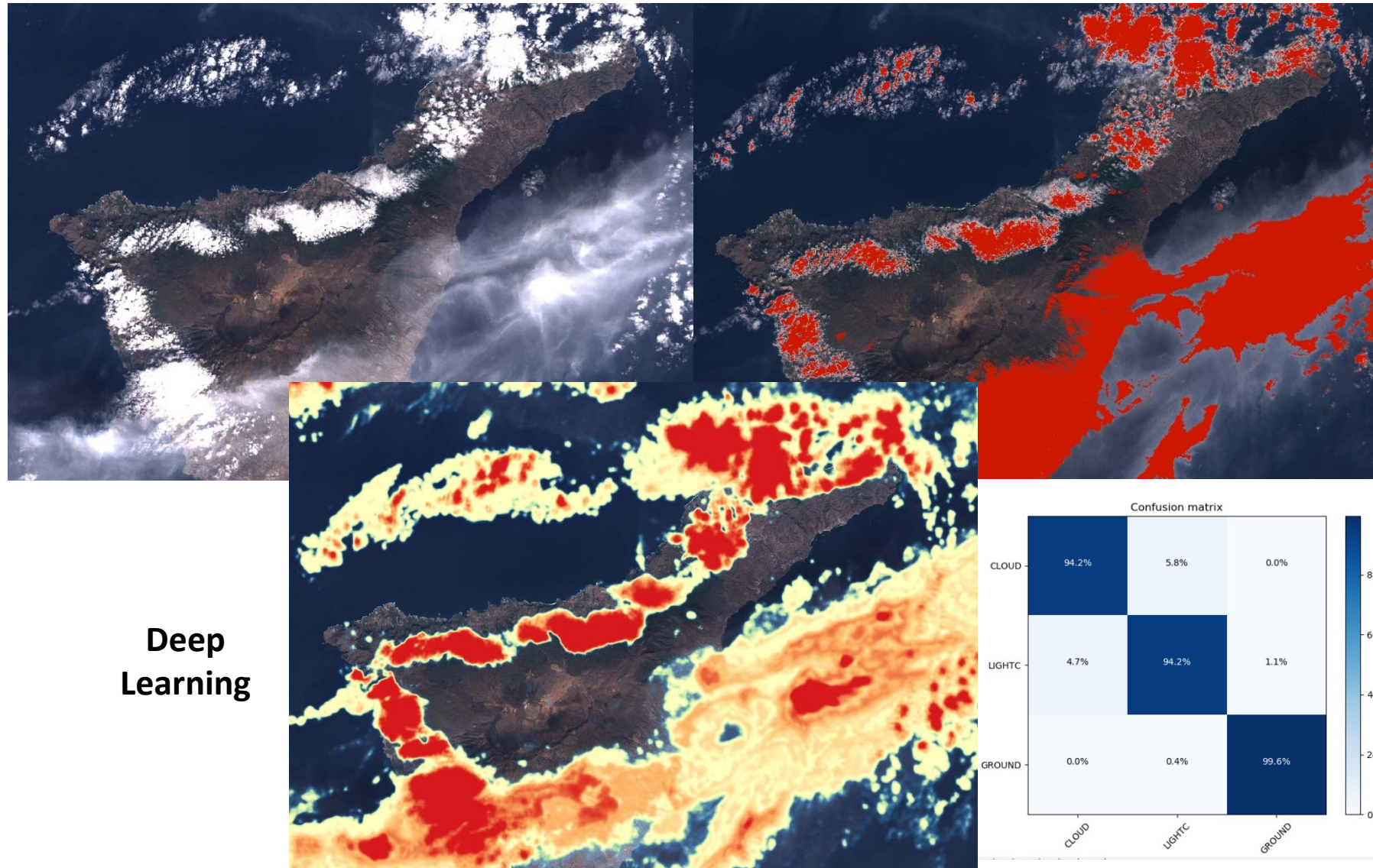




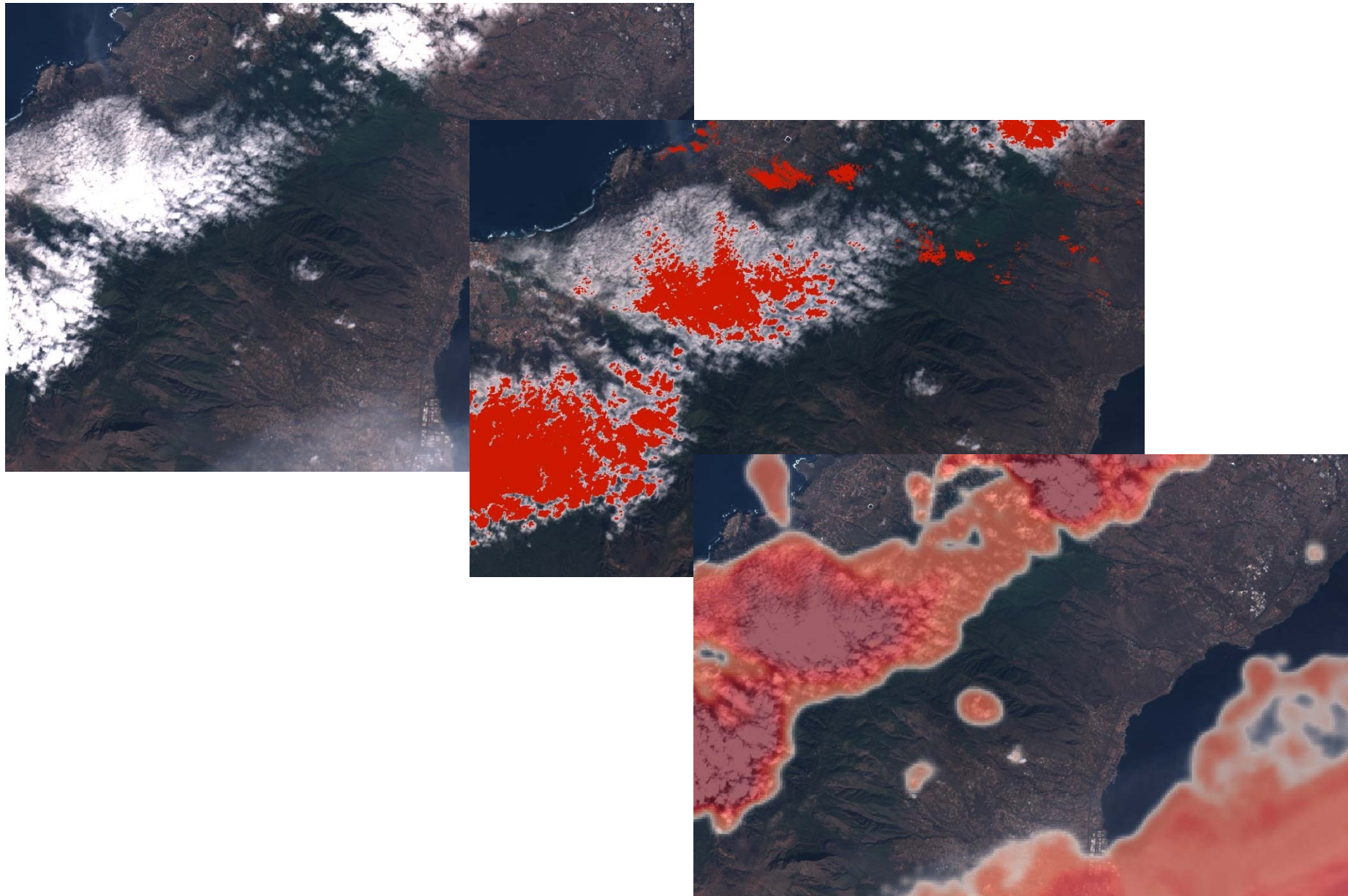
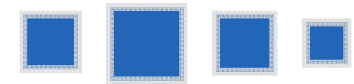
Mapas ocupación suelo



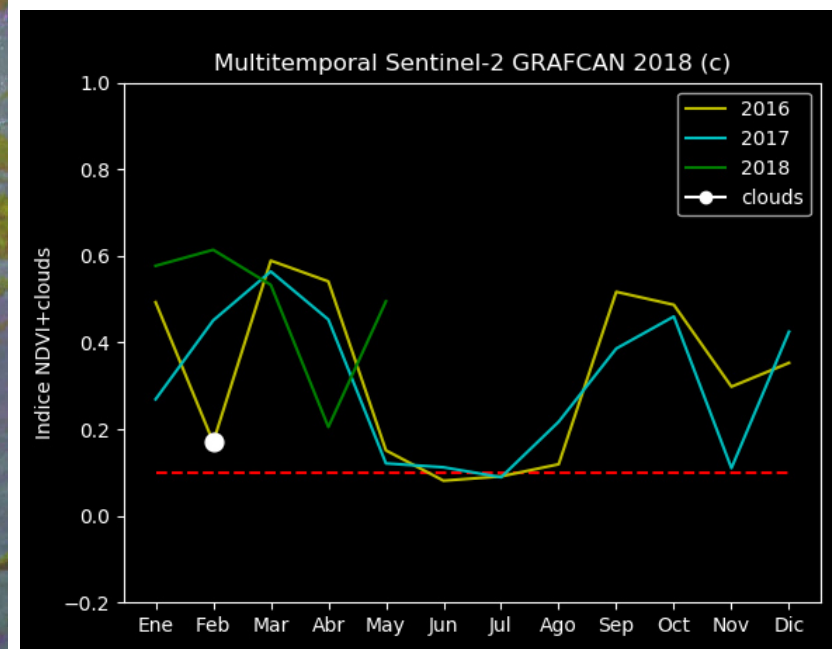
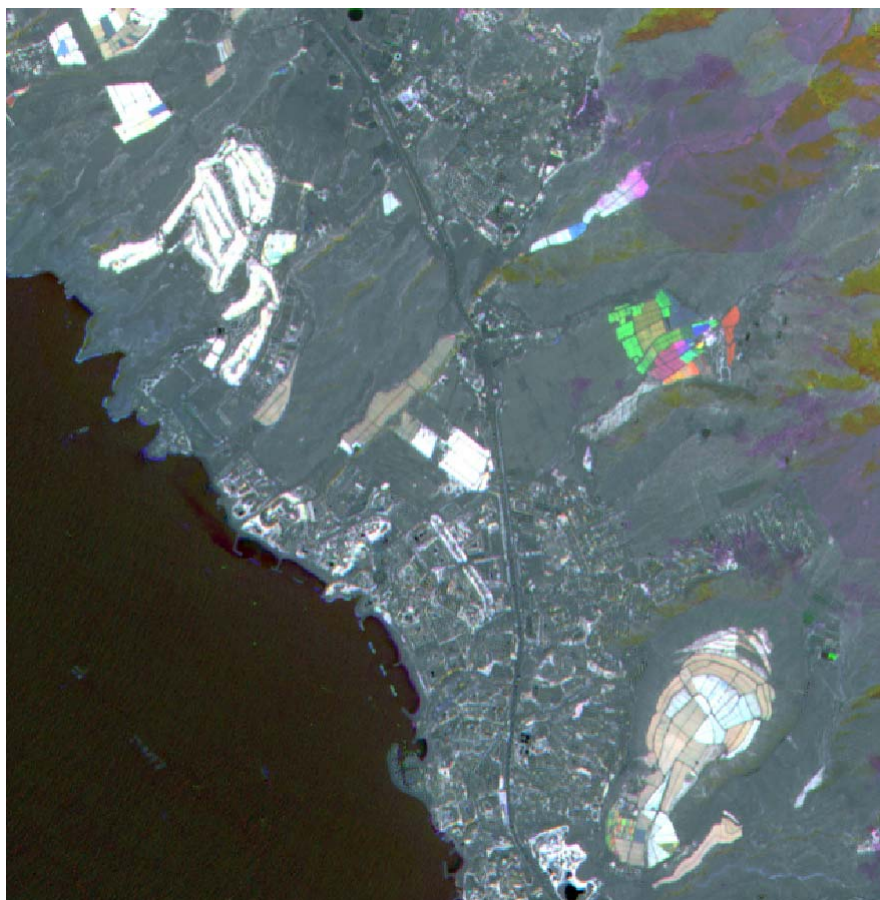
Detección nubes Sentinel2



Detección nubes Sentinel2



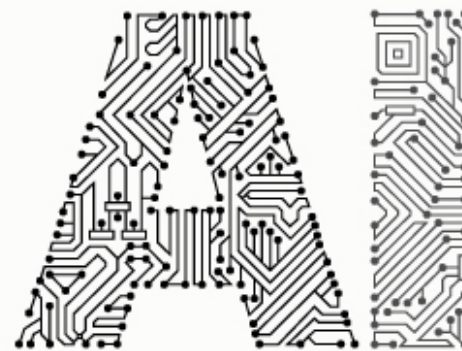
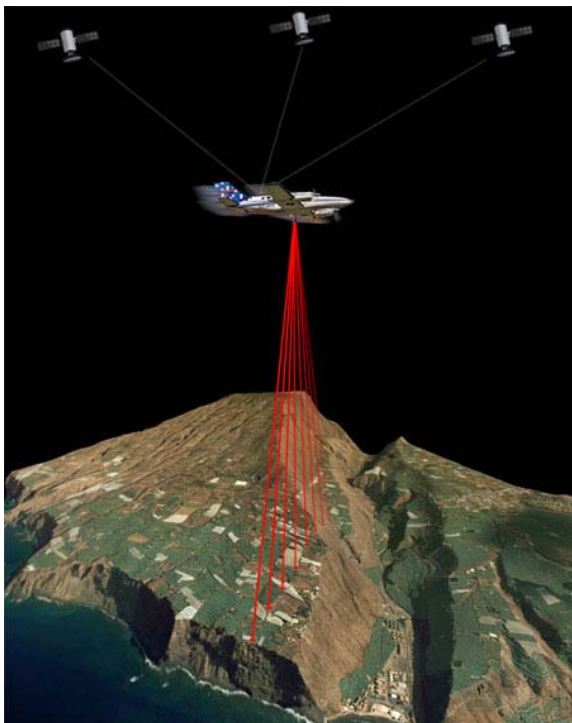
Servicios Multitemporales Sentinel2



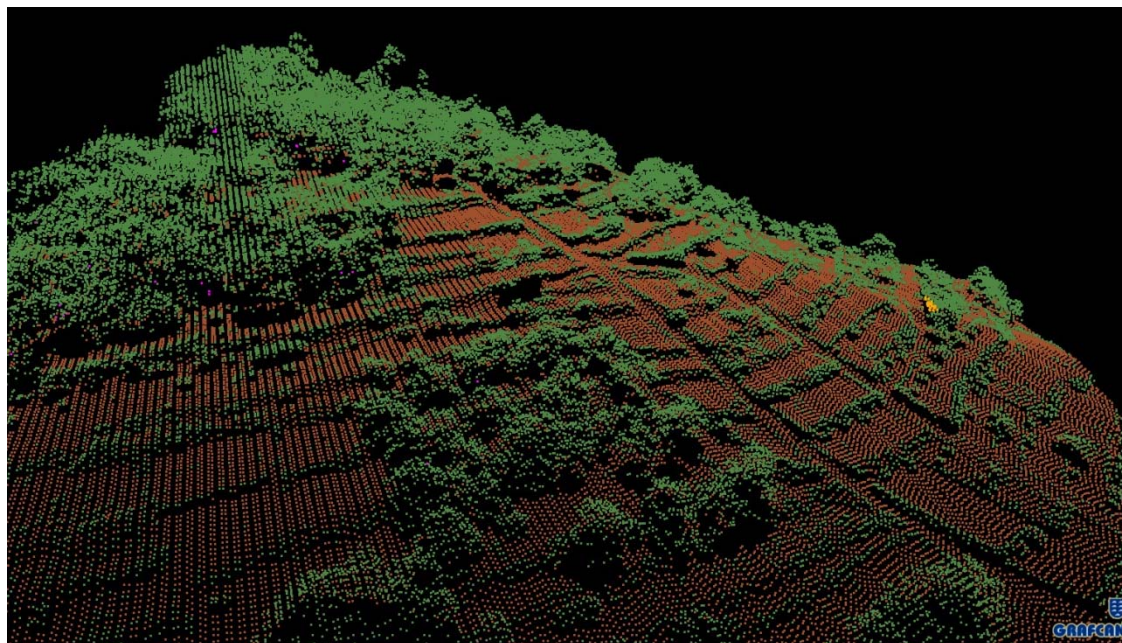
Detección Residuos



Clasificación Lidar (I+D) ...to do...



ARTIFICIAL INTELLIGENCE



Gracias por su atención

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