

AI₄EO

AI Platform for EO Data Scientists



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The esa earth observation Φ -week

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AI4EO IN A NUTSHELL

1. The first web-based platform for earth observation scientists.
2. AI4EO was born with the aim to provide an innovative tool to use modern Deep Learning techniques with EO Data directly in your browser.
3. This project is powered by Earth Observation laboratory at University of Rome Tor Vergata

DEEP LEARNING

A GLOSSARY OF ARTIFICIAL-INTELLIGENCE TERMS

▪ **ARTIFICIAL INTELLIGENCE**

AI is the broadest term, applying to any technique that enables computers to mimic human intelligence, using logic, if-then rules, decision trees, and machine learning (including deep learning).

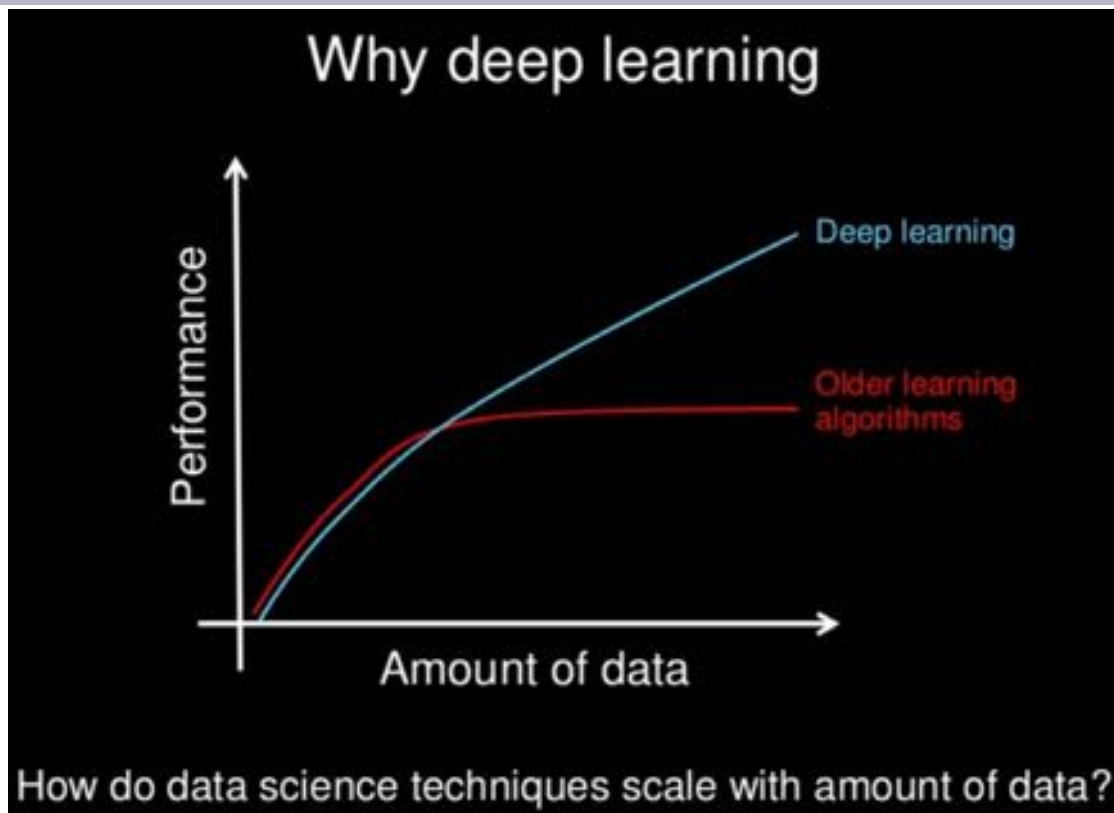
▪ **MACHINE LEARNING**

The subset of AI that includes abstruse statistical techniques that enable machines to improve at tasks with experience. The category includes deep learning.

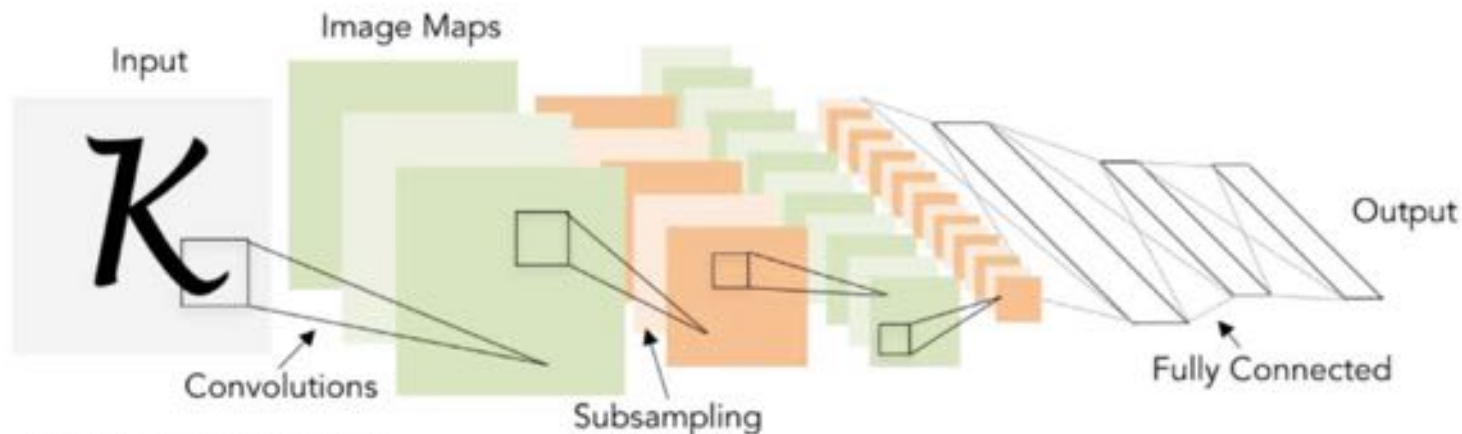
▪ **DEEP LEARNING**

The subset of machine learning composed of algorithms that permit software to train itself to perform tasks, like speech and image recognition, by exposing multilayered neural networks to vast amounts of data.

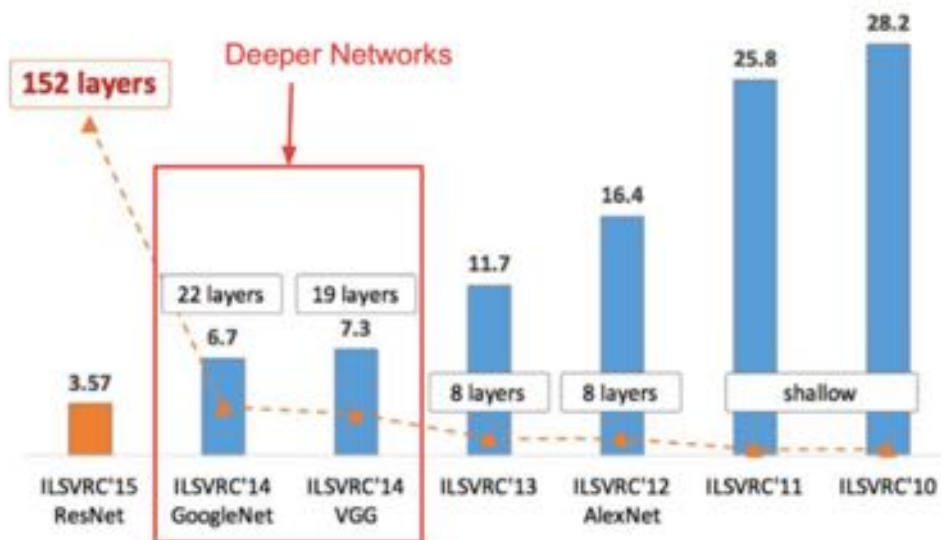
DEEP LEARNING



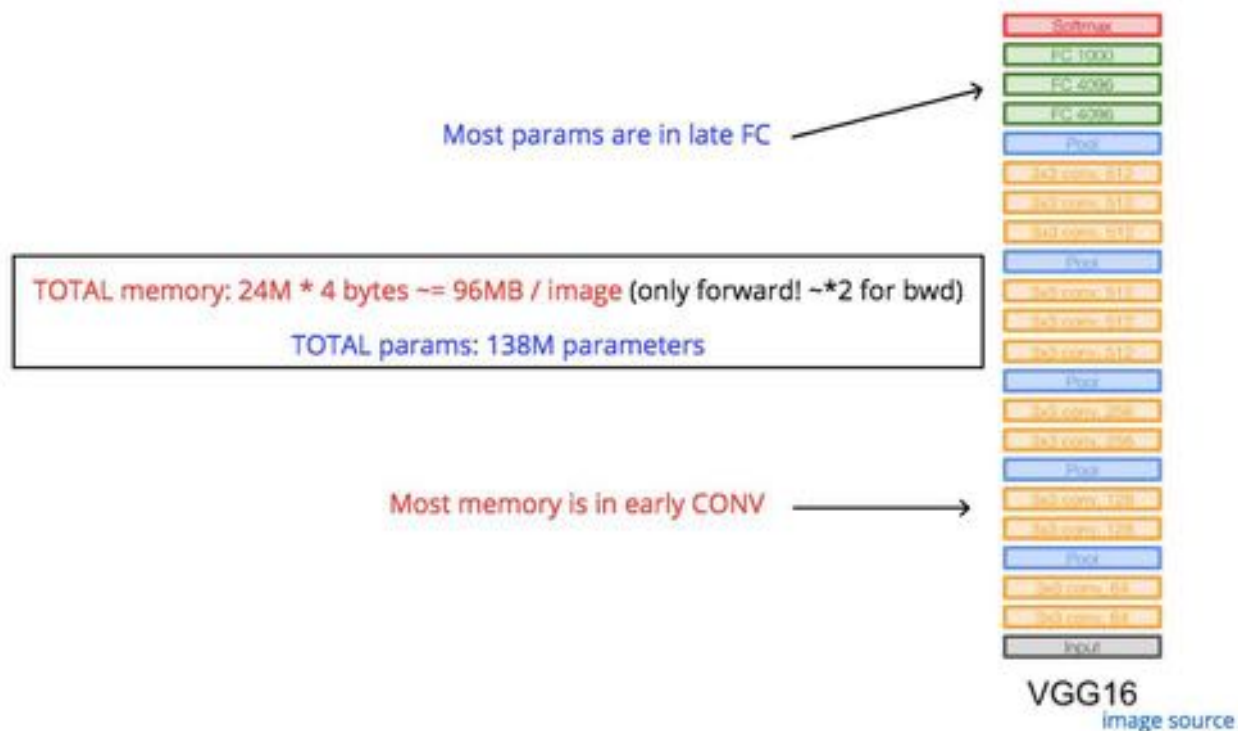
CONVOLUTIONAL NEURAL NETWORK



ImageNet Large Scale Visual Recognition Challenge (ILSVRC) winners



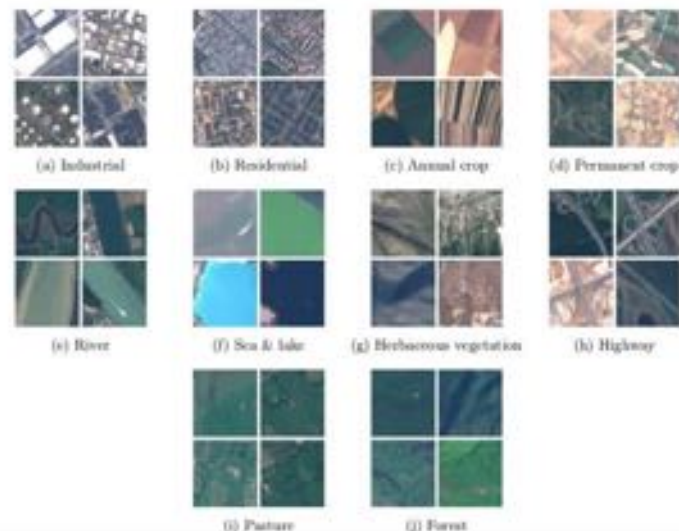
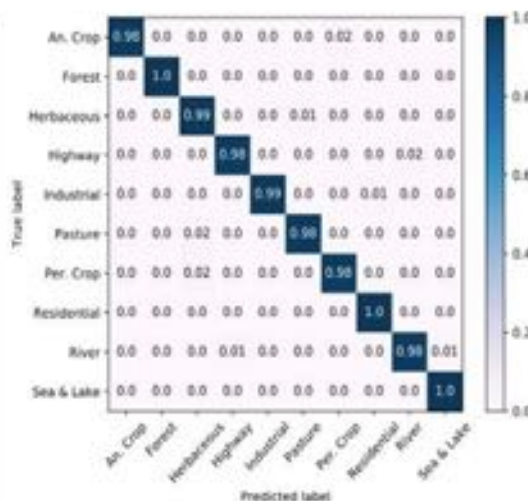
VGG16 ARCHITECTURE



EUROSAT DATASET FOR LAND-COVER



Dataset	GoogLeNet	ResNet-50
UCM	97.32	96.42
AID	93.99	94.38
SAT-6	98.29	99.56
BCS	92.70	93.57
EuroSAT	98.18	98.57



Band Combination	Accuracy (ResNet-50)
CI	98.30
RGB	98.57
SWIR	97.05

AI4EO PLATFORM MODULES



Model Builder

User can define his own neural networks in the browser without coding!



Pre-Trained Deep Neural Networks

User can utilize pre-trained neural networks to perform machine learning predictions using earth observation data, such as classification, semantic segmentation, etc.



Applications

User can play with our applications and improve his knowledge on deep neural networks applied to earth observation field.

TENSORFLOW.JS ECOSYSTEM





Classification

VGG16 Classification with
Sentinel-2 data

[Open App](#)



Change Detection

SAR Change Detection with
Sentinel-1 data

[Open App](#)



Object Detection

YOLO Object Detection with
WorldView3

[Open App](#)



Semantic Segmentation

Efficient Neural Network for



Building Footprint

Retinalnet for building detection



Road Footprint

U-Net for road segmentation



Choose GeoTIFF

Browse

Run



Model

Profile Layer

Layer Name	Output Shape	# Of Params	Trainable
input_1	[batch,64,64,3]	0	false



Choose GeoTIFF

Browse

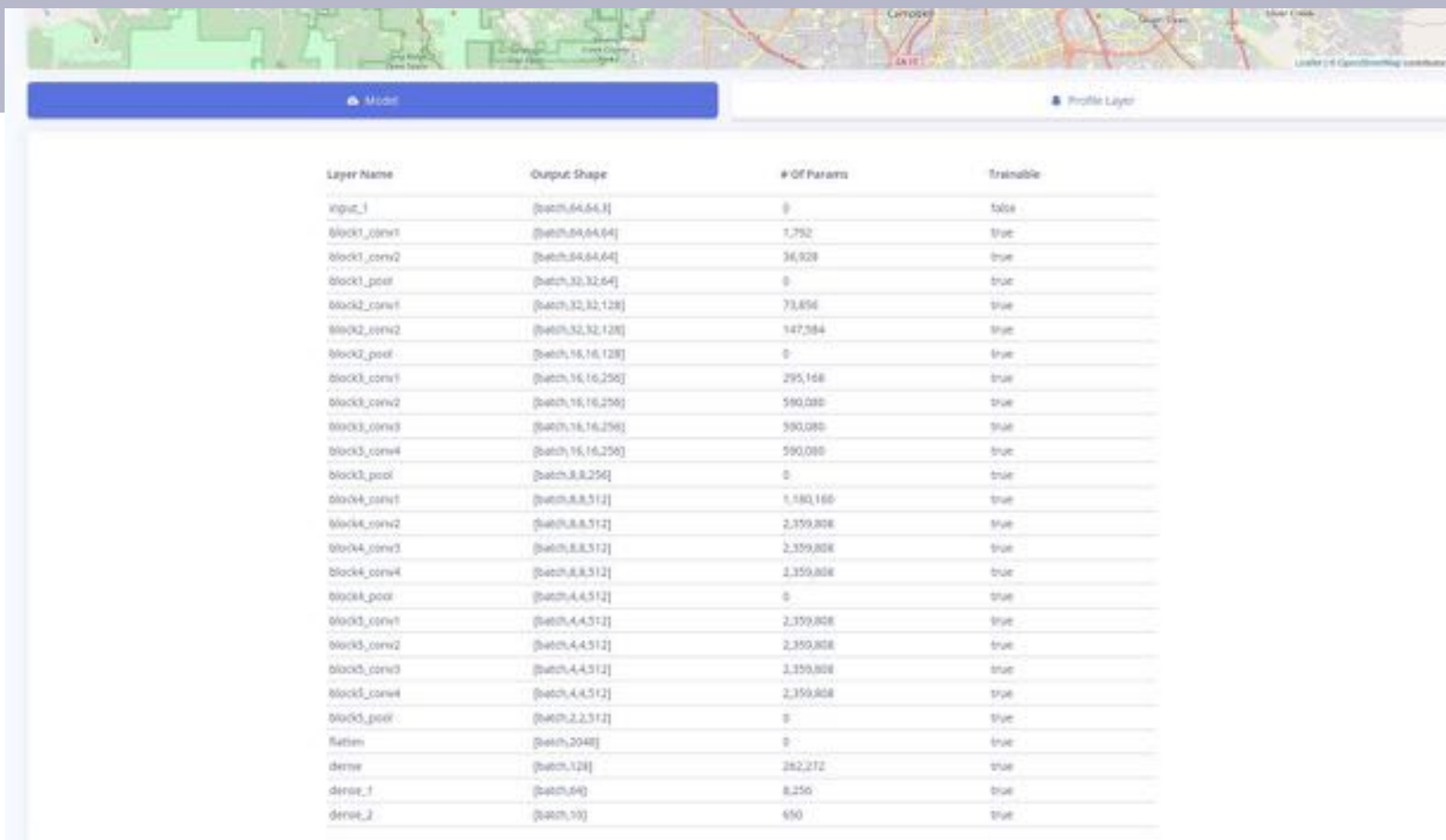
▶ Run



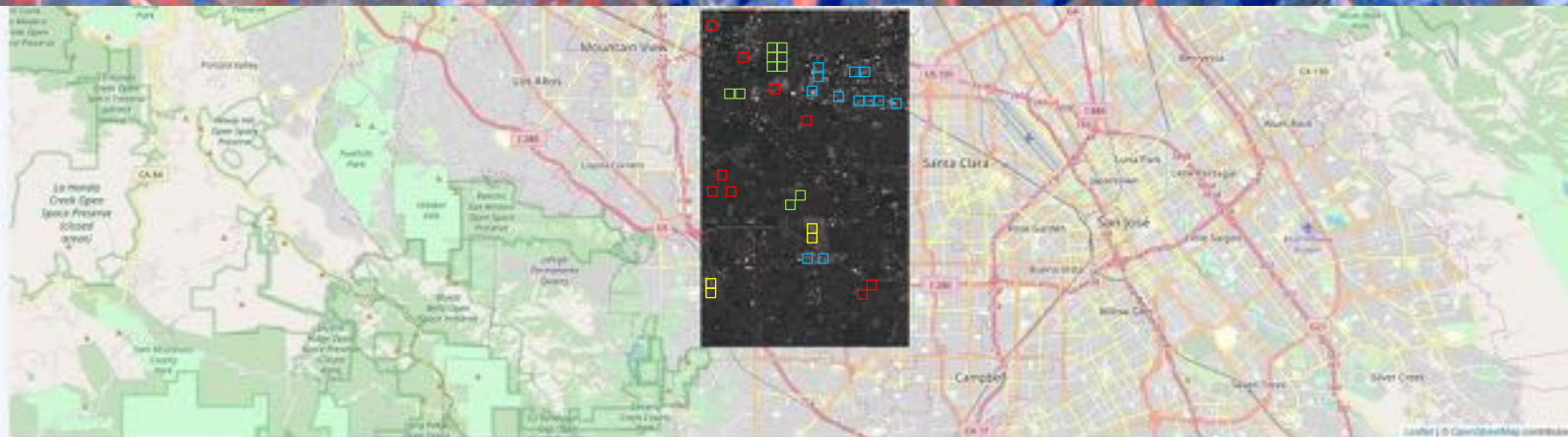
Model

Profile Layer

Layer Name	Output Shape	# Of Params	Trainable
input_1	[batch,64,64,3]	0	false



Layer Name	Output Shape	# Of Params	Trainable
input_1	[batch,64,64,1]	0	false
block1_conv1	[batch,64,64,64]	7,792	true
block1_conv2	[batch,64,64,64]	36,928	true
block1_pool	[batch,32,32,64]	0	true
block2_conv1	[batch,32,32,128]	73,856	true
block2_conv2	[batch,32,32,128]	147,384	true
block2_pool	[batch,16,16,128]	0	true
block3_conv1	[batch,16,16,256]	295,168	true
block3_conv2	[batch,16,16,256]	590,080	true
block3_conv3	[batch,16,16,256]	590,080	true
block3_conv4	[batch,16,16,256]	590,080	true
block3_pool	[batch,8,8,256]	0	true
block4_conv1	[batch,8,8,512]	1,180,160	true
block4_conv2	[batch,8,8,512]	2,359,808	true
block4_conv3	[batch,8,8,512]	2,359,808	true
block4_conv4	[batch,8,8,512]	2,359,808	true
block4_pool	[batch,4,4,512]	0	true
block5_conv1	[batch,4,4,512]	2,359,808	true
block5_conv2	[batch,4,4,512]	2,359,808	true
block5_conv3	[batch,4,4,512]	2,359,808	true
block5_conv4	[batch,4,4,512]	2,359,808	true
block5_pool	[batch,2,2,512]	0	true
flatten	[batch,2048]	0	true
dense	[batch,128]	262,272	true
dense_1	[batch,64]	8,256	true
dense_2	[batch,10]	650	true



Model

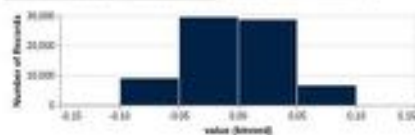
Profile Layer

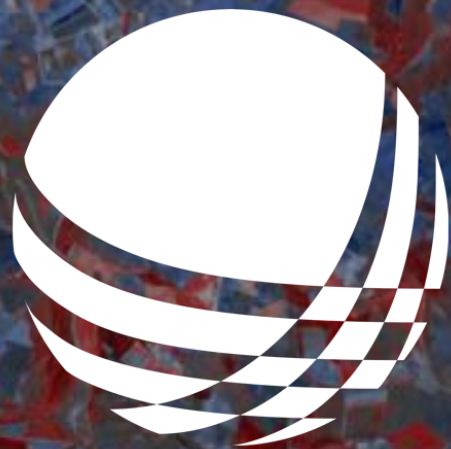
Select Layer:

block2_conv1

Weight Name	Shape	Min	Max	# Params	# Zeros	# NaNs	# Infinity
block2_conv1/kernel	[3,3,64,128]	-0.3889	0.1340	73,728	0	0	0
block2_conv1/bias	[128]	-0.1500	0.1353	128	0	0	0

Show Values Distribution for: block2_conv1/kernel





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Thank you!



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