AI Platform for EO Data Scientists

The esa earth observation Φ-week
12-16 November 2018 | ESA-ESRIN | Frascati (Rome), Italy

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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
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

Why deep learning

Performance vs. Amount of data

How do data science techniques scale with amount of data?

Deep learning vs. Older learning algorithms
CONVOLUTIONAL NEURAL NETWORK
ImageNet Large Scale Visual Recognition Challenge (ILSVRC) winners

- Deeper Networks
- 152 layers
- 22 layers
- 19 layers
- 6.7
- 7.3
- 11.7
- 16.4
- 25.8
- 28.2

ILSVRC'15 ResNet
ILSVRC'14 GoogleNet
ILSVRC'14 VGG
ILSVRC'13
ILSVRC'12 AlexNet
ILSVRC'11
ILSVRC'10
VGG16 ARCHITECTURE

TOTAL memory: 24M * 4 bytes ~ 96MB / image (only forward! ~*2 for bwd)
TOTAL params: 138M parameters

Most memory is in early CONV

Most params are in late FC
EUROSAT DATASET FOR LAND-COVER
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
<table>
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<th>Output Shape</th>
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<th>Trainable</th>
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Thank you!

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