Spatiotemporal machine learning in Python

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Spatiotemporal machine learning in Python

- Conceptual background about machine learning
- Machine learning for geospatial data
- Purely spatial and spatiotemporal
- Hands-on

What is machine learning ?

Machine learning is essentially a subfield of artificial intelligence (AI), using techniques able to learn from data and make accurate predictions, without being explicitly programmed.

Source: Machine Learning: In a Nutshell

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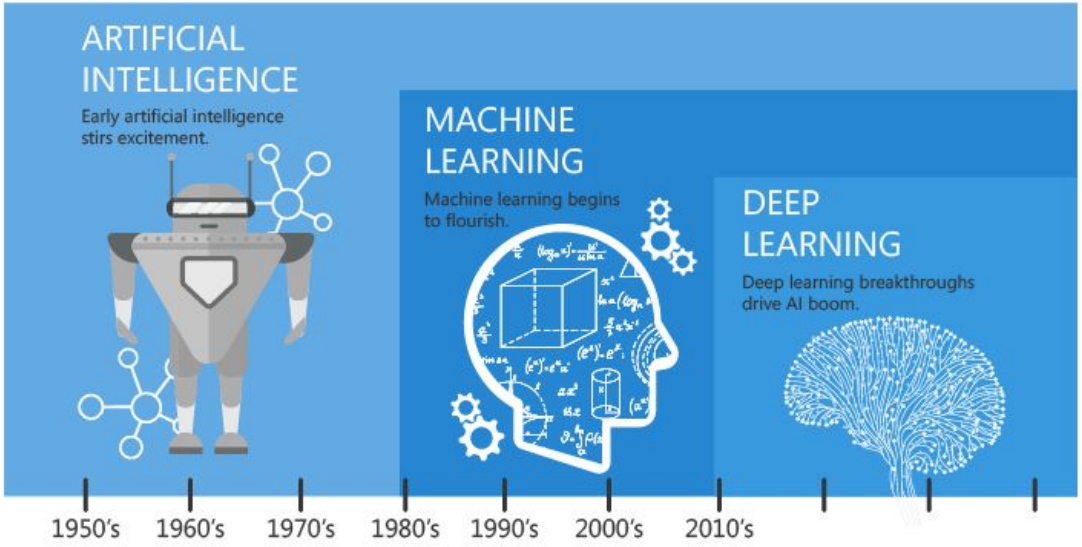

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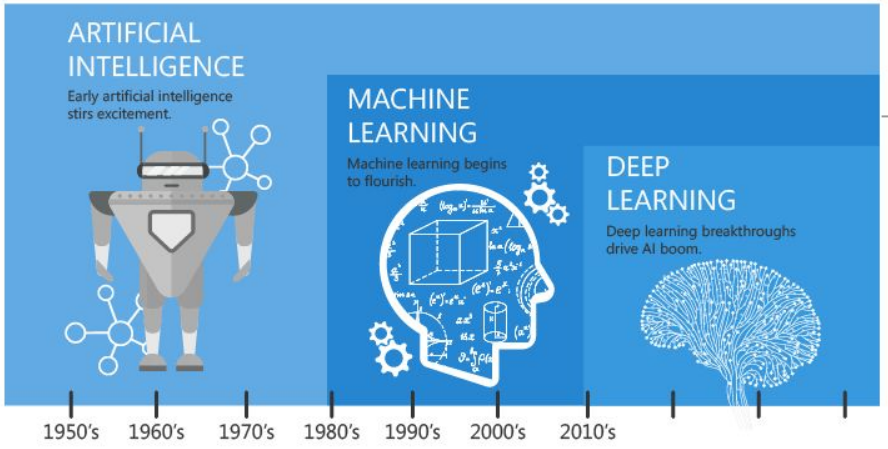

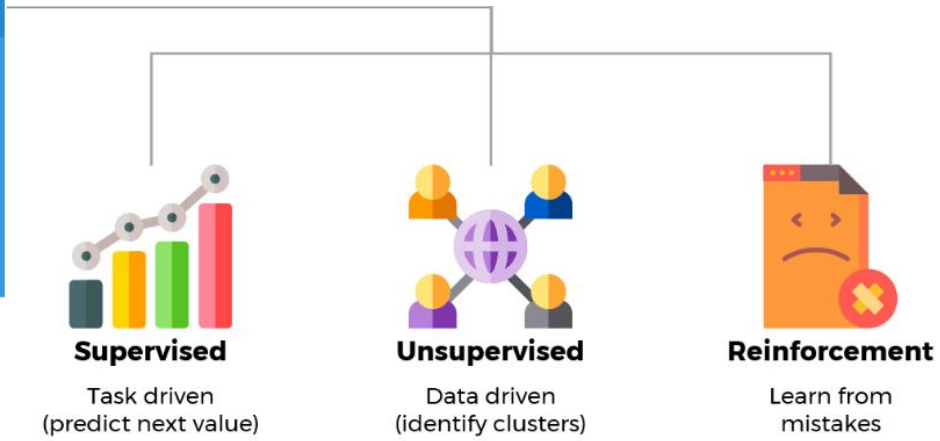

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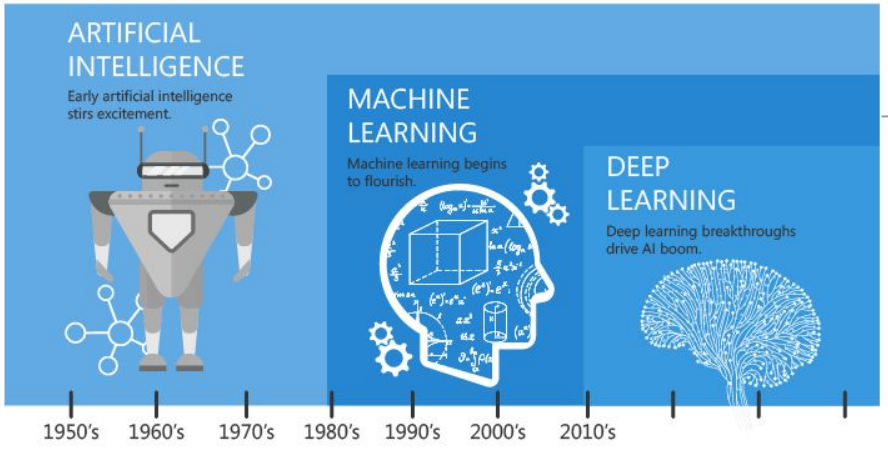

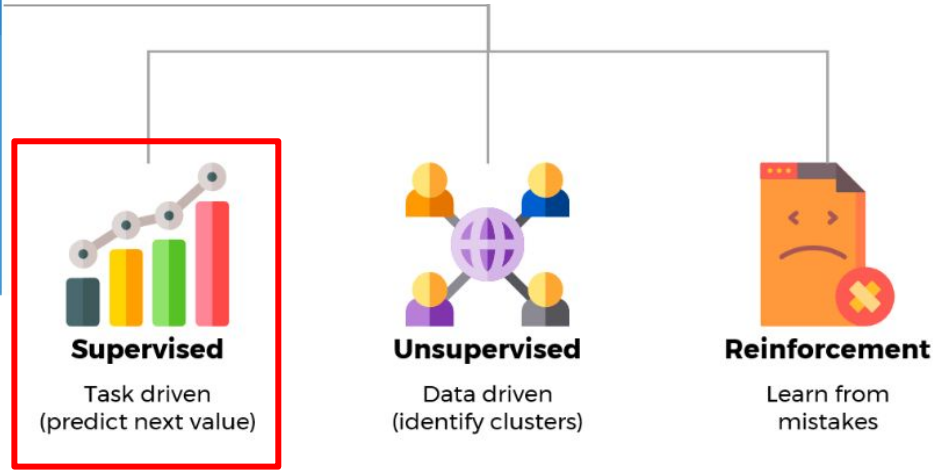

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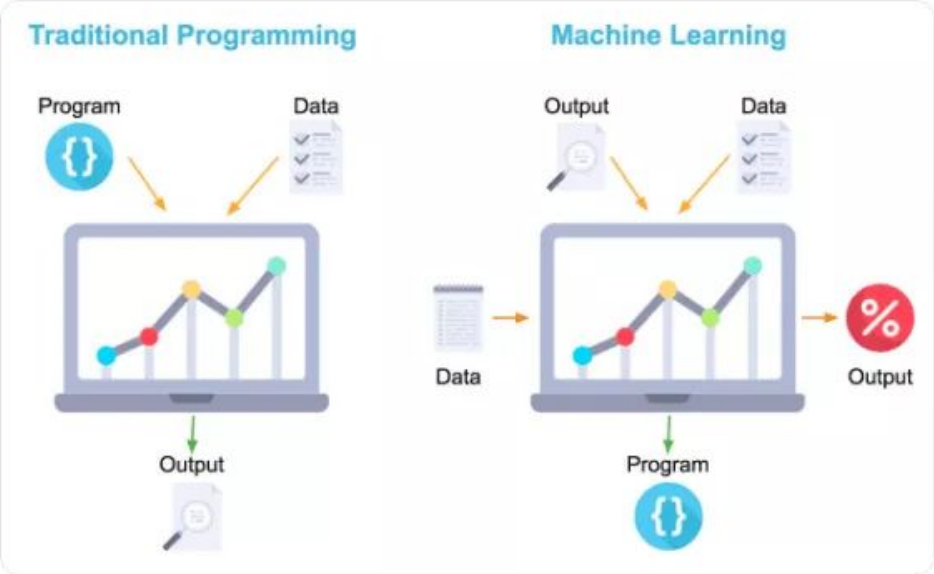
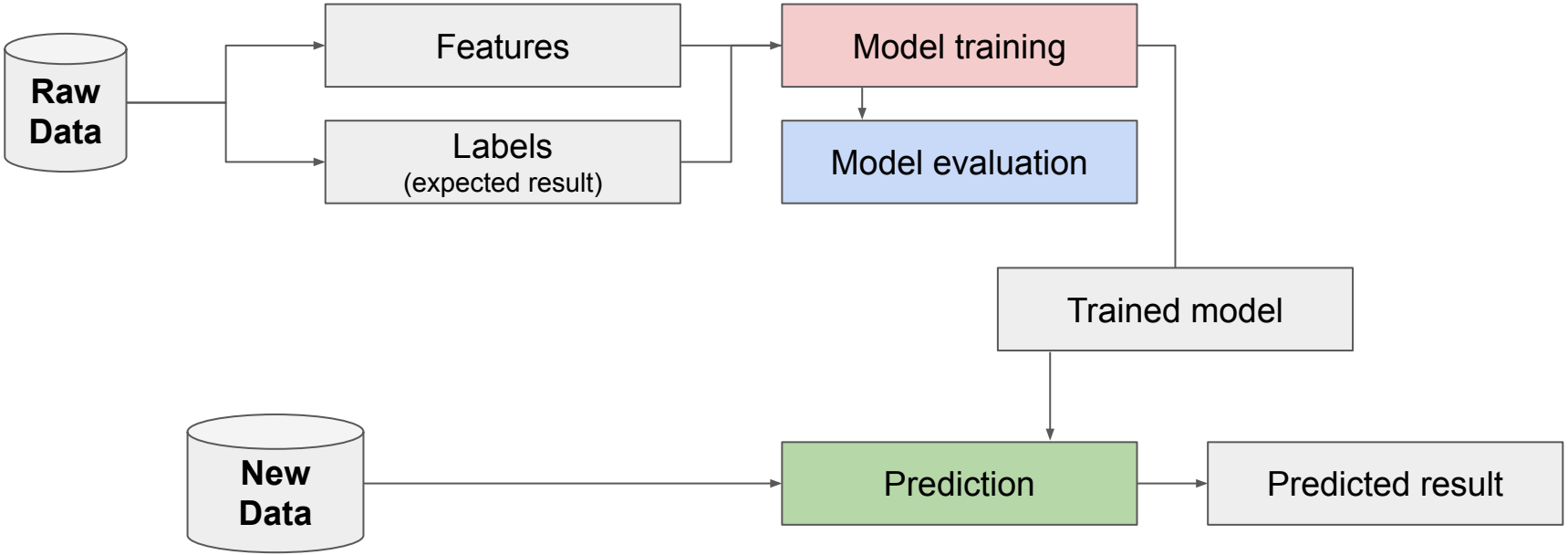


Source: [Machine Learning: In a Nutshell](); [When, Why and How]()

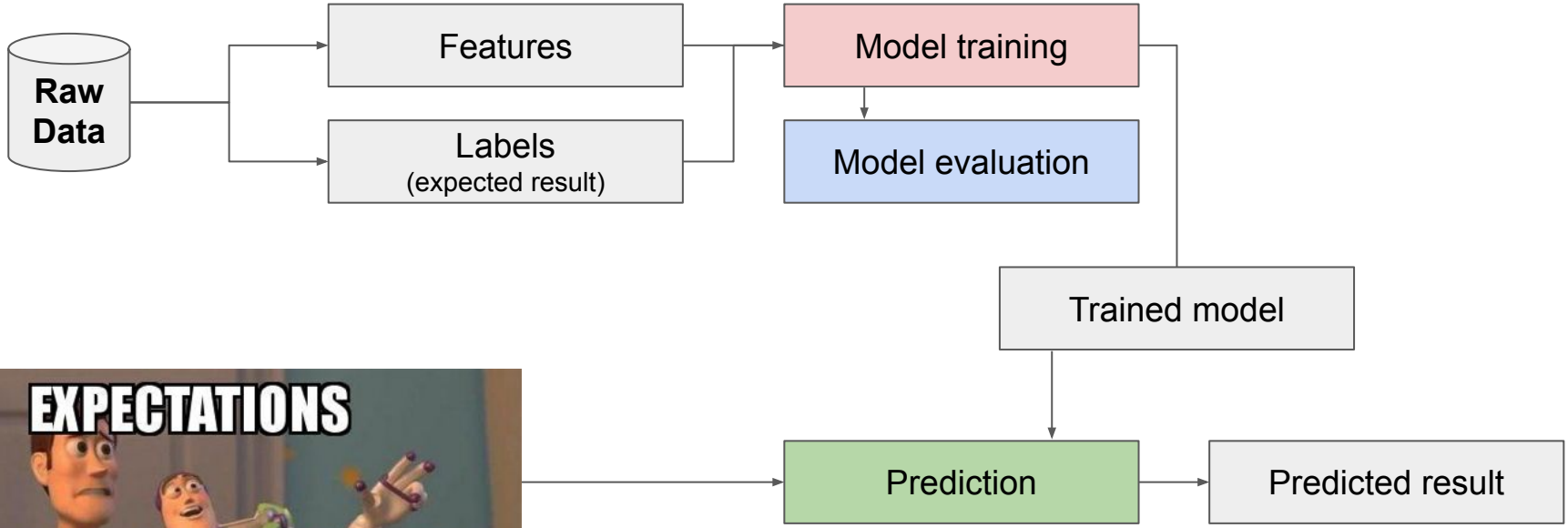
Supervised machine learning

Expected ML workflow



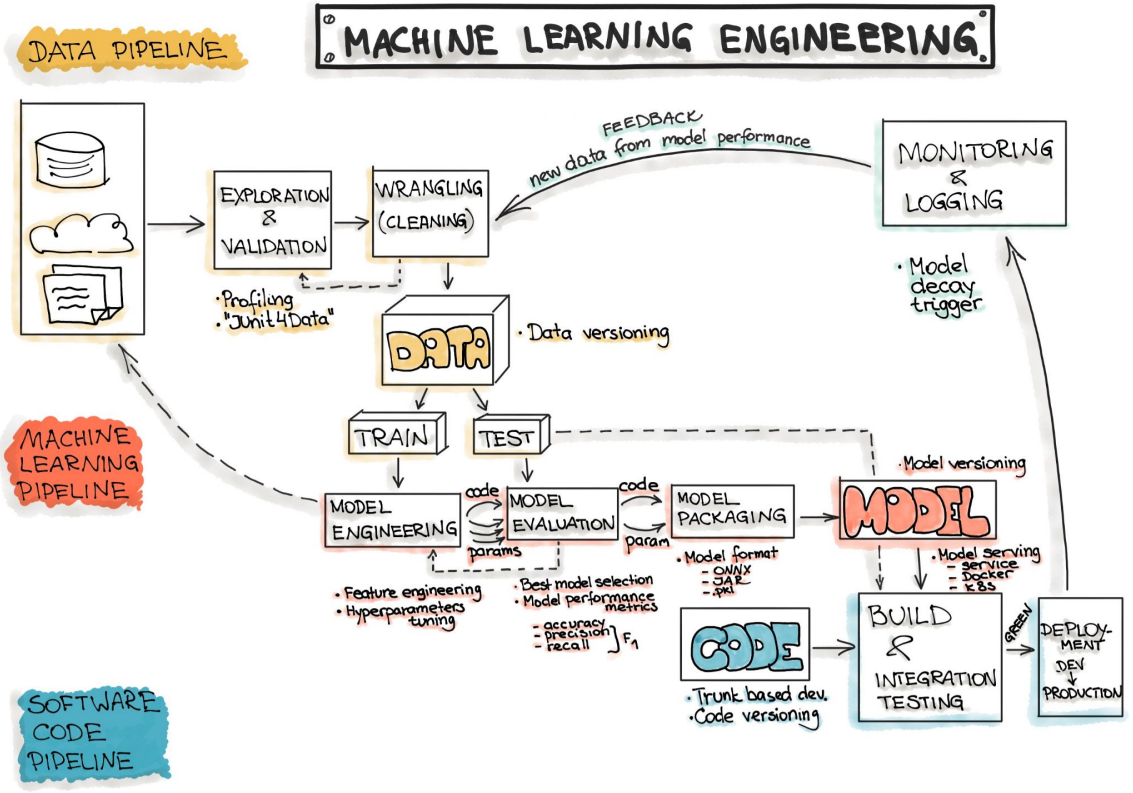
Supervised machine learning

Expected ML workflow



Supervised machine learning

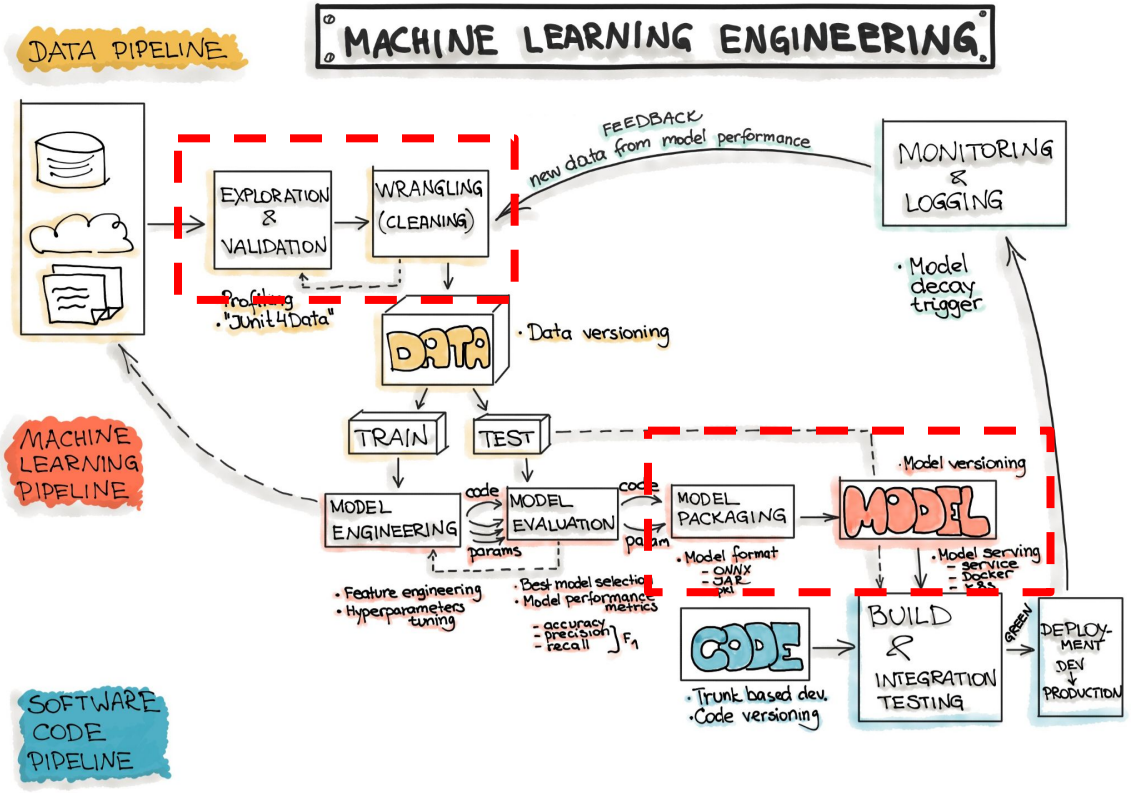
Reality



Source: [An Overview of the End-to-End Machine Learning Workflow]

Supervised machine learning

Reality



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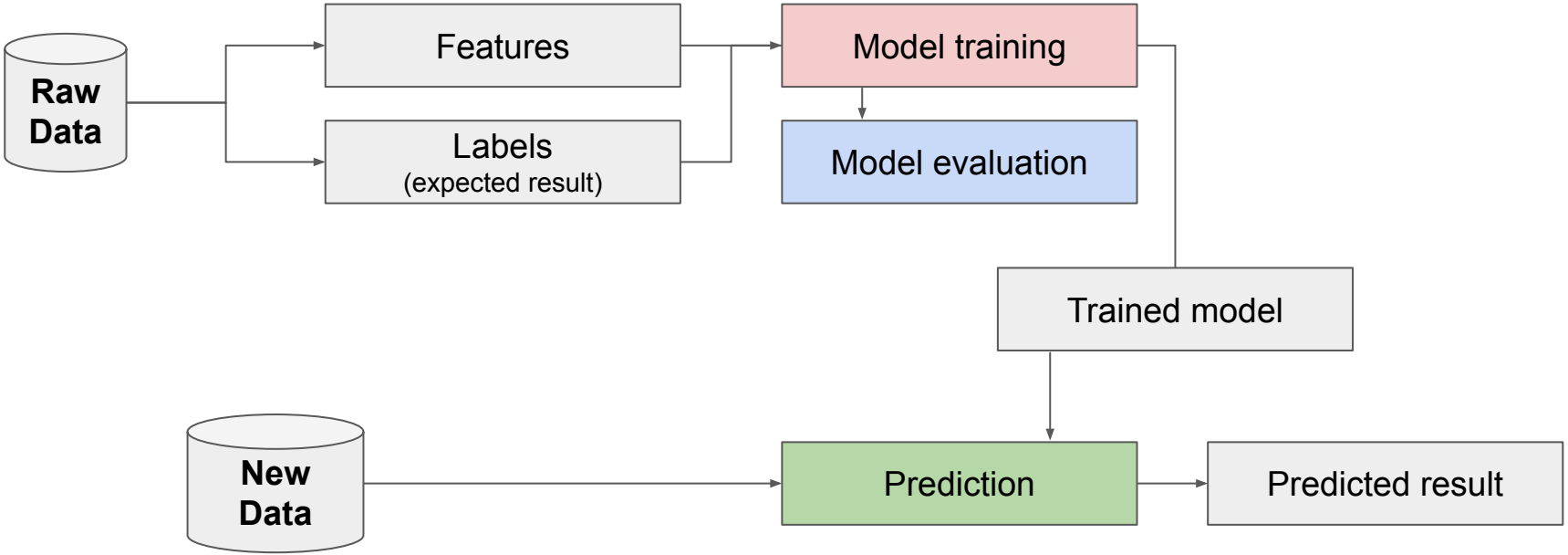
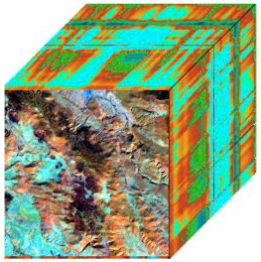
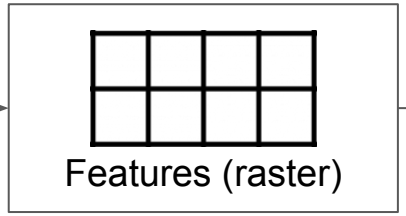
Supervised machine learning

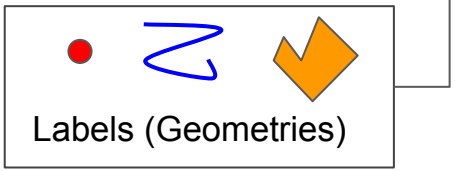


Machine learning for geospatial data



Analysis Ready EO-data

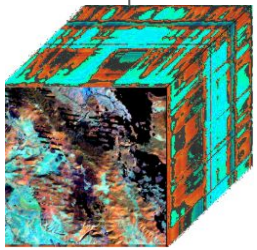




Model training

Model evaluation

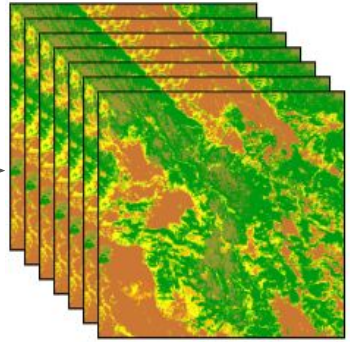
Trained model



Raw EO-data

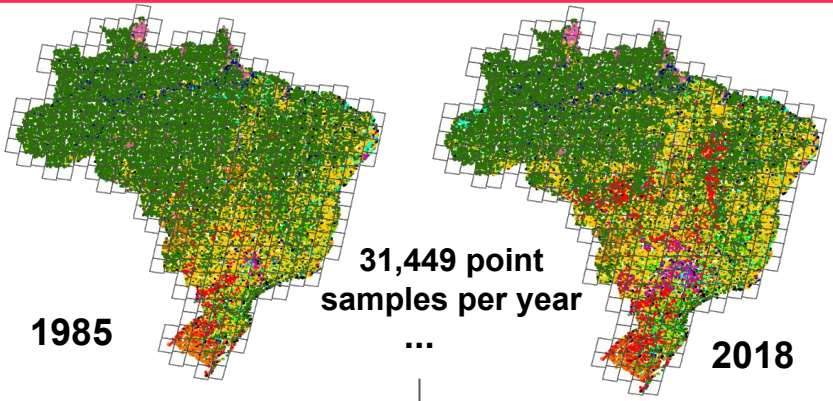
New EO-Data

Prediction



Source: An Overview of the End-to-End Machine Learning Workflow

Purely Spatial



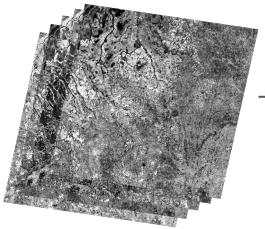
1985

31,449 point samples per year

...

2018

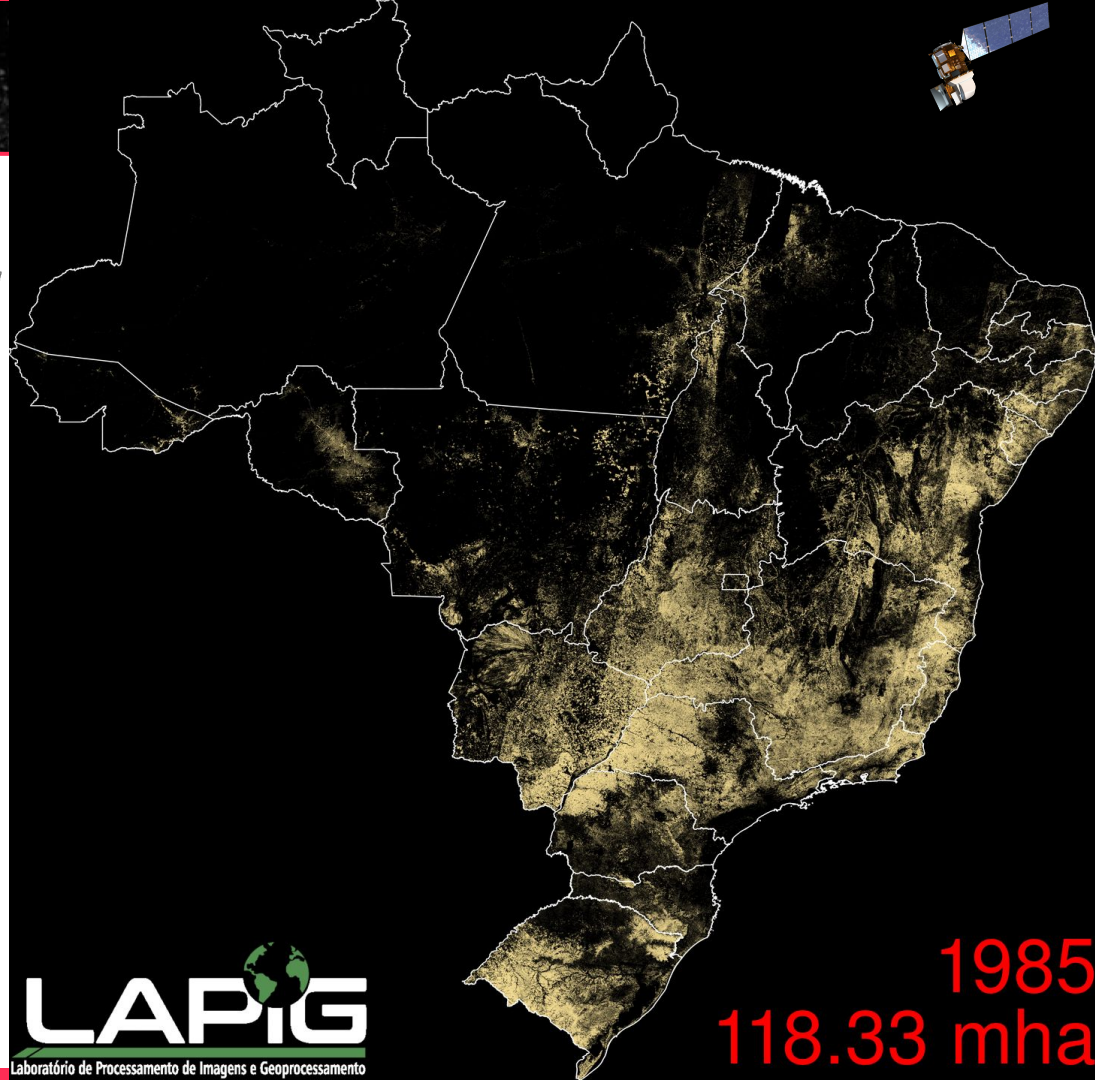
Google Earth Engine



12,920 RF Models
(380 tiles x 34 years)

Landsat (1985 - 2018)

Parente et al., 2019



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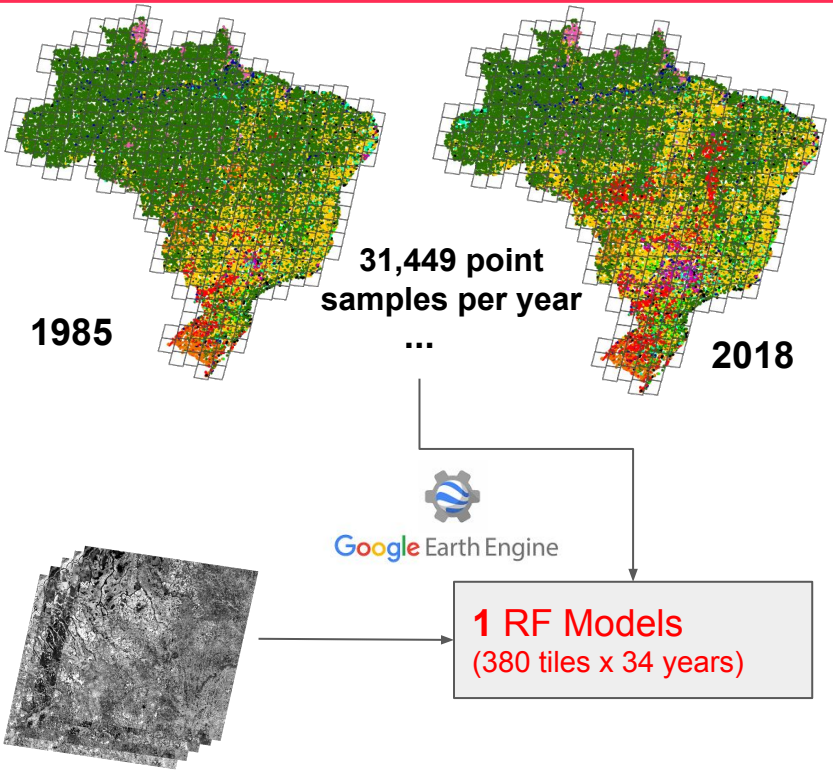

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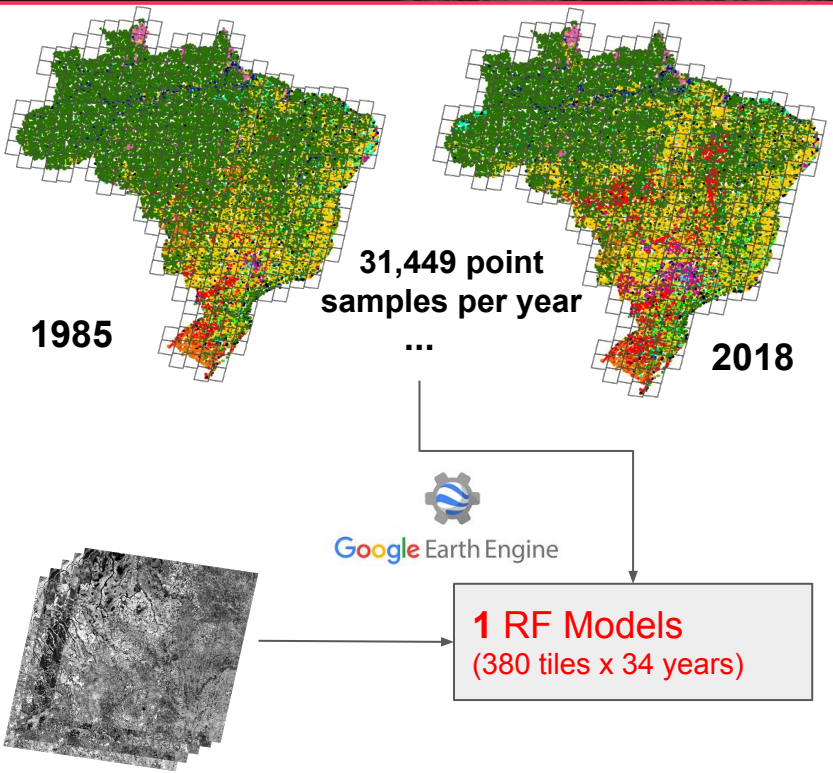


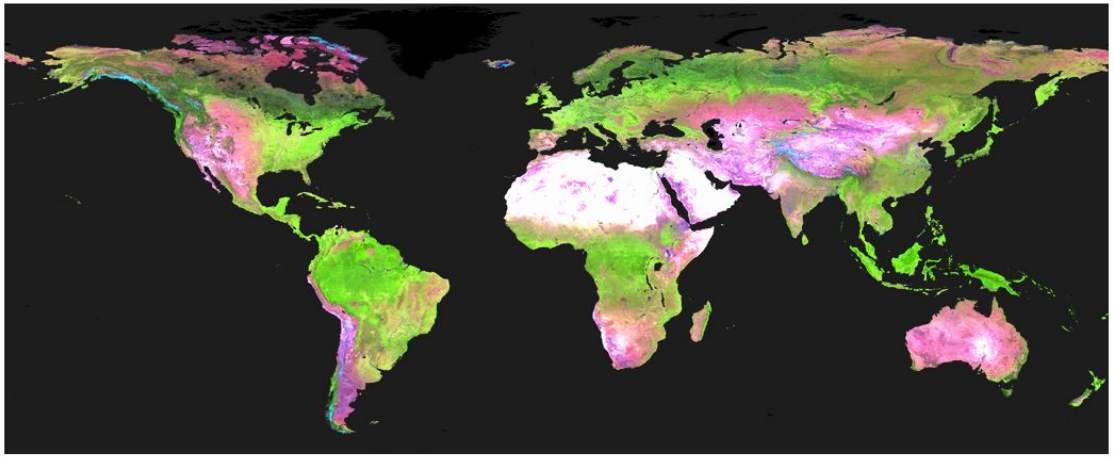
- Capacity (software and hardware) to train a ML model using millions of samples;
- Harmonized EO data (The problem with satellite data is that it is no a commodity)

Parente et al., 2019

Harmonized EO data

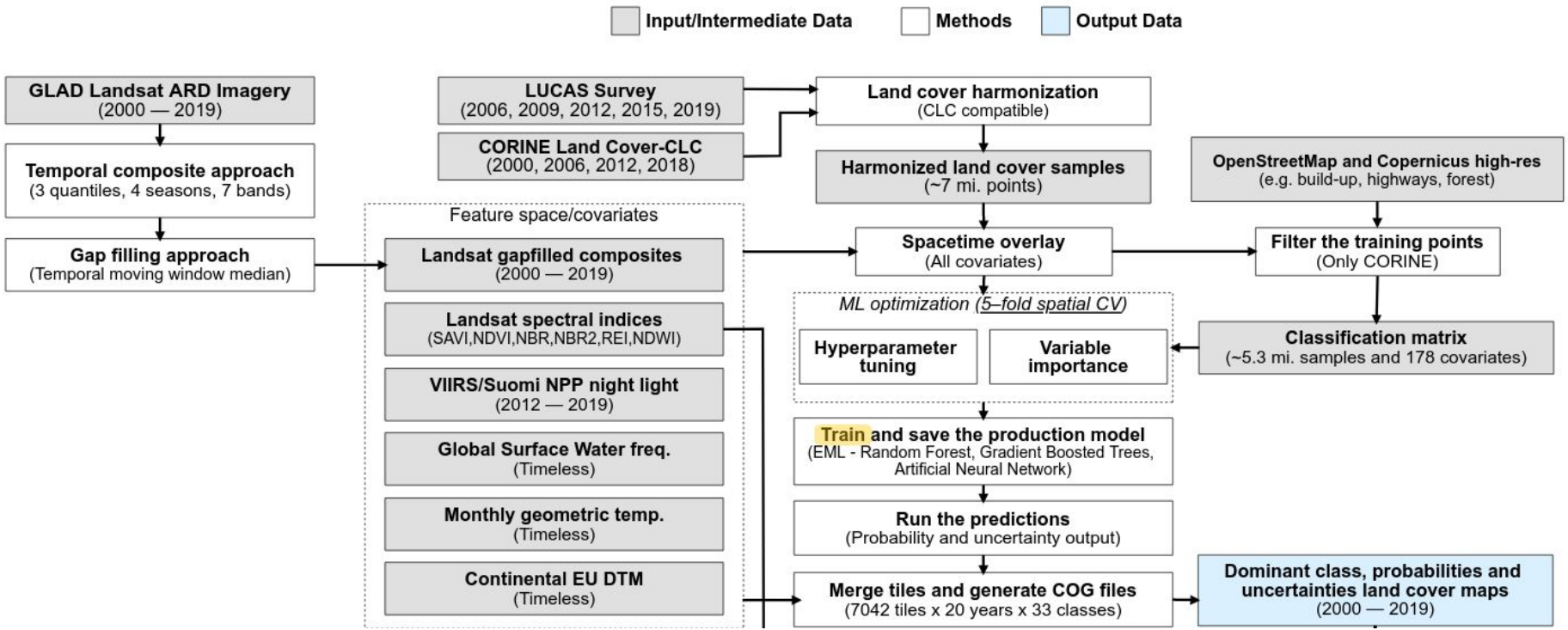
https://hls.gsfc.nasa.gov/

GLAD Landsat ARD



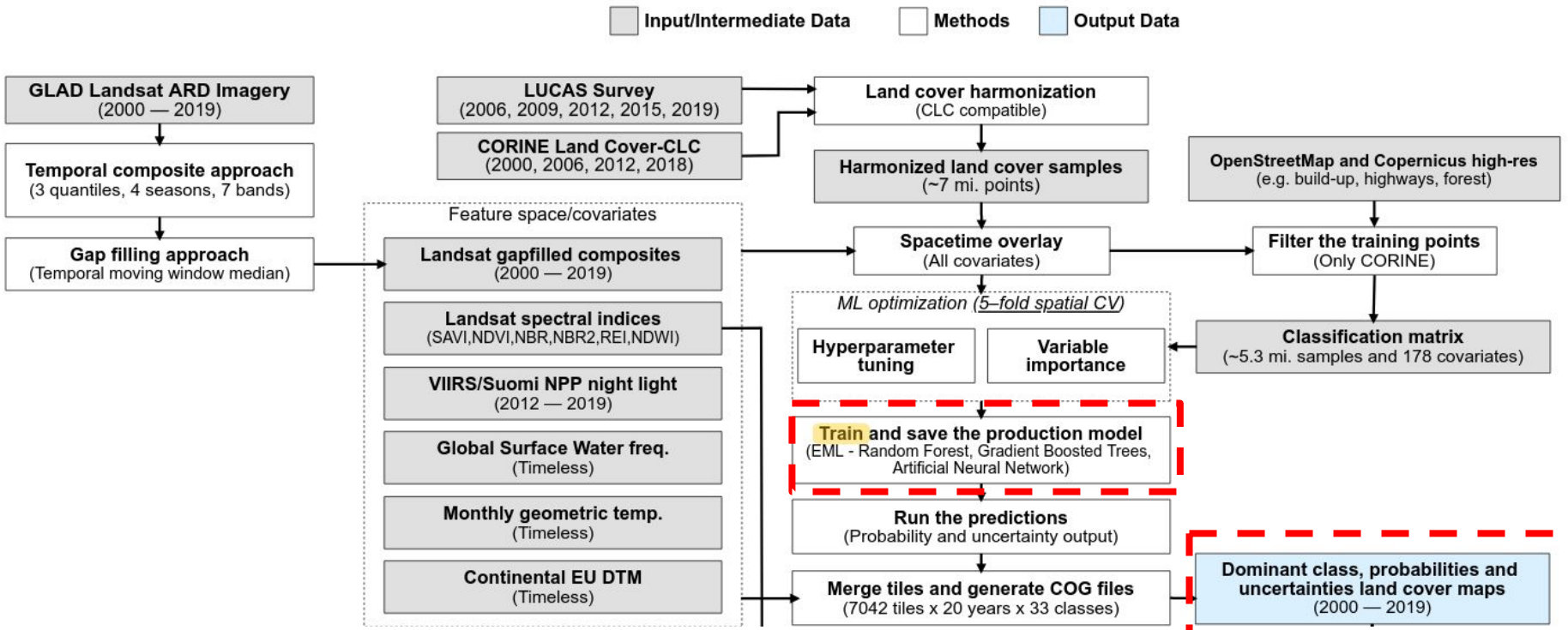
https://glad.geog.umd.edu/ard/glad-landsat-ard-tools

Spatiotemporal



Witjes et al., 2021

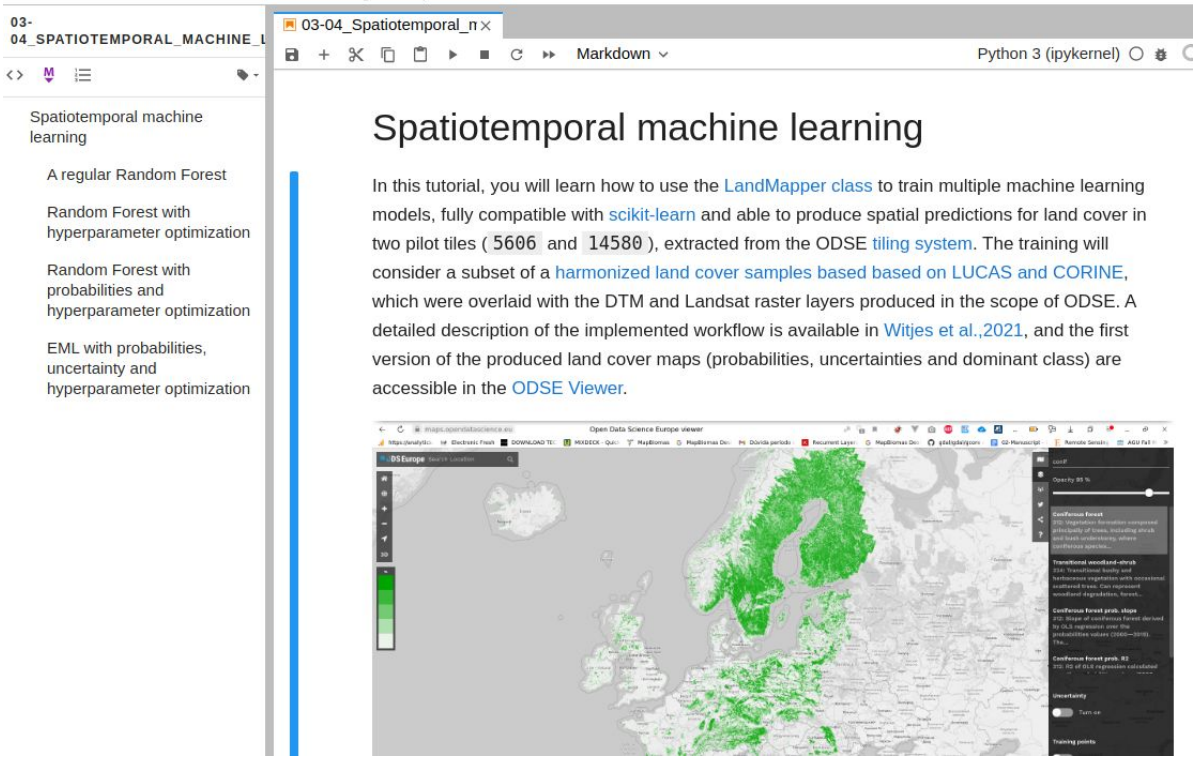
Spatiotemporal



Witjes et al., 2021

Hands-on

https://gitlab.com/geoharmonizer_inea/odse-workshop-2021



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