PerceptiveSentinel

Feature Selection in Land-Cover Classification using eo-learn

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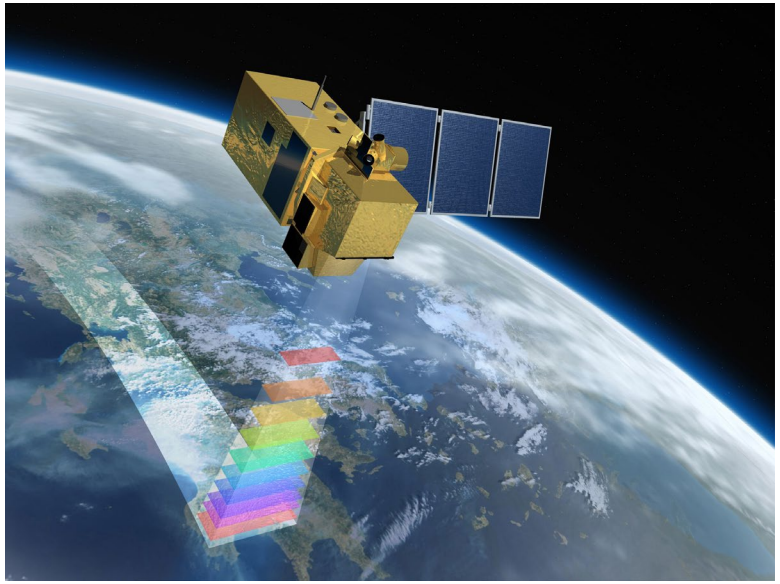
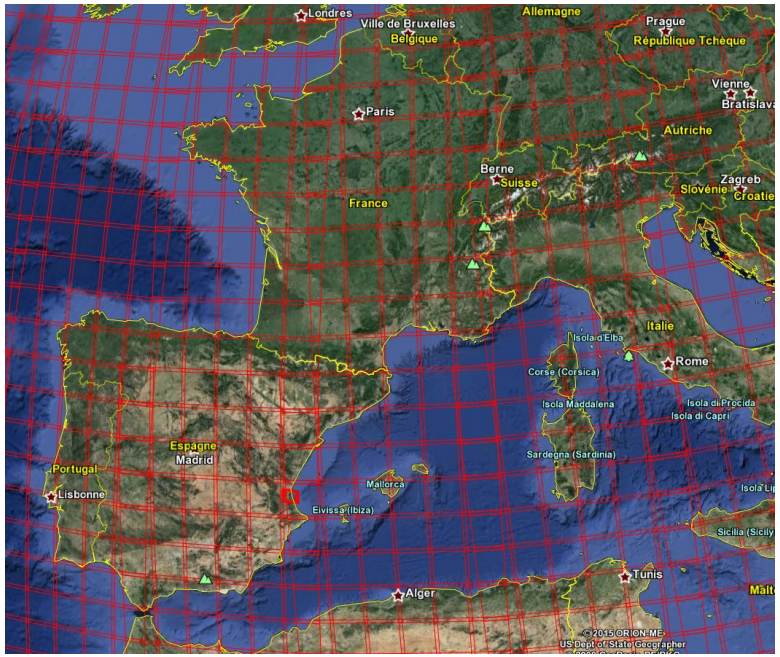
Main task – Land-cover classification

Satellite image blend into land-cover classification by SINERGISE

Outline

- Introduction
- eo-learn library
- Feature generation
- Feature selection
- Conclusions and Future Work

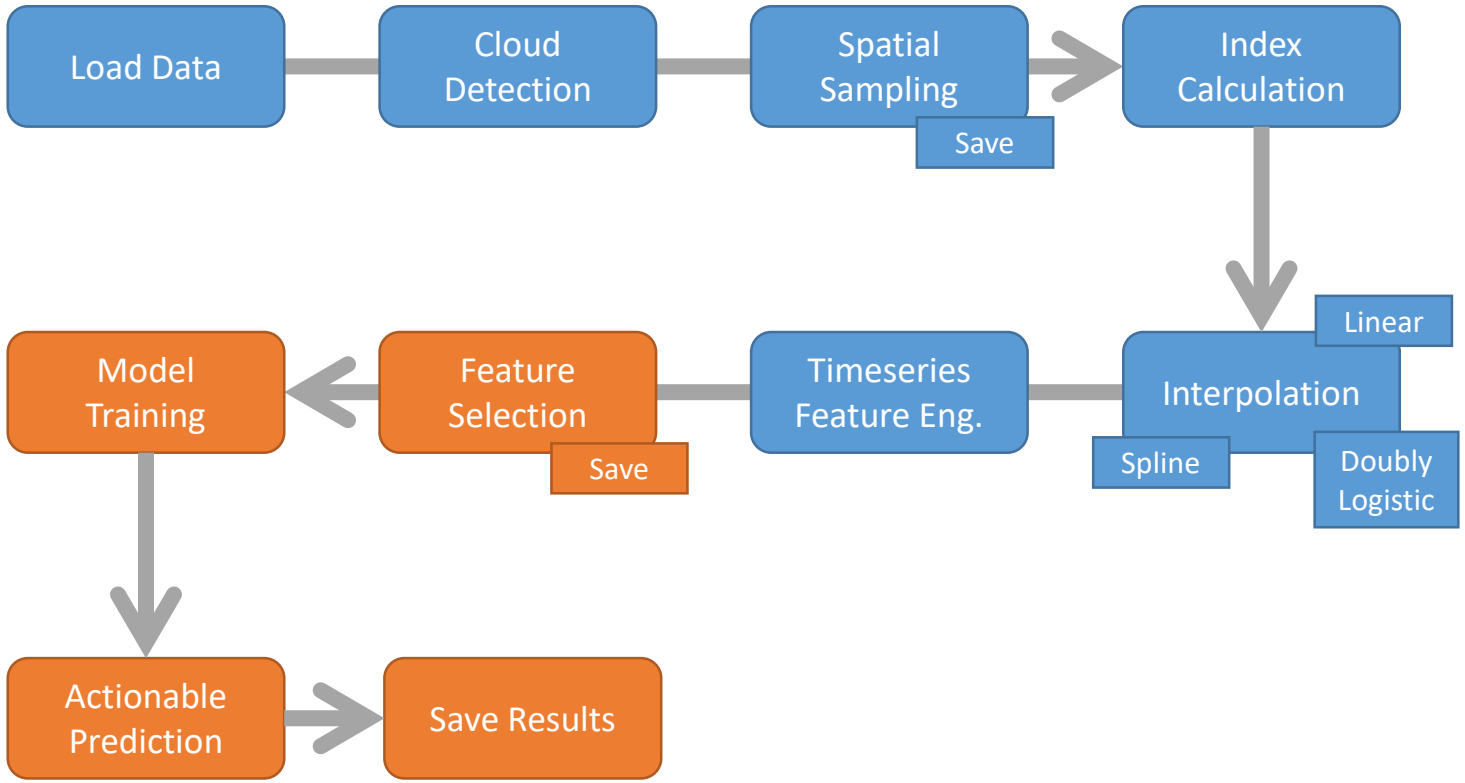




eo-learn

eo-learn: Earth Observation processing library

- Streamline the process
- Fast development cycle
- eo-patch (data struct.)
- eo-task
- Community driven framework and collection of tasks



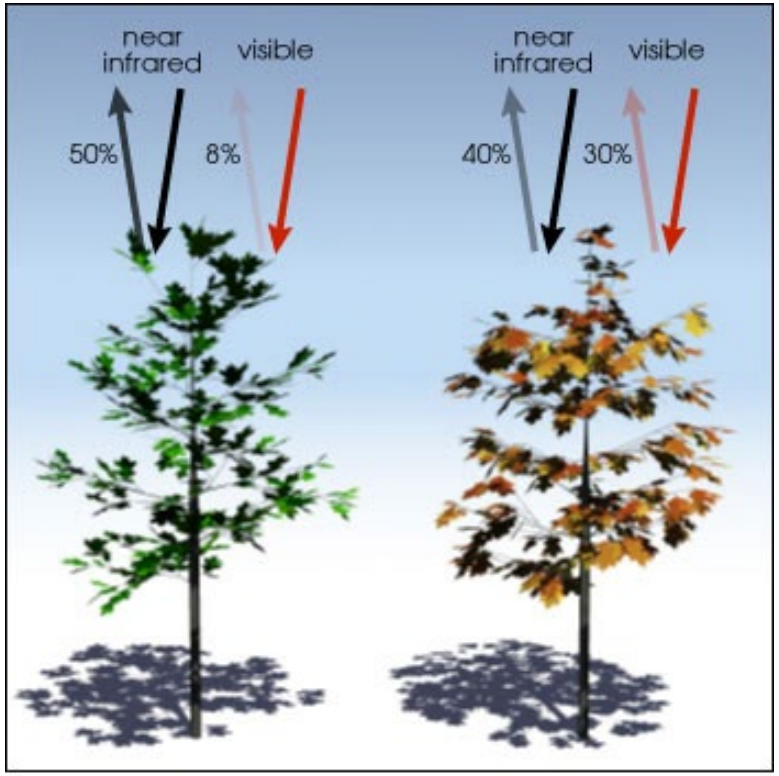
https://github.com/sentinel-hub/eo-learn

eo-learn

Preprocessing – Index Calculation

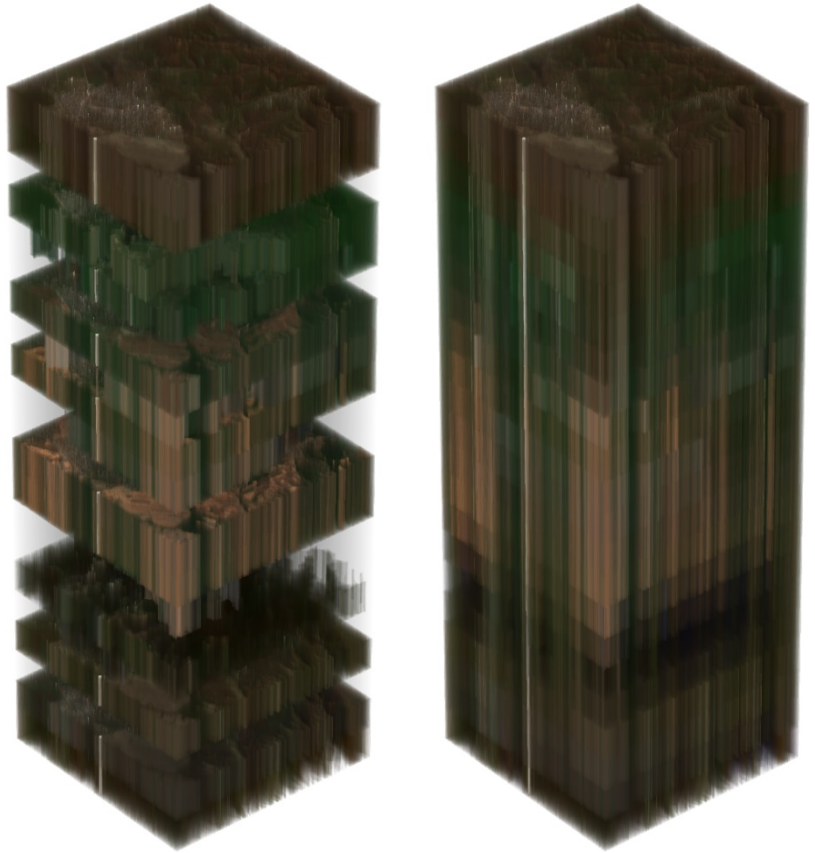
Based on pre-machine learning *era*
(= simple models for classification)

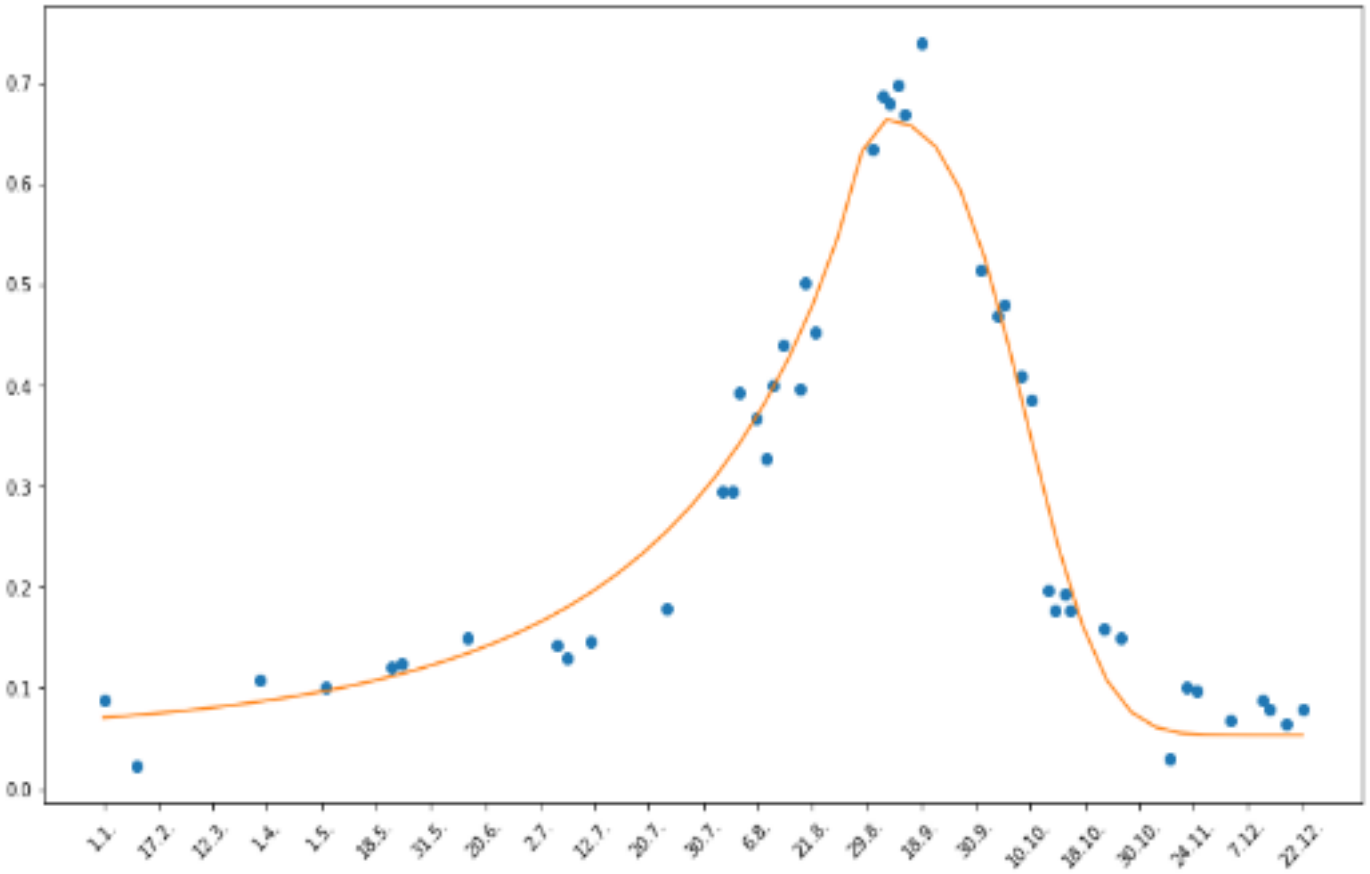
- Normalized differential vegetation index - NDVI
- Normalized differential water index - NDWI
- Enhanced vegetation index - EVI
- Soil-adjusted vegetation index - SAVI



$$\frac{(0.50 - 0.08)}{(0.50 + 0.08)} = 0.72 \qquad \frac{(0.4 - 0.30)}{(0.4 + 0.30)} = 0.14$$

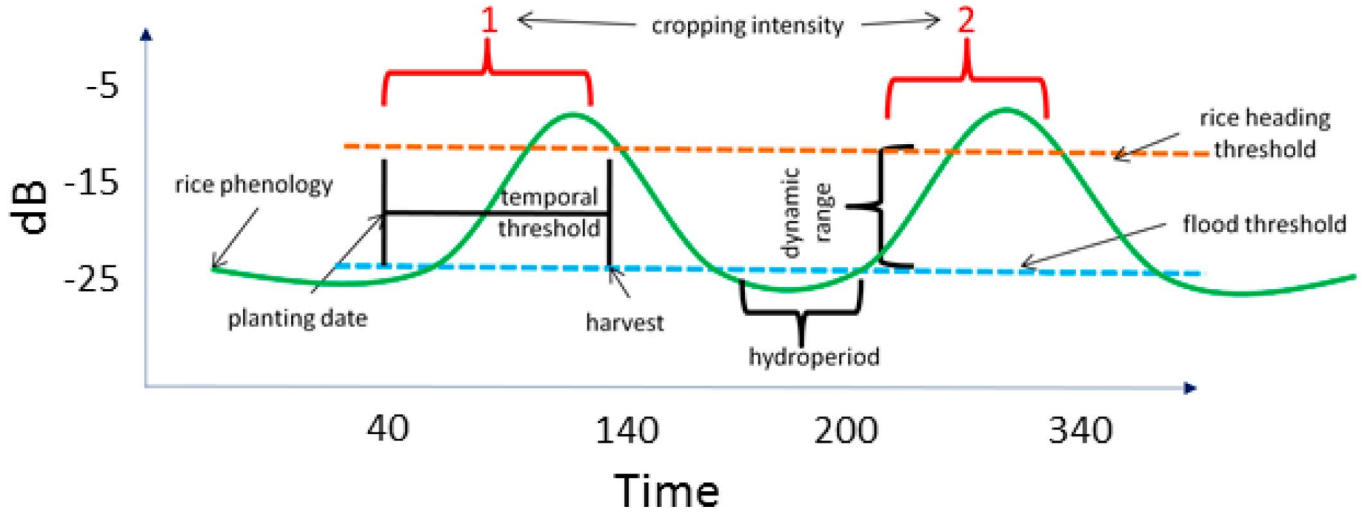
Preprocessing - Interpolation



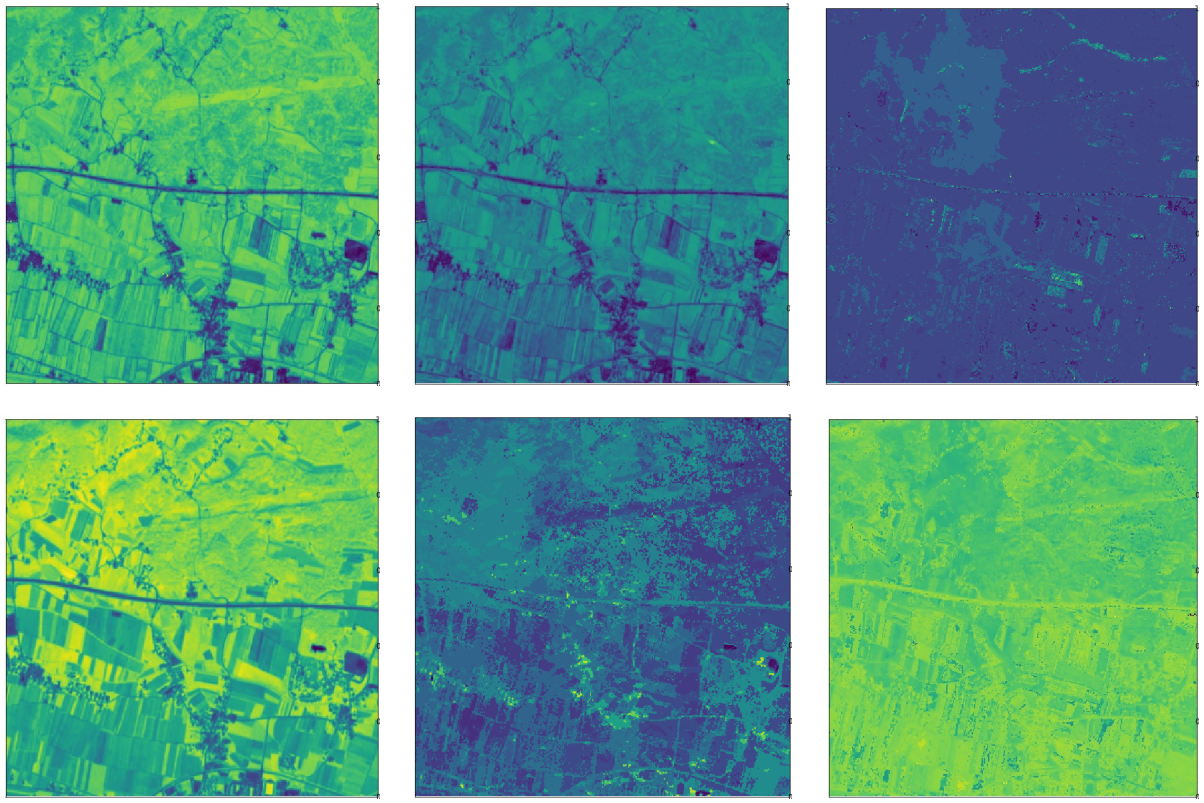


Preprocessing - Feature Extraction

- Extract timeseries features
- Use them as time independent (based on phenological cycle)
- A lot of features (*#features* × *#indices*)



EO-task: Stream-like temporal features

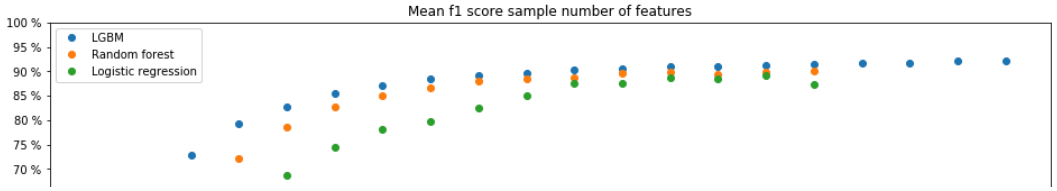


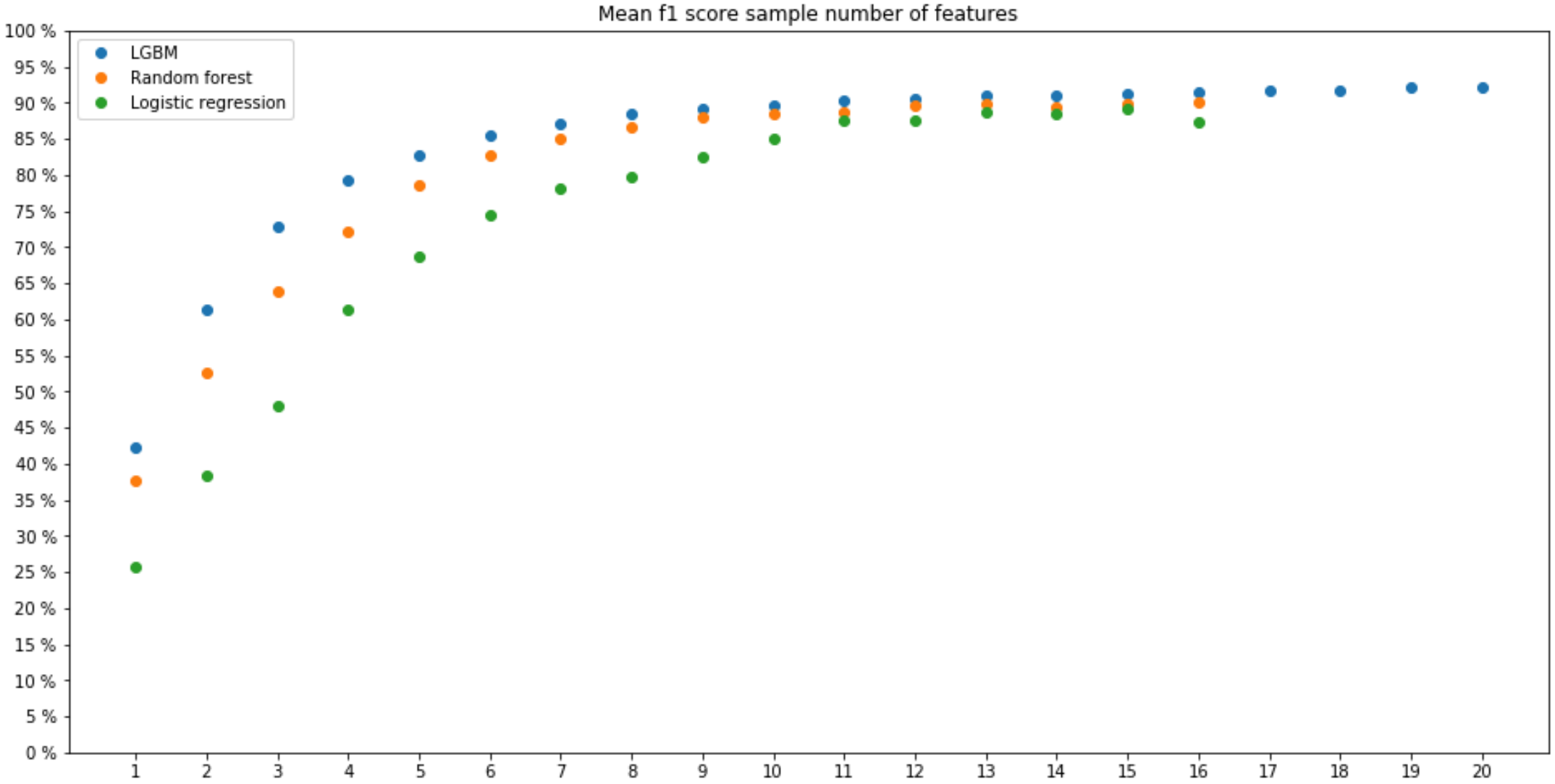
- Examples:
  - MAX/MIN NDVI (any band or index)
  - Longest negative/positive gradient interval
  - Length of max/min mean value interval
- Relatively fast computation
- Overcome any *time-related problems*

Based on: ***Valero (2016)*** *- Production of a Dynamic Cropland Mask by Processing Remote Sensing Image Series at High Temporal and Spatial Resolutions*

eo-learn

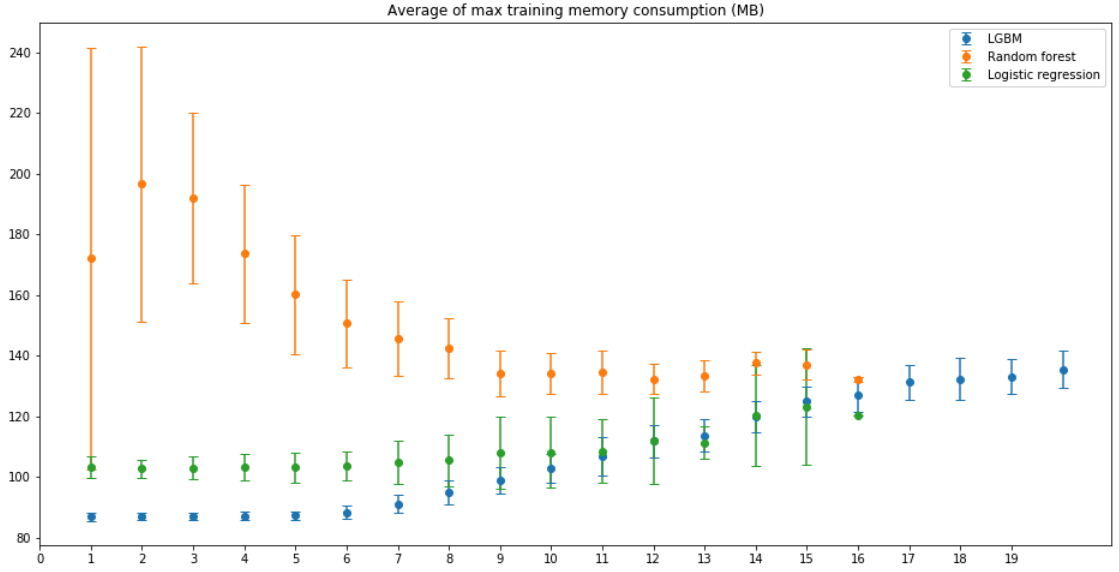
Feature selection

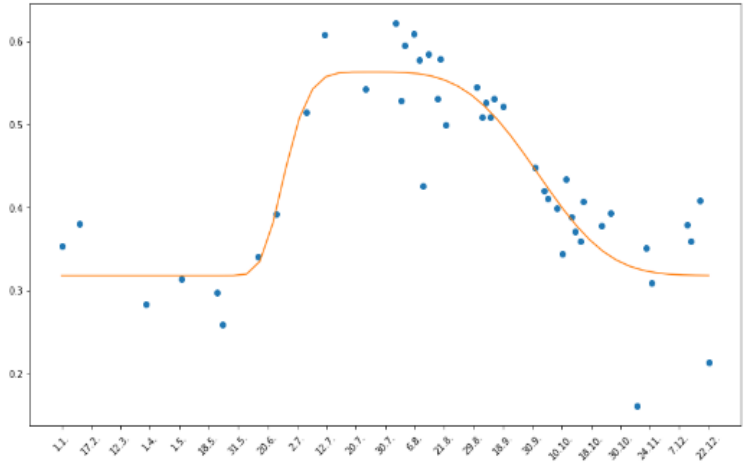




Optimize F_1 vs. train/prediction complexity

- Select optimal features
- Optimize for faster feature extraction of different indices
- Location aware





Conclusions and Future Work

PerceptiveSentinel

State-of-the-Art Feature Extractors

- Interpolation techniques
- Timeseries Extraction

Efficient Feature Selection

- Genetic Algorithm
- Reduce feature space, preserve accuracy

High-throughput Classification Algorithm

- Very Fast Decision Trees (5-10x faster than comparable algorithms)

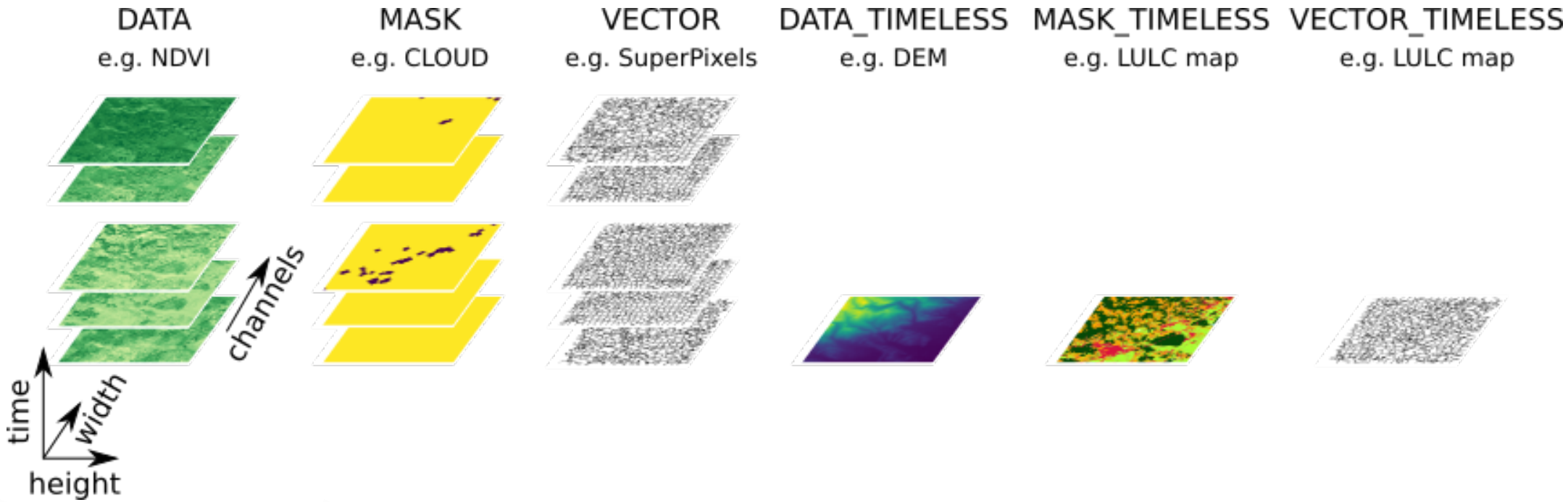
https://github.com/sentinel-hub/eo-learn

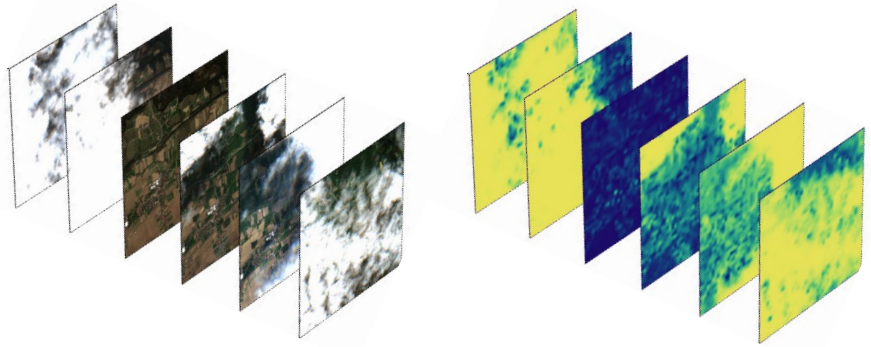
GitHub eo-learn

EO-tasks added by JSI: edge detection, feature extraction, smooting/interpolation …

Additional explanatory slides

Handling Data – eo-patch





eo-learn