GEE遥感训练营出品

Google Earth Engine

Google Earth Engine教学

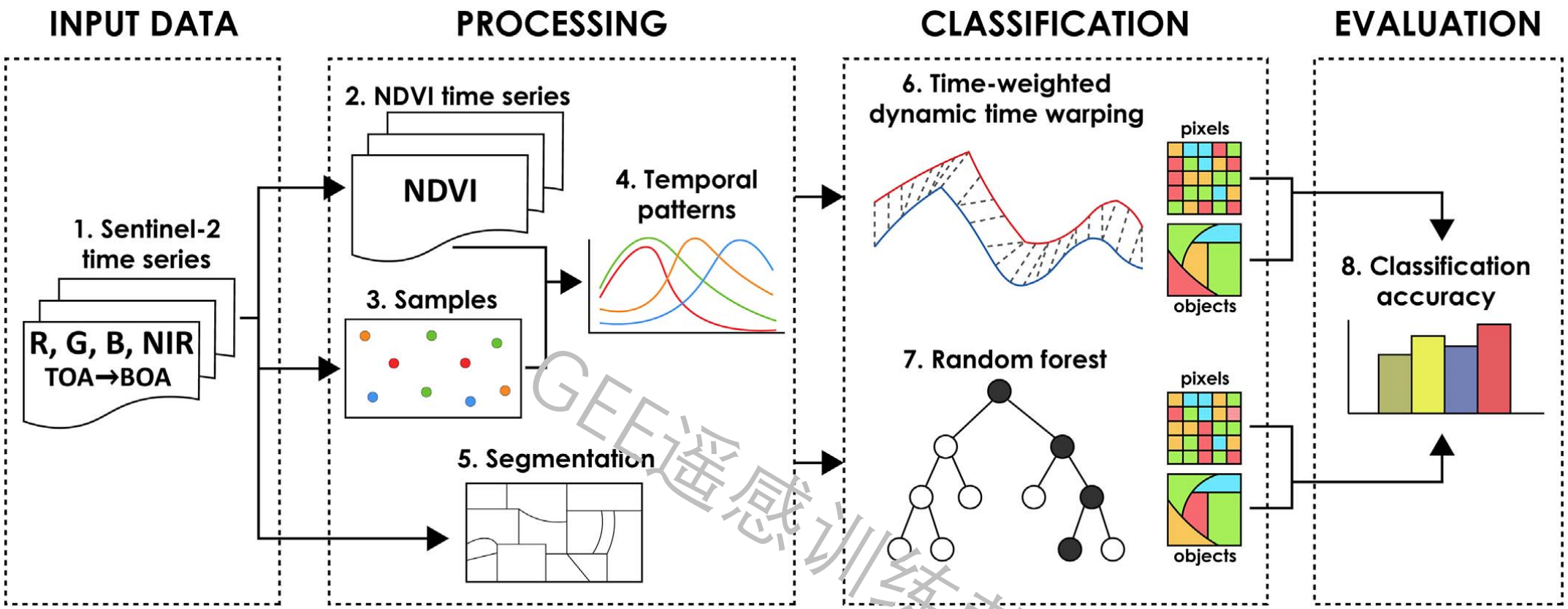
案例分析

Day 6

基本内容

- ✓案例分析
- ✓PCA

监督分类基本流程



Improved method

题目：

Automatic High-Resolution Land Cover Production in Madagascar Using Sentinel-2 Time Series, Tile-Based Image Classification and Google Earth Engine

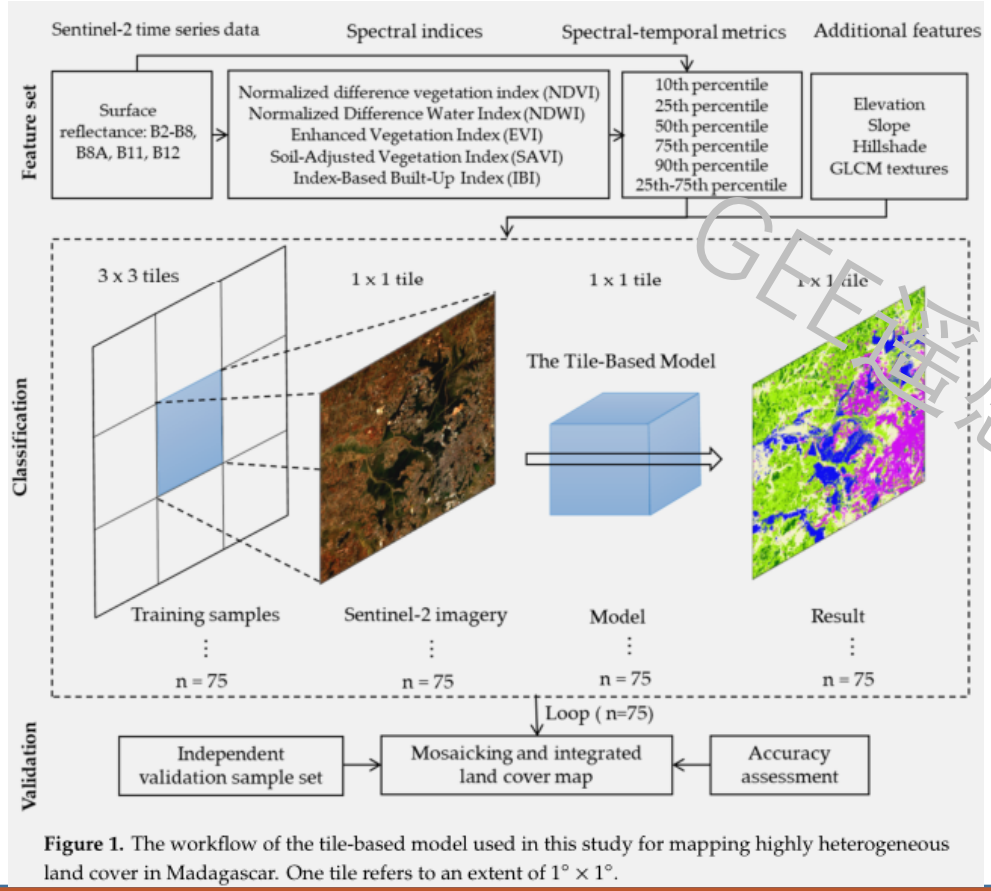


Figure 1. The workflow of the tile-based model used in this study for mapping highly heterogeneous land cover in Madagascar. One tile refers to an extent of 1° × 1°.

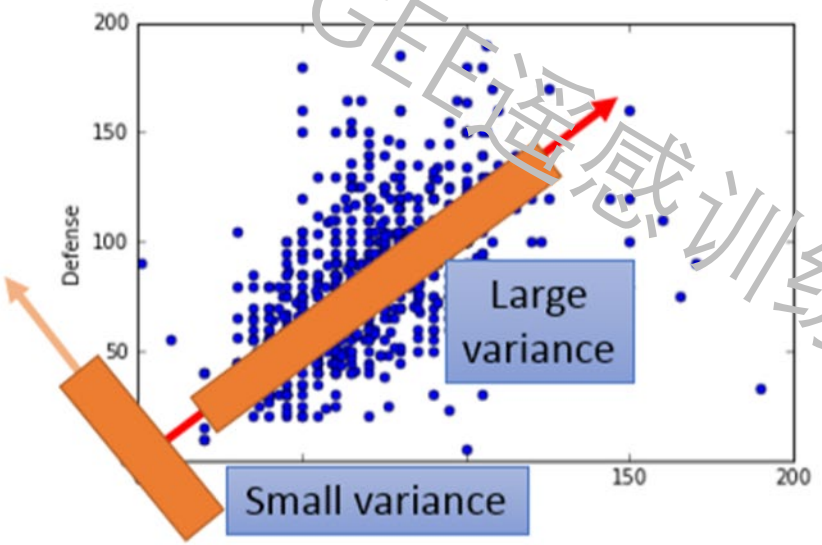
PCA 原理

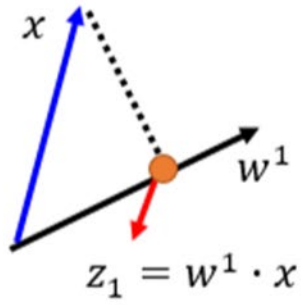
PCA

$z = Wx$

Reduce to 1-D:

$z_1 = w^1 \cdot x$





Project all the data points x onto w^1, and obtain a set of z_1

We want the variance of z_1 as large as possible

$$Var(z_1) = \sum_{z_1} (z_1 - \bar{z_1})^2 \quad \|w^1\|_2 = 1$$

$$\begin{cases} max\ J \\ s.t.\ w_1^T w_1 = 1 \end{cases}$$

$$\begin{aligned} J &= \frac{1}{N}\sum_{i=1}^{N}[(x_i - \bar{X})^T w_1]^2 \\ &= \frac{1}{N}\sum_{i=1}^{N} w_1^T (x_i - \bar{X})(x_i - \bar{X})^T w_1 \\ &= w_1^T (\frac{1}{N}\sum_{i=1}^{N}(x_i - \bar{X})(x_i - \bar{X})^T) w_1 \\ &= w_1^T S w_1 \end{aligned}$$

$$L(w_1, \lambda) = w_1^T S w_1 + \lambda(1 - w_1^T w_1)$$

$$\frac{\partial L}{\partial w_1} = 2Sw_1 - 2\lambda w_1 = 0$$

$$\Rightarrow Sw_1 = \lambda w_1$$

$$Var(a) = \frac{1}{m}\sum_{i=1}^{m}(a_i - \mu)^2 \qquad Var(a) = \frac{1}{m}\sum_{i=1}^{m} a_i^2$$

Thanks for your attention

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