A not so gentle introduction to machine learning in python using scikit-learn

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Meetup #11

About me


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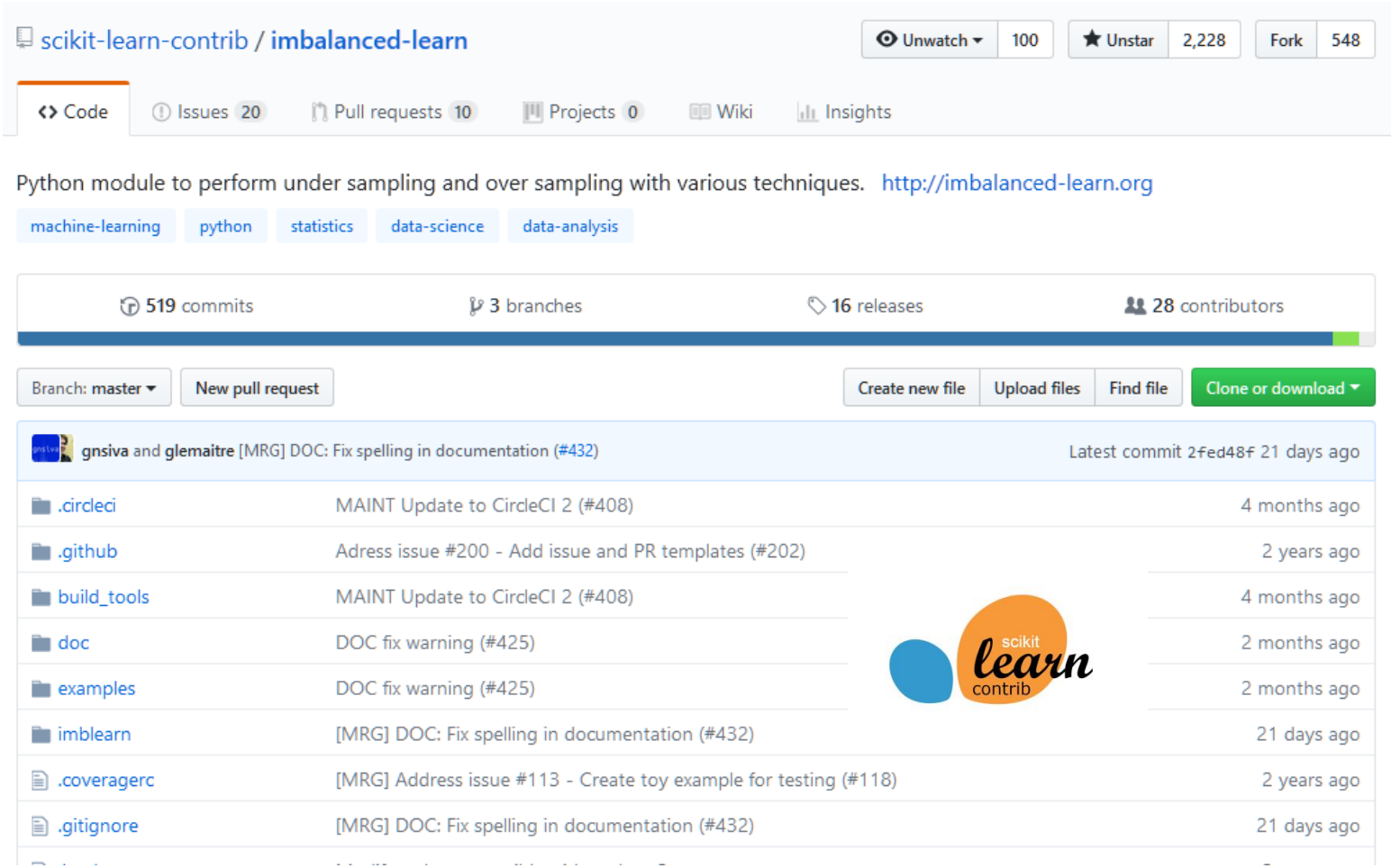
About me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Unwatch 100
Unstar 2,228
Fork 548
Code
Issues 20
Pull requests 10
Projects 0
Wiki
Insights
Python module to perform under sampling and over sampling with various techniques. http://imbalanced-learn.org
machine-learning
python
statistics
data-science
data-analysis
519 commits
3 branches
16 releases
28 contributors
Branch: master
New pull request
Create new file
Upload files
Find file
Clone or download
gnsiva and glemaitre [MRG] DOC: Fix spelling in documentation (#432)
Latest commit 2fed48f 21 days ago
.circleci MAINT Update to CircleCI 2 (#408) 4 months ago
.github Adress issue #200 - Add issue and PR templates (#202) 2 years ago
build_tools MAINT Update to CircleCI 2 (#408) 4 months ago
doc DOC fix warning (#425) 2 months ago
examples DOC fix warning (#425) 2 months ago
imblearn [MRG] DOC: Fix spelling in documentation (#432) 21 days ago
.coveragerc [MRG] Address issue #113 - Create toy example for testing (#118) 2 years ago
.gitignore [MRG] DOC: Fix spelling in documentation (#432) 21 days ago
scikit
learn
contrib

About you

- Machine Learning
- Python
- scikit-learn

What is Machine Learning?

- Machine learning is the process of extracting knowledge from data automatically
- Nowadays touch nearly every aspect of everyday life, from the face detection in our phones and the spam filtering to picking restaurants, partners, and movies.
- A classical example is a spam filter, for which the user keeps labeling incoming mails as either spam or not spam. A machine learning algorithm then "learns" a predictive model from data that distinguishes spam from normal emails, a model which can predict for new emails whether they are spam or not.

Machine Learning Concepts

- **Automating decision making** from data **without the user specifying explicit rules** how this decision should be made.
- **Generalization**

Machine Learning Concepts: Data

- Two-dimensional array (or matrix) of numbers.
- Each data point (aka *sample* or *training instance or object or example*) that we want to either learn from or make a decision on is represented as a list of numbers, a so-called feature vector, and its containing features (or attributes) represent the properties of this point.

Machine Learning Concepts: Data

Iris, a classic benchmark dataset in the field of machine learning, contains the measurements of 150 iris flowers from 3 different species: Iris-Setosa, Iris-Versicolor, and Iris-Virginica.

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Machine Learning Concepts: Data

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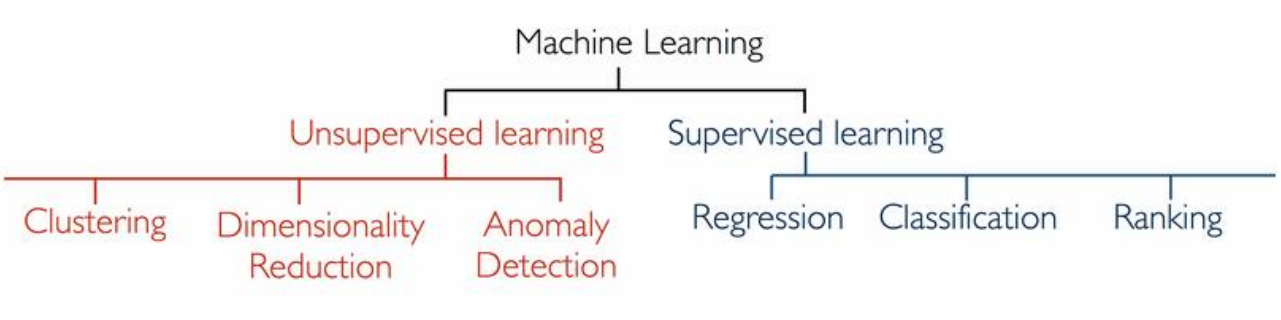
- Each flower sample represented as one row in our data array, and the columns (features or attributes) represent the flower measurements in centimeters.

$$\mathbf{X} = \begin{bmatrix} x_1^{(1)} & x_2^{(1)} & x_3^{(1)} & \dots & x_4^{(1)} \\ x_1^{(2)} & x_2^{(2)} & x_3^{(2)} & \dots & x_4^{(2)} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_1^{(150)} & x_2^{(150)} & x_3^{(150)} & \dots & x_4^{(150)} \end{bmatrix}.$$

Machine Learning Taxonomy



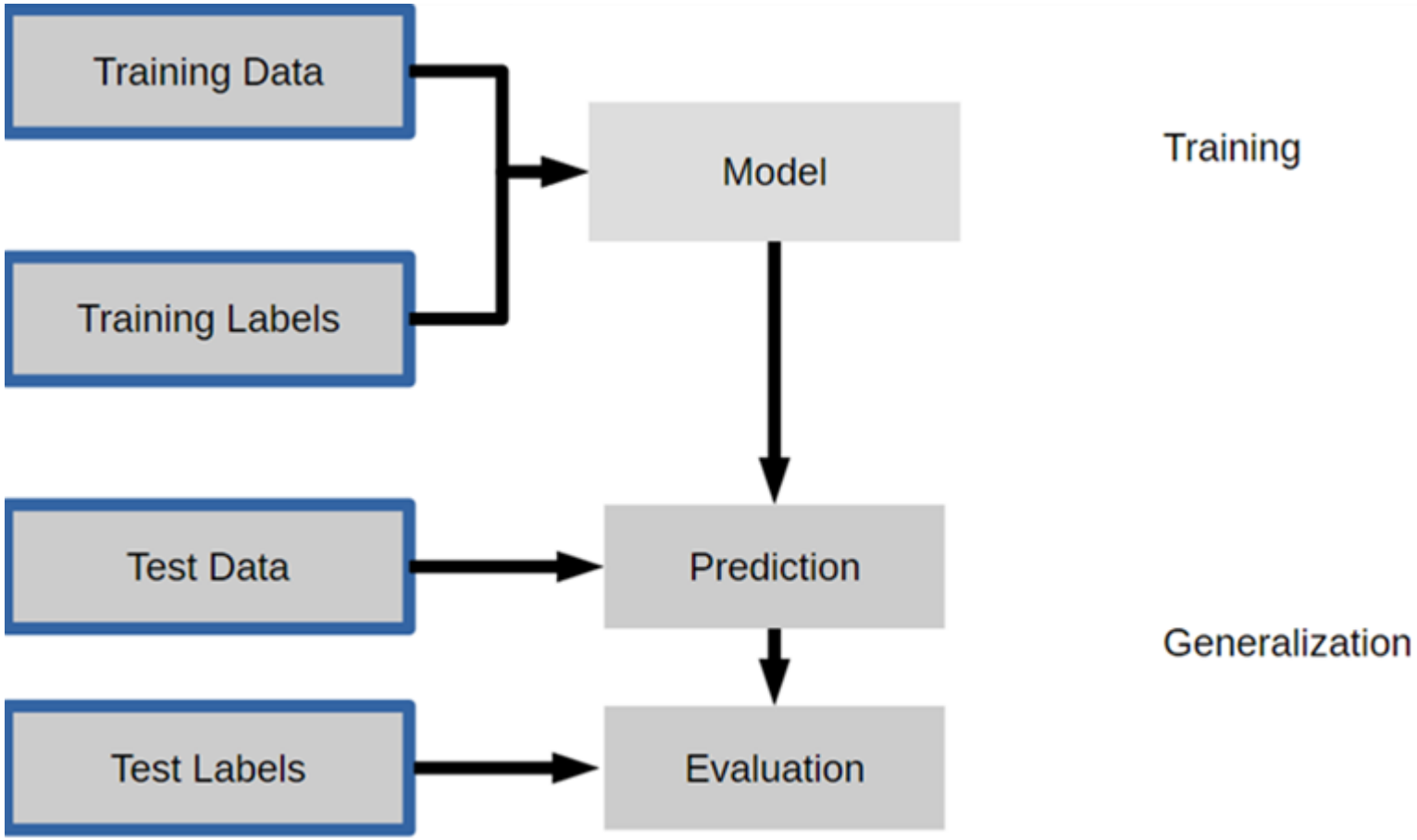
Supervised Learning: Classification and regression

- In Supervised Learning, we have a dataset consisting of both input features and a desired output.
- The task is to construct a model (or program) which is able to predict the desired output of an unseen object given the set of features.

Supervised Learning: Classification and regression

- **In classification, the label is discrete**
- **In regression, the label is continuous**

Supervised Learning: Classification and regression



Unsupervised Learning

- There is no desired output associated with the data
- We are interested in extracting some form of knowledge
- You can think of unsupervised learning as a means of discovering labels from the data itself.

Unsupervised Learning

- Is it more challenging than Supervised Learning?
  - Probably. But why?
  - Is often harder to understand and to evaluate

Why scikit-learn?

- **Python of course**
- **Commitment to documentation and usability**
- **Models are chosen and implemented by a dedicated team of experts**
- **Covers most machine-learning tasks**
- **Scales to most data problems**
- **Focus**

https://www.oreilly.com/ideas/six-reasons-why-i-recommend-scikit-learn

Why scikit-learn?

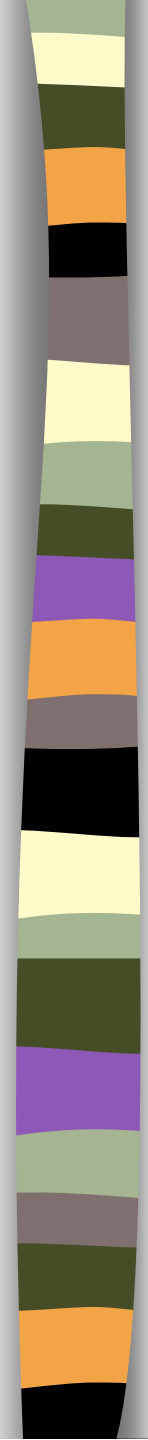
Classification
Regression
Clustering
Semi-Supervised Learning
Feature Selection
Feature Extraction
Manifold Learning
Dimensionality Reduction
Kernel Approximation
Hyperparameter Optimization
Evaluation Metrics
Out-of-core learning

https://www.oreilly.com/ideas/six-reasons-why-i-recommend-scikit-learn

Who is using scikit-learn?

The New York Times

Booking.com



Coding Time