7.3. Generated datasets

In addition, scikit-learn includes various random sample generators that can be used to build artificial datasets of controlled size and complexity.

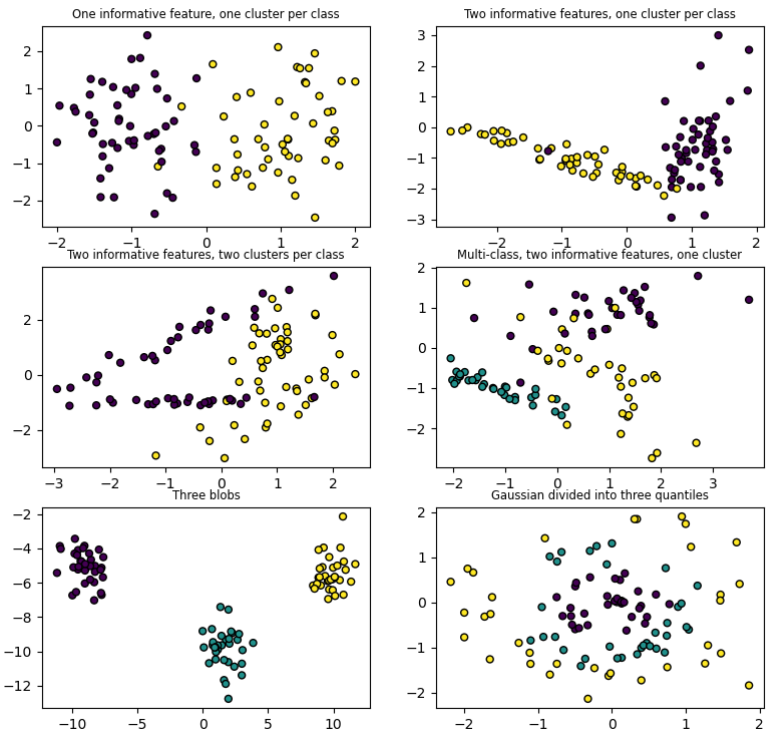
7.3.1. Generators for classification and clustering

These generators produce a matrix of features and corresponding discrete targets.

7.3.1.1. Single label

Both `make_blobs` and `make_classification` create multiclass datasets by allocating each class one or more normally-distributed clusters of points. `make_blobs` provides greater control regarding the centers and standard deviations of each cluster, and is used to demonstrate clustering. `make_classification` specializes in introducing noise by way of: correlated, redundant and uninformative features; multiple Gaussian clusters per class; and linear transformations of the feature space.

`make_gaussian_quantiles` divides a single Gaussian cluster into near-equal-size classes separated by concentric hyperspheres. `make_hastie_10_2` generates a similar binary, 10-dimensional problem.

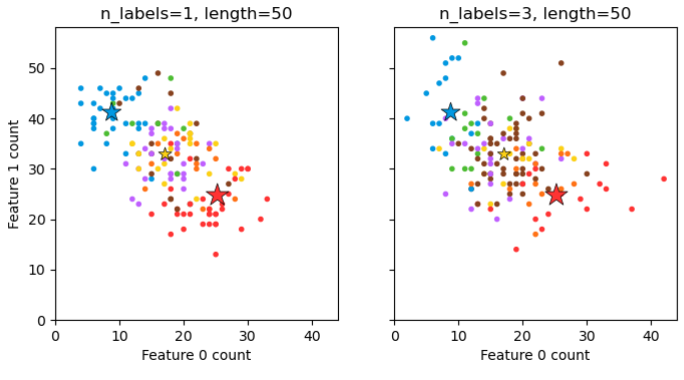


`make_circles` and `make_moons` generate 2d binary classification datasets that are challenging to certain algorithms (e.g. centroid-based clustering or linear classification), including optional Gaussian noise. They are useful for visualization. `make_circles` produces Gaussian data with a spherical decision boundary for binary classification, while `make_moons` produces two interleaving half circles.

7.3.1.2. Multilabel

`make_multilabel_classification` generates random samples with multiple labels, reflecting a bag of words drawn from a mixture of topics. The number of topics for each document is drawn from a Poisson distribution, and the topics themselves are drawn from a fixed random distribution. Similarly, the number of words is drawn from Poisson, with words drawn from a multinomial, where each topic defines a probability distribution over words. Simplifications with respect to true bag-of-words mixtures include:

- Per-topic word distributions are independently drawn, where in reality all would be affected by a sparse base distribution, and would be correlated.
- For a document generated from multiple topics, all topics are weighted equally in generating its bag of words.
- Documents without labels words at random, rather than from a base distribution.



7.3.1.3. Biclustering

make_biclusters(shape, n_clusters, *[, ...])	Generate a constant block diagonal structure array for biclustering.
make_checkerboard(shape, n_clusters, *[, ...])	Generate an array with block checkerboard structure for biclustering.

7.3.2. Generators for regression

make_regression produces regression targets as an optionally-sparse random linear combination of random features, with noise. Its informative features may be uncorrelated, or low rank (few features account for most of the variance).

Other regression generators generate functions deterministically from randomized features. make_sparse_uncorrelated produces a target as a linear combination of four features with fixed coefficients. Others encode explicitly non-linear relations: make_friedman1 is related by polynomial and sine transforms; make_friedman2 includes feature multiplication and reciprocation; and make_friedman3 is similar with an arctan transformation on the target.

7.3.3. Generators for manifold learning

make_s_curve([n_samples, noise, random_state])	Generate an S curve dataset.
make_swiss_roll([n_samples, noise, ...])	Generate a swiss roll dataset.

7.3.4. Generators for decomposition

make_low_rank_matrix([n_samples, ...])	Generate a mostly low rank matrix with bell-shaped singular values.
make_sparse_coded_signal(n_samples, *, ...)	Generate a signal as a sparse combination of dictionary elements.
make_spd_matrix(n_dim, *[, random_state])	Generate a random symmetric, positive-definite matrix.
make_sparse_spd_matrix([dim, alpha, ...])	Generate a sparse symmetric definite positive matrix.