r2_score

sklearn.metrics.r2_score(*y_true*, *y_pred*, *, *sample_weight*=None, *multioutput*='uniform_average', *force_finite*=True) # [source]

R^2 (coefficient of determination) regression score function.

Best possible score is 1.0 and it can be negative (because the model can be arbitrarily worse). In the general case when the true y is non-constant, a constant model that always predicts the average y disregarding the input features would get a R^2 score of 0.0.

In the particular case when `y_true` is constant, the R^2 score is not finite: it is either `NaN` (perfect predictions) or `-Inf` (imperfect predictions). To prevent such non-finite numbers to pollute higher-level experiments such as a grid search cross-validation, by default these cases are replaced with 1.0 (perfect predictions) or 0.0 (imperfect predictions) respectively. You can set `force_finite` to `False` to prevent this fix from happening.

Note: when the prediction residuals have zero mean, the R^2 score is identical to the **Explained Variance score**.

Read more in the User Guide.

Parameters:

y_true : *array-like of shape (n_samples,) or (n_samples, n_outputs)*

Ground truth (correct) target values.

y_pred : *array-like of shape (n_samples,) or (n_samples, n_outputs)*

Estimated target values.

sample_weight : *array-like of shape (n_samples,), default=None*

Sample weights.

multioutput : *{'raw_values', 'uniform_average', 'variance_weighted'}, array-like of shape (n_outputs,) or None, default='uniform_average'*

Defines aggregating of multiple output scores. Array-like value defines weights used to average scores. Default is "uniform_average".

'raw_values' :

Returns a full set of scores in case of multioutput input.

'uniform_average' :

Scores of all outputs are averaged with uniform weight.

'variance_weighted' :

Scores of all outputs are averaged, weighted by the variances of each individual output.

> **Changed in version 0.19:** Default value of multioutput is 'uniform_average'.

force_finite : *bool, default=True*

Flag indicating if `NaN` and `-Inf` scores resulting from constant data should be replaced with real numbers (`1.0` if prediction is perfect, `0.0` otherwise). Default is `True` , a convenient setting for hyperparameters' search procedures (e.g. grid search cross-validation).

> **Added in version 1.1.**

Returns:

z : *float or ndarray of floats*

The R^2 score or ndarray of scores if 'multioutput' is 'raw_values'.

Notes

This is not a symmetric function.

Unlike most other scores, R^2 score may be negative (it need not actually be the square of a quantity R).

This metric is not well-defined for single samples and will return a NaN value if n_samples is less than two.

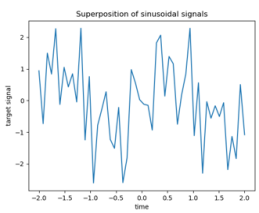
References

[1] Wikipedia entry on the Coefficient of determination

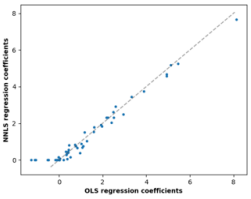
Examples

```
>>> from sklearn.metrics import r2_score
>>> y_true = [3, -0.5, 2, 7]
>>> y_pred = [2.5, 0.0, 2, 8]
>>> r2_score(y_true, y_pred)
0.948...
>>> y_true = [[0.5, 1], [-1, 1], [7, -6]]
>>> y_pred = [[0, 2], [-1, 2], [8, -5]]
>>> r2_score(y_true, y_pred,
...          multioutput='variance_weighted')
0.938...
>>> y_true = [1, 2, 3]
>>> y_pred = [1, 2, 3]
>>> r2_score(y_true, y_pred)
1.0
>>> y_true = [1, 2, 3]
>>> y_pred = [2, 2, 2]
>>> r2_score(y_true, y_pred)
0.0
>>> y_true = [1, 2, 3]
>>> y_pred = [3, 2, 1]
>>> r2_score(y_true, y_pred)
-3.0
>>> y_true = [-2, -2, -2]
>>> y_pred = [-2, -2, -2]
>>> r2_score(y_true, y_pred)
1.0
>>> r2_score(y_true, y_pred, force_finite=False)
nan
>>> y_true = [-2, -2, -2]
>>> y_pred = [-2, -2, -2 + 1e-8]
>>> r2_score(y_true, y_pred)
0.0
>>> r2_score(y_true, y_pred, force_finite=False)
-inf
```

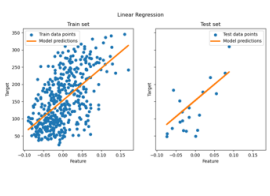
Gallery examples



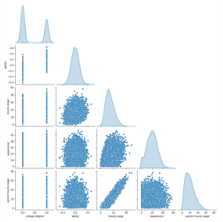
L1-based models for Sparse Signals



Non-negative least squares



Ordinary Least Squares Example



Failure of Machine Learning to infer causal effects