

Linear Regression

A linear regression algorithm with optional L1 (LASSO), L2 (ridge) or L1L2 (elastic net) regularization.

Inputs

- Data: input dataset
- Preprocessor: preprocessing method(s)

Outputs

- Learner: linear regression learning algorithm
- Model: trained model
- Coefficients: linear regression coefficients

The **Linear Regression** widget constructs a learner/predictor that learns a **linear function** from its input data. The model can identify the relationship between a predictor x_i and the response variable y . Additionally, **Lasso** and **Ridge** regularization parameters can be specified. Lasso regression minimizes a penalized version of the least squares loss function with L1-norm penalty and Ridge regularization with L2-norm penalty.


Linear regression works only on regression tasks.

The screenshot shows the 'Linear Regression' widget interface. It has a title bar with standard macOS window controls (red, yellow, grey buttons) and the title 'Linear Regression'. Below the title bar, there is a 'Name' section with a text field containing 'Linear Regression', marked with a circled '1'. Below that is a 'Regularization' section, marked with a circled '2'. This section contains two radio buttons: 'No regularization' (which is selected) and 'Ridge regression (L2)'. To the right of these radio buttons is a 'Regularization strength:' label and a horizontal slider. Below the slider, the text 'Alpha: 0.0001' is displayed.

☐ Lasso regression (L1)

☐ Elastic net regression

Elastic net mixing:

L1  L2

0.50 : 0.50

3 Report ☒ 4 Apply Automatically

1. The learner/predictor name
2. Choose a model to train:
 - no regularization
 - a Ridge regularization (L2-norm penalty)
 - a Lasso bound (L1-norm penalty)
 - an Elastic net regularization
3. Produce a report.
4. Press *Apply* to commit changes. If *Apply Automatically* is ticked, changes are committed automatically.

Example

Below, is a simple workflow with *housing* dataset. We trained **Linear Regression** and **Random Forest** and evaluated their performance in **Test & Score**.

The image shows an Orange Data Mining workflow and the settings for two widgets: Linear Regression and Test & Score.

Workflow: A 'File' widget connects to a 'Test & Score' widget. The 'Test & Score' widget is connected to two model widgets: 'Linear Regression' and 'Random Forest'.

Linear Regression Widget Settings:

- Name: Linear Regression
- Regularization:
 - ☒ No regularization
 - ☐ Ridge regression (L2)
 - ☐ Lasso regression (L1)
 - ☐ Elastic net regression
- Regularization strength: Alpha: 0.0001
- Elastic net mixing: L1 0.50 : 0.50 L2
- Buttons: Report, ☒ Apply Automatically

Test & Score Widget Settings:

- Sampling:
 - ☒ Cross validation
 - Number of folds: 10
 - ☒ Stratified
 - ☐ Random sampling
 - Repeat train/test: 10
 - ☐ Leave one out
 - ☐ Test on train data
 - ☐ Test on test data
- Training set size: 66 %
- Buttons: Report

Evaluation Results:

Method	MSE	RMSE	MAE	R2
Linear Regression	23.370	4.834	3.376	0.723
Random Forest	11.313	3.364	2.317	0.866