

1.15. Isotonic regression

The class `IsotonicRegression` fits a non-decreasing real function to 1-dimensional data. It solves the following problem:

$$\text{minimize } \sum_i w_i (y_i - \hat{y}_i)^2$$
$$\text{subject to } \hat{y}_i \leq \hat{y}_j \text{ whenever } X_i \leq X_j,$$

where the weights w_i are strictly positive, and both x and y are arbitrary real quantities.

The `increasing` parameter changes the constraint to $\hat{y}_i \geq \hat{y}_j$ whenever $X_i \leq X_j$. Setting it to 'auto' will automatically choose the constraint based on [Spearman's rank correlation coefficient](#).

`IsotonicRegression` produces a series of predictions \hat{y}_i for the training data which are the closest to the targets y in terms of mean squared error. These predictions are interpolated for predicting to unseen data. The predictions of `IsotonicRegression` thus form a function that is piecewise linear:

