4 components of an ML algorithm

1. Data
   - defines our problem
   - what relationship are we modeling?
   - what labels (y) are we predicting from what features (X)
2. Model
   - mathematical function that makes predictions of labels from features
   - "hypothesis"
   - $\hat{y} = h(X)$ — $\hat{y}$ is prediction of y
3. Criterion
   - how do we measure how bad our model is?
4. Optimiser
   - how do we improve the model?

More ... these l...

The Data

This data has one feature & one label

One datapoint

Features: $x^{(i)} = \left[x_1^{(i)}\right] \in \mathbb{R}^1$ in the space of scalar real numbers

1 feature = ag...

Labels: $y^{(i)} = \left[y_1^{(i)}\right] \in \mathbb{R}^1$

1 label = heigl...

Whole dataset

$$X = \begin{bmatrix} x^{(1)} \\ \vdots \\ x^{(m)} \end{bmatrix} = \begin{bmatrix} [x_1^{(1)}] \\ \vdots \\ [x_1^{(m)}] \end{bmatrix} \in \mathbb{R}^{m \times n}$$ matr...

capital because it's a matrix

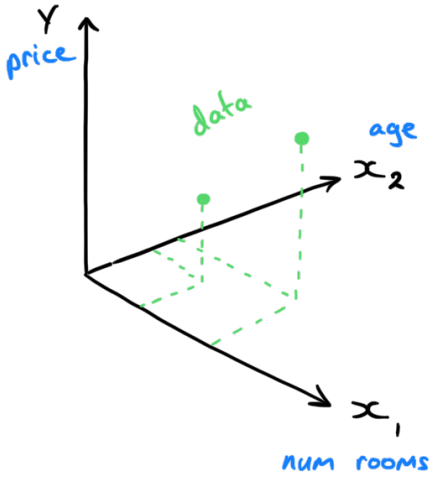
m examples

n features

$$y = \begin{bmatrix} y^{(1)} \\ \vdots \\ y^{(m)} \end{bmatrix} \in \mathbb{R}^m$$ vector

New dataset - House prices

This data has two features & one label



One datapoint

in the space of vectors containing 2 real numbers

Features : $x^{(i)} = \begin{bmatrix} x_1^{(i)} \\ x_2^{(i)} \end{bmatrix} = \begin{bmatrix} \text{num rooms} \\ \text{age} \end{bmatrix} \in \mathbb{R}^2$

Labels : $y^{(i)} = [\, y_1^{(i)} \,] \in \mathbb{R}^1$

1 label = height

Whole dataset

$$X = \begin{bmatrix} x^{(1)} \\ \vdots \\ x^{(m)} \end{bmatrix} = \begin{bmatrix} [\, x_1^{(1)} \quad x_2^{(1)} \,] \\ \vdots \\ [\, x_1^{(m)} \quad x_2^{(m)} \,] \end{bmatrix} \in \mathbb{R}^{m \times n}$$

capital because it's a matrix

m examples

n features

$$y = \begin{bmatrix} y^{(1)} \\ \vdots \\ y^{(m)} \end{bmatrix} \in \mathbb{R}^m$$ vector