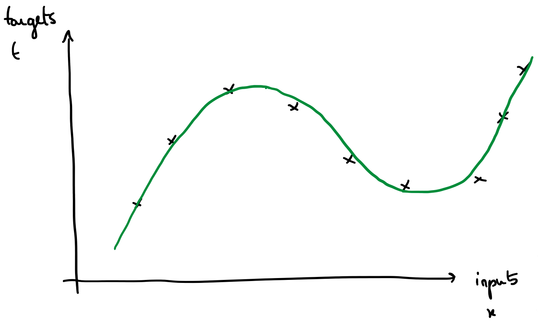
Video 12

Saturday, October 10, 2020 3:24 PM



1D regression task

one feature

$y = \vec{w}^T \vec{x}$ → $y = w_3 x^3 + w_2 x^2 + w_1 x + w_0$

Linear regression

Polynomial regression

here we have a 1D input

$y = w_1 x + w_0$ (scalar, scalar)

Scalar

Feature mappings

Define a feature map $\phi(x) = \begin{pmatrix} 1 \\ x \\ x^2 \\ x^3 \end{pmatrix}$

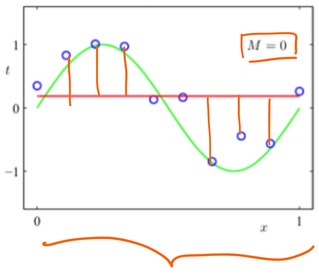
vector because the feature map produces 4 outputs (features)

Define a polynomial regression model: $y = \vec{w}^T \phi(x)$

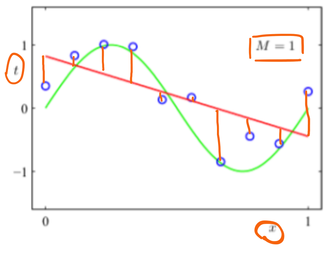
input x is replaced with the feature map.

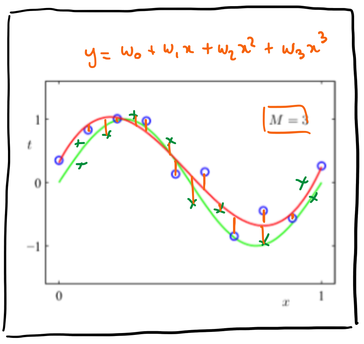
How to choose the degree of the polynomial?

$y = w_0$ ← bias (b)

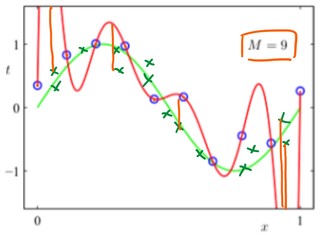


$y = w_0 + w_1 x$





$y = w_0 + w_1 x + \dots + w_8 x^8 + w_9 x^9$



Adapted from Bishop (Pattern Recognition & ML)

Generalization

Hyperparameters: parameters which we can't include in the training itself

(e.g., the degree of the polynomial)

To tune hyperparameters, we will use a validation set.