MACHINE LEARNING WITH PYTHON

POLYNOMIAL REGRESSION

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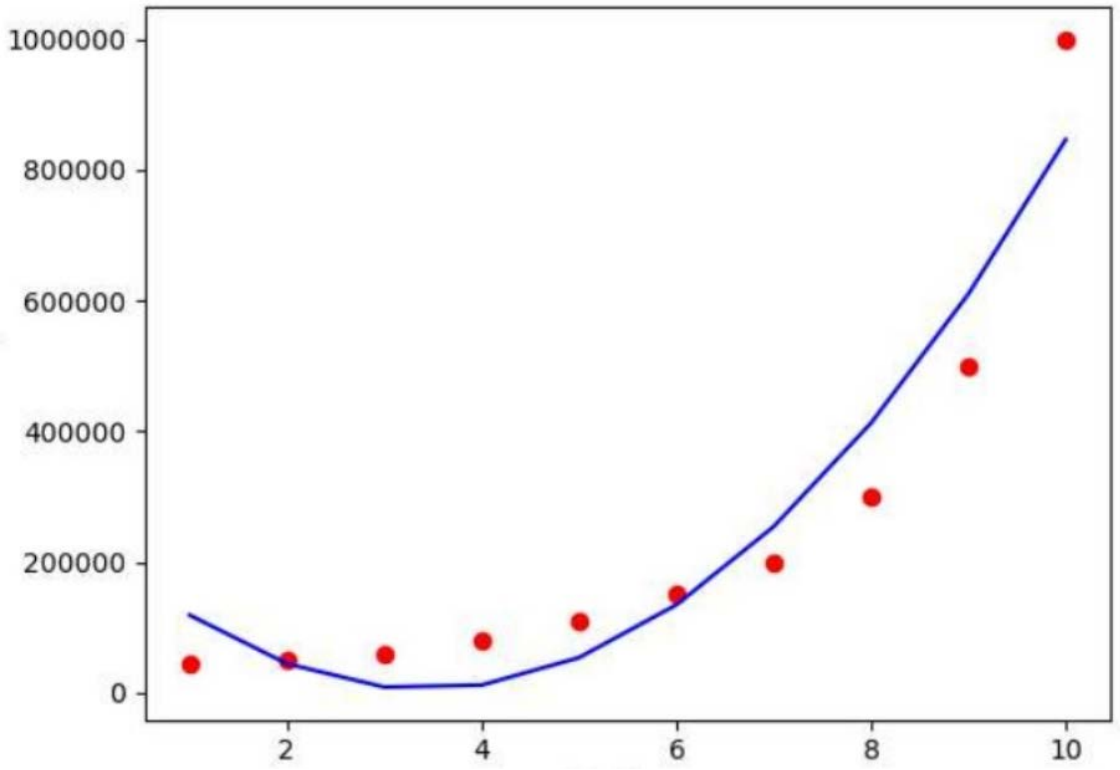
Polynomial Regression

- Apply when data is not linear
- Linear Regression with Polynomial Features

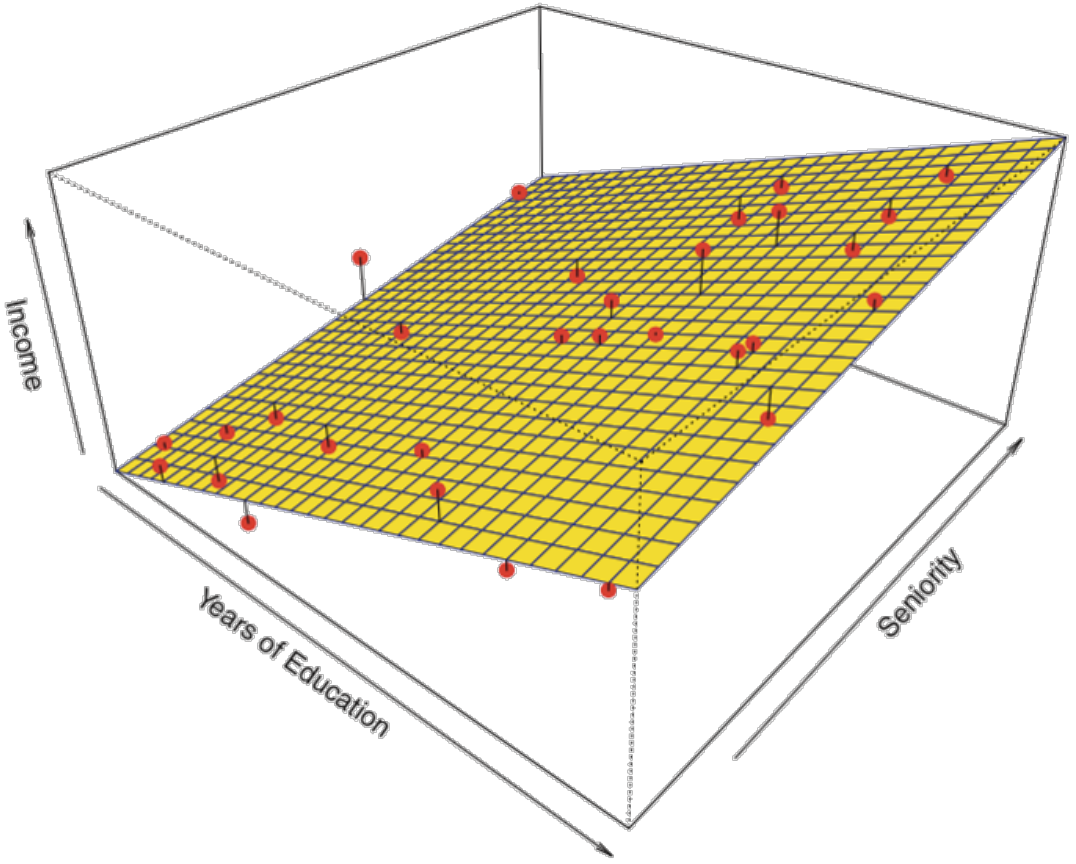


Source: https://www.slideshare.net/akhileshjoshi123/polynomial-linear-regression

Regression in multiple dimensions

- Linear Regression (1d)
  $y = b_0 + b_1 \cdot x$
- Linear Regression (2d)

  $z = b_0 + b_1 \cdot x + b_2 \cdot y$



Source: sphweb.bumc.bu.edu/otlt/MPH-Modules/BS/R/R5_Correlation-Regression/R5_Correlation-Regression4.html

Polynomial Features

- Linear Regression (1d)

$$y = b_0 + b_1 \cdot x$$

- Transform to polynomial of degree 2

$$y = b_0 + b_1 \cdot x + b_2 \cdot x^2$$

- Linear Regression (2d)

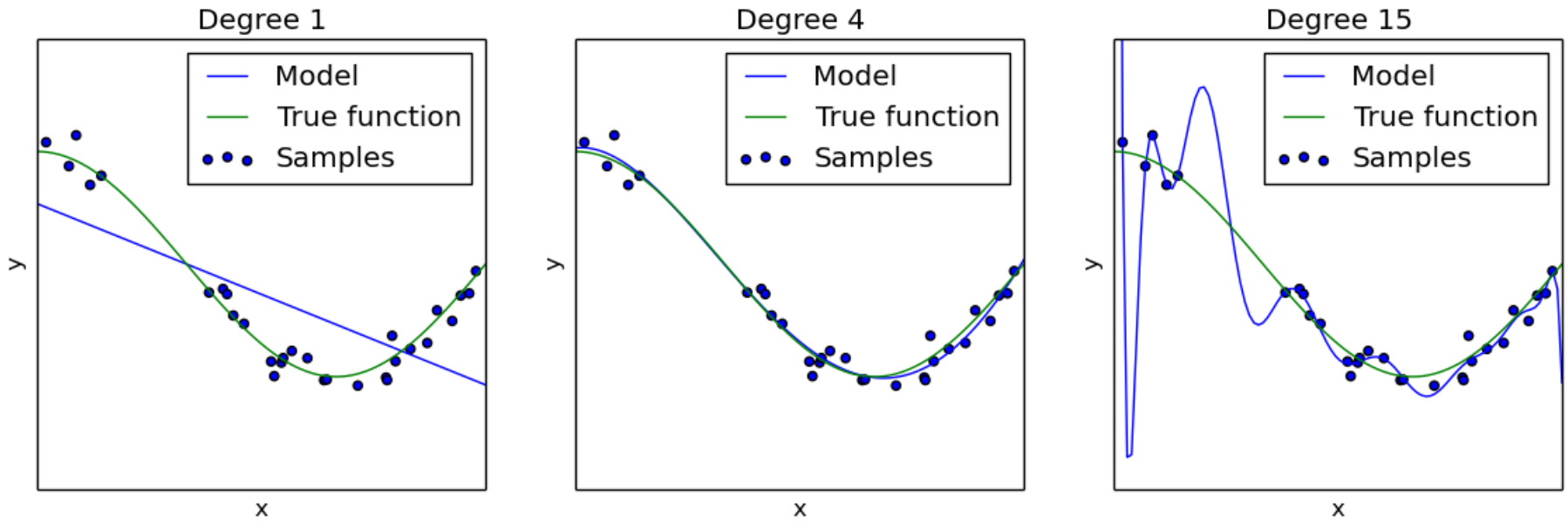
$$z = b_0 + b_1 \cdot x + b_2 \cdot y$$

$$z = b_0 + b_1 \cdot x + b_2 \cdot y + b_3 \cdot x^2 + b_4 \cdot xy + b_5 \cdot y^2$$

Source: https://www.ics.uci.edu/~jutts/201-F13/Lecture13.pdf

Underfitting and Overfitting

- Relevant to polynomial degree
- Check by visualizing data or using elbow method



Source: http://scikit-learn.org/0.15/auto_examples/plot_underfitting_overfitting.html