

An Introduction to Machine Learning with Python Programming
12 Sep 2023 - 20 Oct 2023

iHUB, DivyaSampark, IIT Roorkee

Polynomial Regression

Ritvij Bharat Private Limited (RBPL)

Theory and Motivation

Presented By:
Shreyas Shukla

Polynomial Regression

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Two issues polynomial regression will address for us:

- Non-linear feature relationships to label
- Interaction terms between features

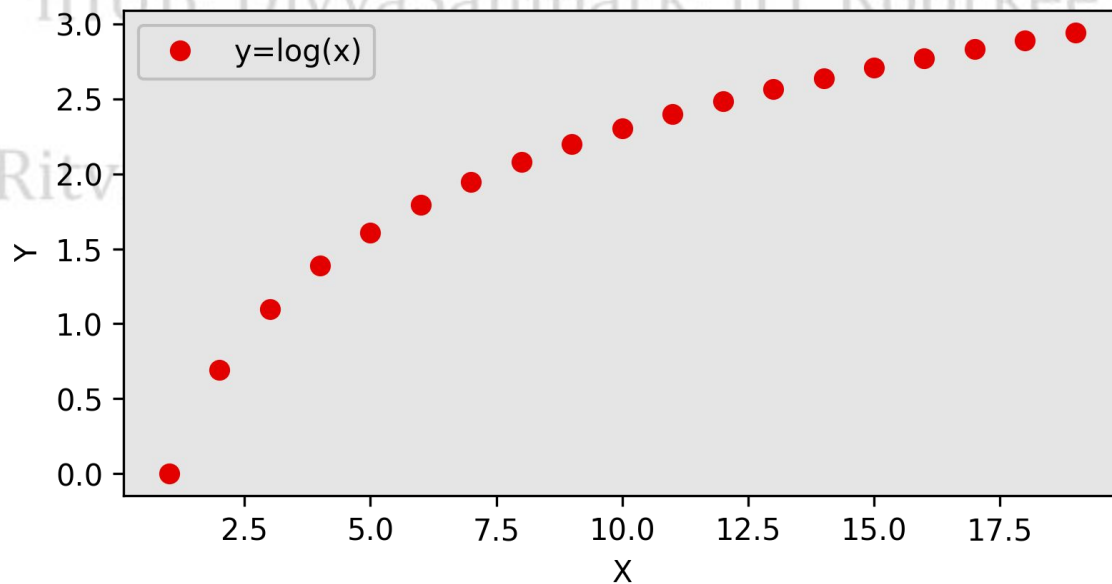
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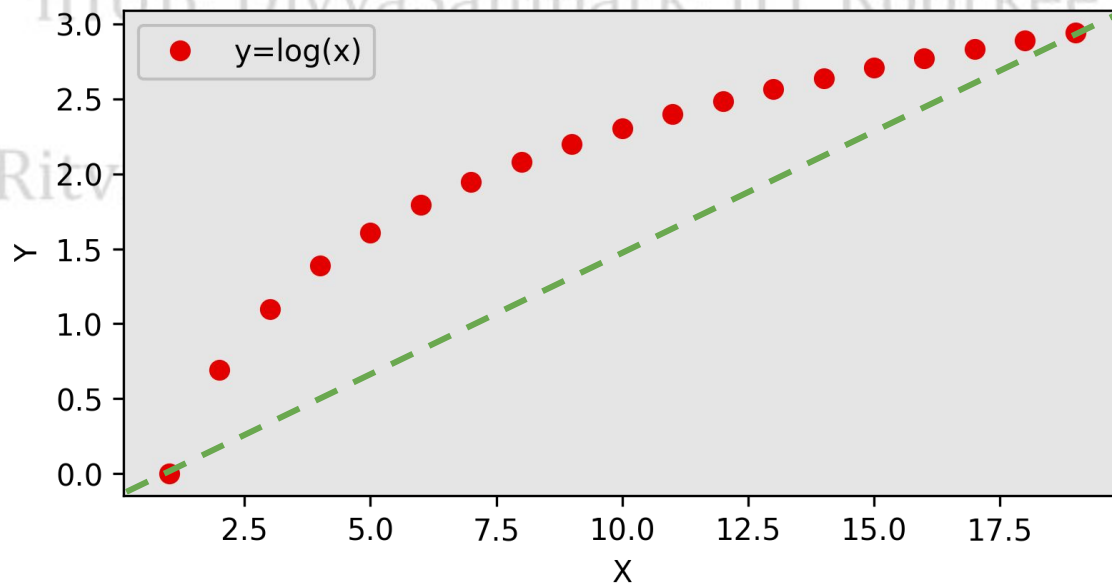
Non- linear:



Caution: x inside $\log(x)$ is not feature

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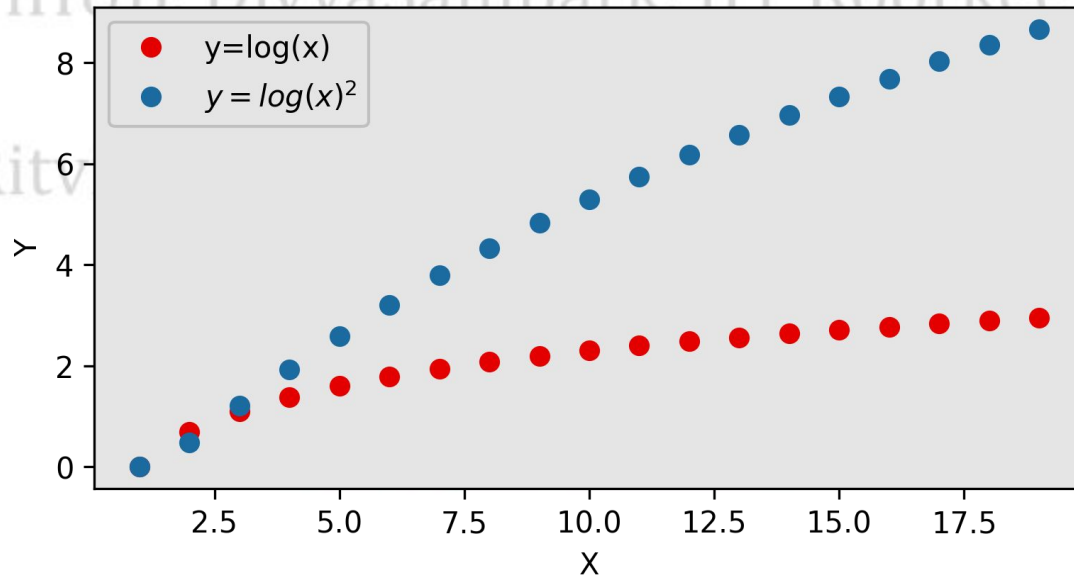
Not a linear relationship



Polynomial Regression

What about the square?

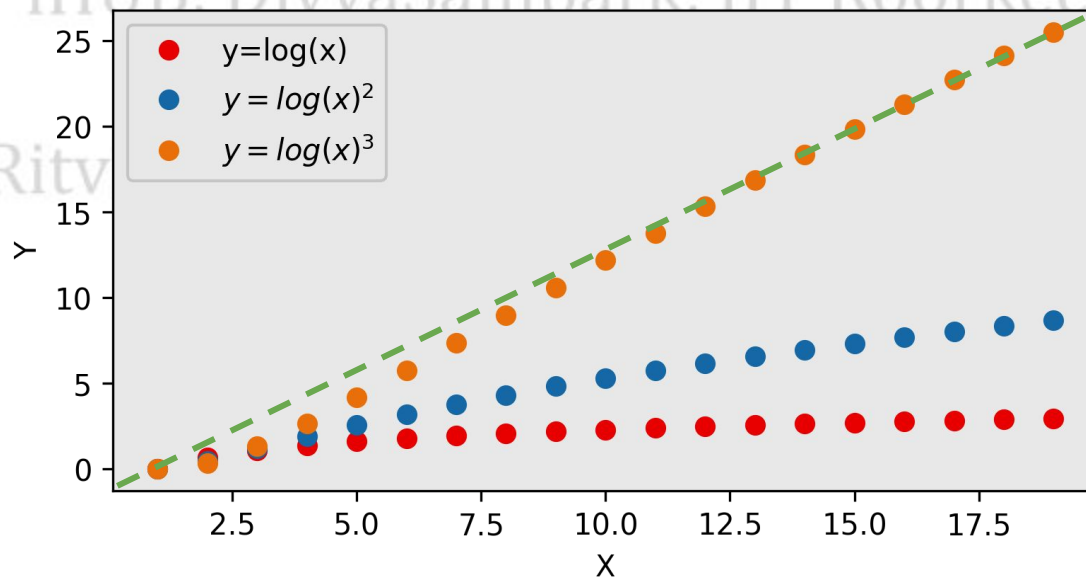
Seems moving to linearity



Polynomial Regression

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Even more so for higher orders!



Polynomial Regression

- **Interaction terms.**
- What if features are only significant when in sync with one another?
 - Perhaps newspaper advertising spend by itself is not effective, but greatly increases effectiveness if added to a TV advertising campaign. How to check?
 - create a new feature that multiplies two existing features together to create an interaction term

Presented By:

Shweta Shukla

TV, Newspaper, and also $TV * Newspaper$

- Sci-kit Learn library

Polynomial Regression

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The features created include:

- **The bias (the value of 1.0)**
- **Values raised to a power for each degree (e.g. x^1 , x^2 , x^3 , ...)**
- **Interactions between all pairs of features (e.g. $x_1 * x_2$, $x_1 * x_3$, ...)**

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