

2025

4Geeks Academy: data science cohort 12

DAY 9: CALCULUS & LINEAR ALGEBRA

TODO

CALCULUS & LINEAR ALGEBRA

Use case, qualitative interpretations

API REQUESTS PROJECT

Submit Interacting with an API using Python (API requests module) if you haven't done so already

NO NEW PROJECT

Catch-up on old assignments, get ahead in reading or work on optimizer 'bonus' project

TOPICS

01 REGRESSION

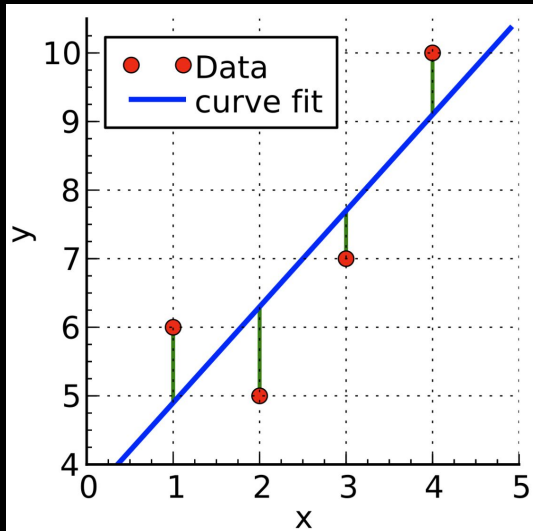
02 CALCULUS: GRADIENT DESCENT

03 LINEAR ALGEBRA: MODELS

04 LINEAR ALGEBRA: DATA

REGRESSION

WHAT Method(s) to estimate the relationship (function) between input variable(s) and an output variable

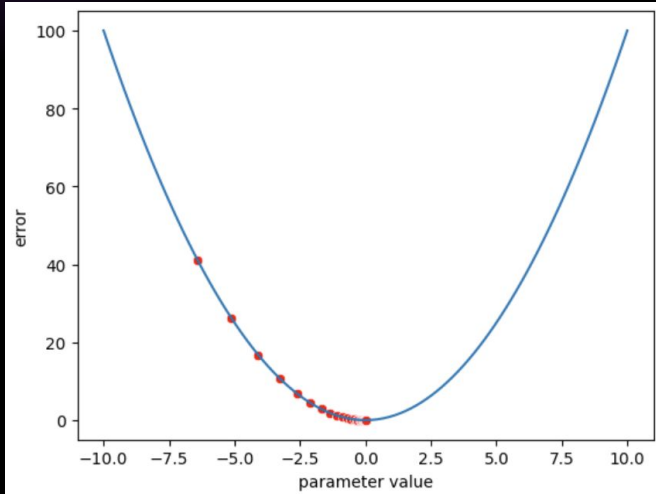


$$y = mx + b$$

The 'best' values for m & b have the lowest error (smallest green lines)

CALCULUS: GRADIENT DESCENT

WHAT Calculus can be used to find the slope of a function at a given point. The slope can be used to 'optimize' that function.



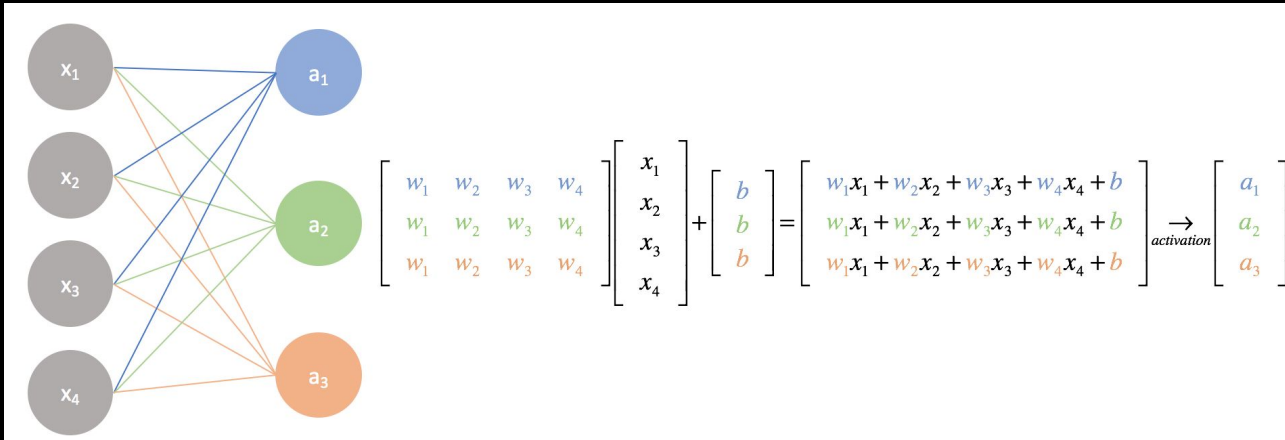
ALGORITHM

1. Pick starting value for m
2. Calculate gradient of error function at that point
3. Update m by larger/smaller amount based on size/direction of gradient
4. Go to step 2

LINEAR ALGEBRA: MODELS

WHAT Most (all?) machine learning models are arrays and work via array multiplication

WHY Optimizing machine learning models is linear algebra



LINEAR ALGEBRA: DATA

WHAT Branch of math that deals with vectors (think: lists) and matrices (think: arrays)

WHY Allows efficient (fast) operations on data

HOW

- **Numpy**: Python library for large, N-dimensional arrays and high-level math functions
- **Pandas**: Built on Numpy, user-friendly API for data
- **TensorFlow**: Google's deep learning library for Python - specifically optimized for fast tensor math on GPU & TPU.