Data Science: Deep Learning Prerequisites – Linear Reg in Python Notes

**Section 1: Introduction and Outline**

starter course for machine learning

high school stuff

derivatives

matrices and vectors

method for teaching

hands on

Outline of the course

1. What is machine learning and how does linear regression do it?

2. intro to course example: moore’s law

moore’s law: number of transistors on a chip doubles every few years

3. 1-D linear regression techniques (theory and code)

4. prove moore’s law

5. think in pictures

we need to think about machine learning in a visual form

6. more input variables

7. discuss more advanced

**What is machine learning and prerequisites:**

prereqs

calculus

python

linear algebra (vectors, matrices)

probabily (gaussian/normal dist)

what is machine learning

predict outcome by learning from past examples

2 categories

1. supervised

output is given as (X->Y also know as “X leads to Y”)

2 sub categories

1. classification

trying to predict a category or label

e.g. what digit is this

does this picture contain a cat

2. regression

predicut real-valued number or vector

temperature

stock price

linear regression (“line of best fit”) is an example of supervised learning

input X->output Y (X,Y coordinates)

real examples

number of hours of exercise per week and body mass index

critical to be protective of causality

do not mistake coorelation

2. unsupervised

no output just trying to learn structure

example: given a bunch of documents, maybe there are similarities betweena bunch of documents

2. unsupervised

**Example: Introduction to Moore’s Law**

use linear regression to prove Moore’s law

Moore’s law: transistor count on integrated circuit doubles every 2 years

this would suggest an exponential curve

If you take the log of the equation

you get something that looks like linear regression with time (in years) on x axis and log of transistor counts on y axis

T0=A0

T1=2\*A0

T2=2\*2\*A0

…

then

log(Tn)=log(A0)+log(2)\*n

we will learn how to do this in the coming slides

try taking concepts learned in next couple of slides to moore’s law (see github)

**Quiz 1:**

What can linear regression be used for?

focuses on predictiving values not classification of what something is

predict height based on inputs

not predict if object is a cat

**How to succeed in this course**

1. make of the Q&A

goal of connecting the dots

2. make sure you meet prerequisites

may have to do your own research

3. implement everything you learn

python code is same no matter what tool you are using