1. I want to predict the price of a car given the parameters of the car.
    a. Supervised machine learning
    b. # of neurons in last layers: 1
    c. Activation function in last layer: No Activation
    d. Scaling the label - Min, Max.,
        i. Unscale Price = predicted * range + min
    e. Loss function: MSE / Huber Loss

2. Is a photo obsene ? You have data of photos and label (yes/no)
    a. Supervised classification - binary classification
    b. # of neurons in output layer: 1, activation: sigmoid
    c. Loss function: Cross Entropy. $- y \; log2(yp) \; - (1-y) \; log2(1-yp)$

3. Given a photo of vegeable, we are predict which vegetable it is. There a total of 50 type of vegetables.
    a. Supervised - Classification - Multiclass
    b. # of neurons in output layer = 50,
    c. what will be activation of output layer: Soffmax
        1. e^x and then divide by the total sum.
    d. Loss Function: Cross Entropy
        $y1 \; log(yp1) + y2 \; log(yp2) + …. + y50 * log (yp50)$

3. A patient might have gone through radiation therapy as well as surgery. Give the document of the patient, predict whether document mentions radiation therapy, cancer surgery or both or neither.

We have
Documents -> Labels (RT, Sur)
    • A folder containing all the documents - 100,000
    • An excel sheet contain doc_file_name, RT, Sur (three columns)
a. Supervised
b. Classification, Multilabel - 2 labels
c. How many neurons in output layer? 2
d. Activation: Sigmoid
e. Loss = sum of the two cross entropies.

Two Models

Single model & two neurons in last layer

More compute resources

40, 000 +

20, 000 +

More data per weight ?

Given text, you want to create image.

You have the images from internet along with their descriptions / captions.

text — embed 1500 features —> model —> Image (18 x 18) - BW

a. Supervised.
b. Multilabel - 324 labels
c. Classification or Regression???
d. Multi Class - 255 class per pixel (old)
e. **Each pixel produce an intensity between 0 and 1 we multiply that with 255.
f. Multilabel regression.
ff. Activation: *sigmoid* / None
g. Loss - MSE

For color:
Label: 324 * 3
…

If the input is a sequence:
    • *RNN / LSTM etc (yet to be discussed)*
    • Convert the [1, 2, 3, 4] -> 5 - Moving Window
    • Window of last 15 days stock price -> next stock price

If you are given one column data of the stock price. From top to bottom the data is temporal.

Come up with window size - 15
Convert your data into 15 features using moving window.

a. Regression
b. # of neuron - 1
c. MSE /Huber Loss

What if we want to predict next 5 days stock predictions?
Option 1 - Have 5 output labels

Option 2 - Iteratively call model 5 days. Put output of prev step in the input for next step.

Stock Price: Option 1

LLMs: Option 2

Images:

CNN - coming soon

Audio

What is audio?

There are 44100 numbers in a second.

Given 10 seconds of the sound, predict which bird is it? There are 100 different birds.

How many features ?
441,000

    1. Classification
    2. Multiclass
    3. # of features: 441,000
    4. Find if someone has embedding model?
    5. Dimensionality Reduction: — Try different algo
    6. Sampling - every thousand number
    7. Moving window average. - Move the window by 100 and the widow size is 150.
    8. Superposition principle - Fourier transformation.
    9. MelSpectogram (A x B) -> Image

How to compose Audio?

10 seconds Music -> 3 minutes sound.

Downloaded all music from internet.

Previous 10 seconds (441000) -> 1 seconds. (44100)

Call it 3*60 -> 180 times

    1. Multi Label - regression / classification
    2. Frequencies -> frequencies
    3.