**Notes of Study on Dec 7, 2022 (Wed) - Dec 8, 2022 (Thu)**

Based on lecture notes of Stanford cs231n

Module 1: Neural Networks

[Linear classification: Support Vector Machine, Softmax](https://cs231n.github.io/linear-classify/)

parameteric approach, bias trick, hinge loss, cross-entropy loss, L2 regularization, web demo

And,

[**https://www.youtube.com/watch?v=h7iBpEHGVNc**](https://www.youtube.com/watch?v=h7iBpEHGVNc)

**Mapping function**

1. **Mapping the raw image pixels to class scores**

Classification by k-nn is memory and time consuming because it must compare the image with all the training data stored.

The first component of this approach is to define the score function that maps the pixel values of an image to confidence scores for each class.

The score function is defined as:

Where

For example:

From CIFAR-10, we have a training set of N = 50,000 images, each with D = 32 x 32 x 3 = 3072 pixels. And K = 10, since there are 10 distinct classes (dog, cat, car, etc).

1. A simple linear mapping function

Where

The training data is used to learn the parameters W,b, but once the learning is complete we can discard the entire training set and only keep the learned parameters.

A simple untuned linear classier:

テーブル が含まれている画像

自動的に生成された説明A common simplifying trick to representing the two parameters *W*,*b* as one.

**Chain rule**

**Backpropagation**

A simple example:

テキスト

中程度の精度で自動的に生成された説明

The computational graph, where

green = value computed forwards

red = gradient computed backwards

ダイアグラム

自動的に生成された説明

A complex case:

ダイアグラム が含まれている画像

自動的に生成された説明

Appendix

テキスト が含まれている画像

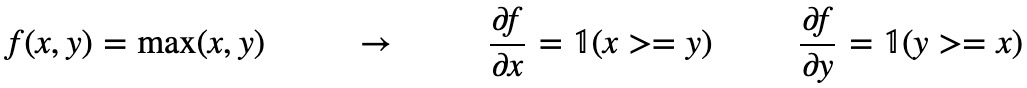
自動的に生成された説明

Its computational graph:

タイムライン

自動的に生成された説明

The last example, kinks:



Whose computational graph:

ダイアグラム

自動的に生成された説明

**Characteristics of single gate (conclusion)**

1. Add gate: distributes gradient equally to all of its inputs
2. Max gate: route the gradient to the max input
3. Multiply gate: follow the derivative formula. Check carefully

Next study:

[Neural Networks Part 1: Setting up the Architecture](https://cs231n.github.io/neural-networks-1/)

model of a biological neuron, activation functions, neural net architecture, representational power

As well as,

Assignment 1