



Surviving the Singularity

[Twitch.tv/1bit2far](https://www.twitch.tv/1bit2far)

Background Info

Youtube: @1bit2far

Github: github.com/krisciu/SurvivingtheSingularity

Course Resource: <https://d2l.ai>

Classification



One-Hot Encoding



Kitten

Robot



Steve

1




0

0

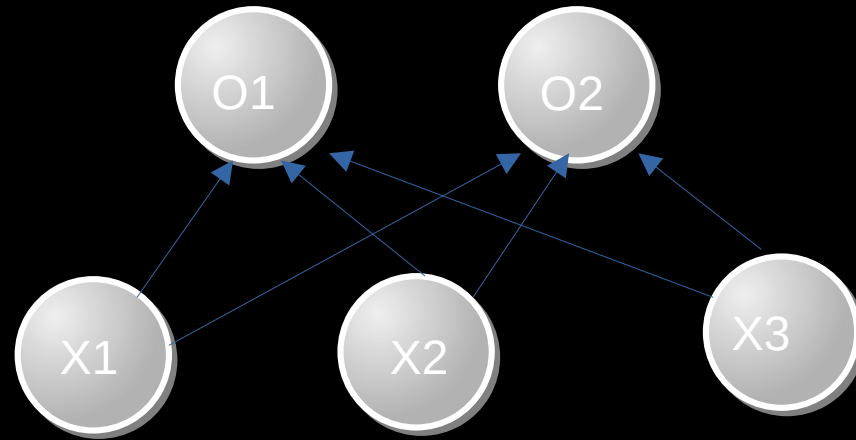
One-Hot Encoding

	Kitten	Robot	Steve
	1	0	0
	0	1	0

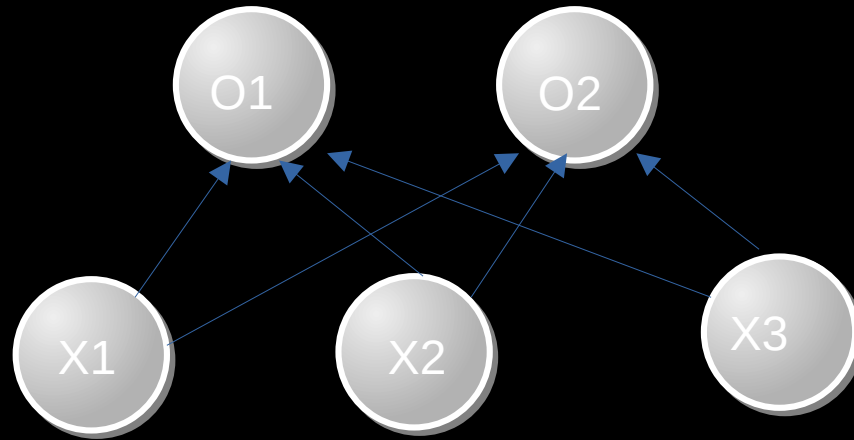
One-Hot Encoding

	Kitten	Robot	Steve
	1	0	0
	0	1	0
	0	0	1

Neural Network Model



Neural Network Model



$$O_1 = x_1 w_{11} + x_2 w_{12} + x_3 w_{13} + b_1$$

$$O_2 = x_1 w_{21} + x_2 w_{22} + x_3 w_{23} + b_2$$

Softmaxing

Problem: Want to calculate probability a given feature is a class, but we only have difficult-to-decipher output numbers



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$$f(x)_i = \frac{e^{x_i}}{\sum_{j=1}^K e^{x_j}}$$

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Forces the output to be greater than 0

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Softmaxing

Problem: Want to calculate probability a given feature is a class, but we only have difficult-to-decipher output numbers

Normalizes the output so it adds up to 1 by dividing by sum



Forces the output to be greater than 0

$$f(x)_i = \frac{e^{x_i}}{\sum_{j=1}^K e^{x_j}}$$

Cross-Entropy Loss

$$\textit{loss}(E, A) = - \sum_{j=1}^K A_j \log E_j$$

BEEG Data



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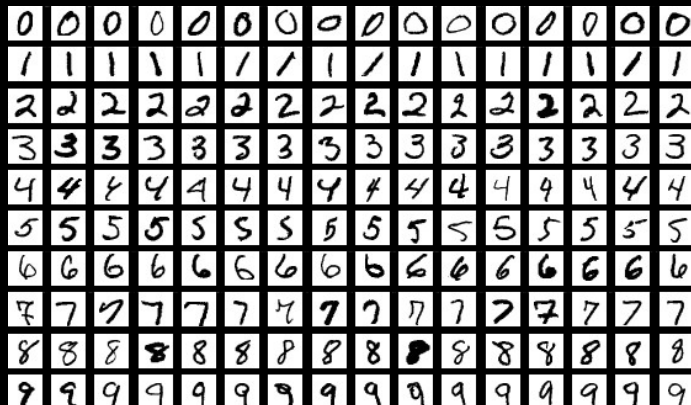
MNIST

Absolute Classic

Used as a sanity check today

Fashion-MNIST used fairly commonly today

60k training set – 10k testing set



BEEG Data

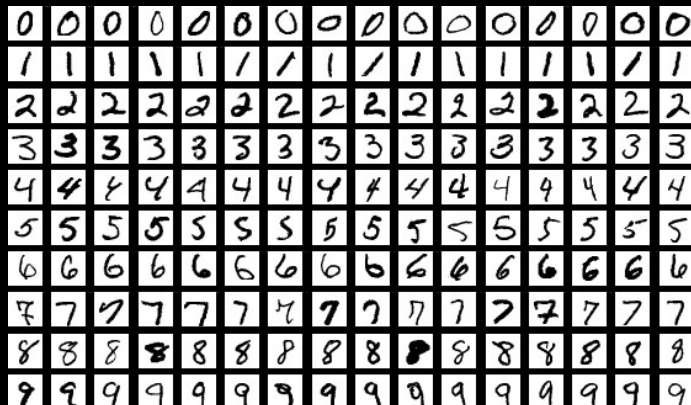
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IMAGENET

Modern Standard

> 14M images

Typically use subsets of 1.2M training 150k testing set



Softmax Regression Lab



Common Problems



Covariate Shift

This is a Fox!



Covariate Shift

This is a Fox!



Core labeling
function/model does
not change...

Covariate Shift

This is a Fox!



This is a Mutant!



Core labeling
function/model does
not change...

But input does!

Concept Shift

Definitions change
over time

This is a Cool dude!



Concept Shift

This is a Cool dude!



Lame Alert!



Definitions change
over time

Distributions are non-
stationary

Questions?