



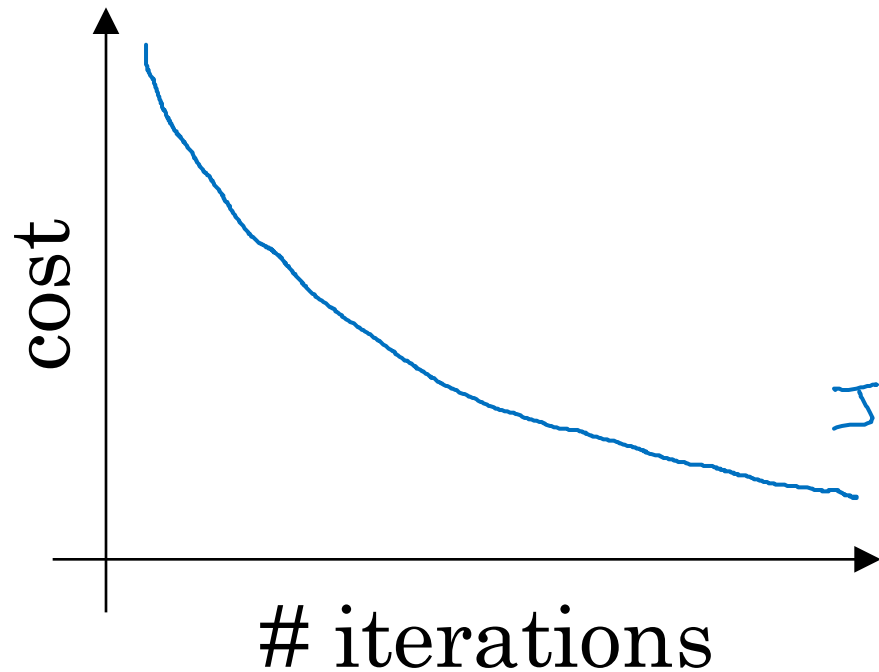
deeplearning.ai

Optimization Algorithms

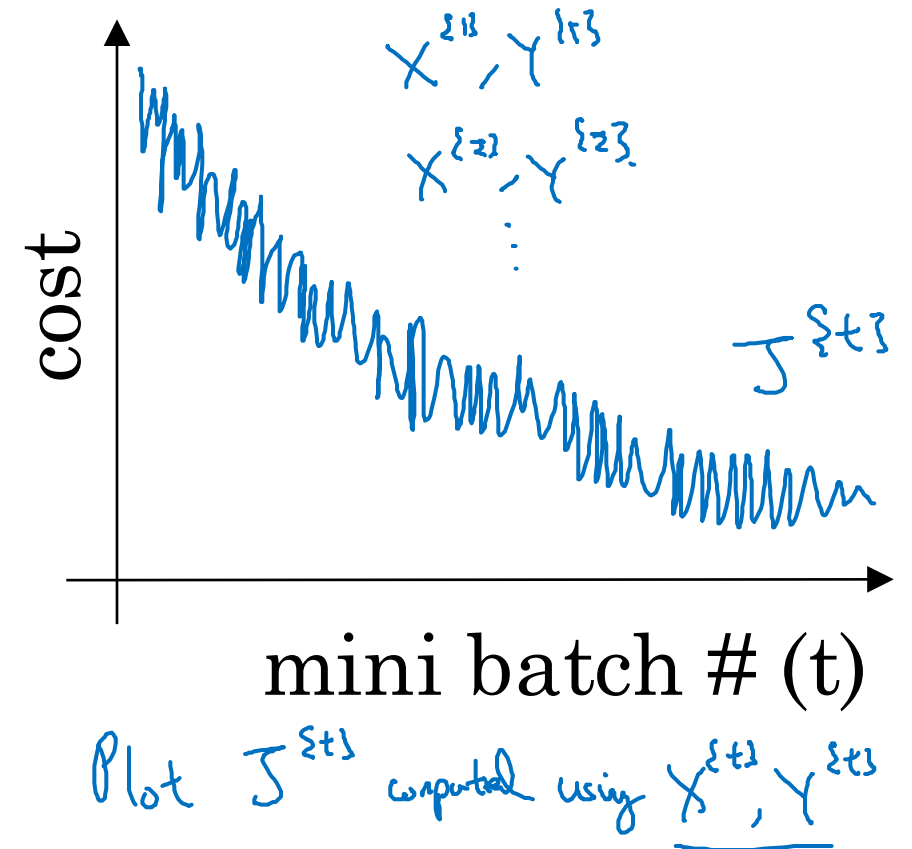
Understanding
mini-batch
gradient descent

Training with mini batch gradient descent

Batch gradient descent



Mini-batch gradient descent



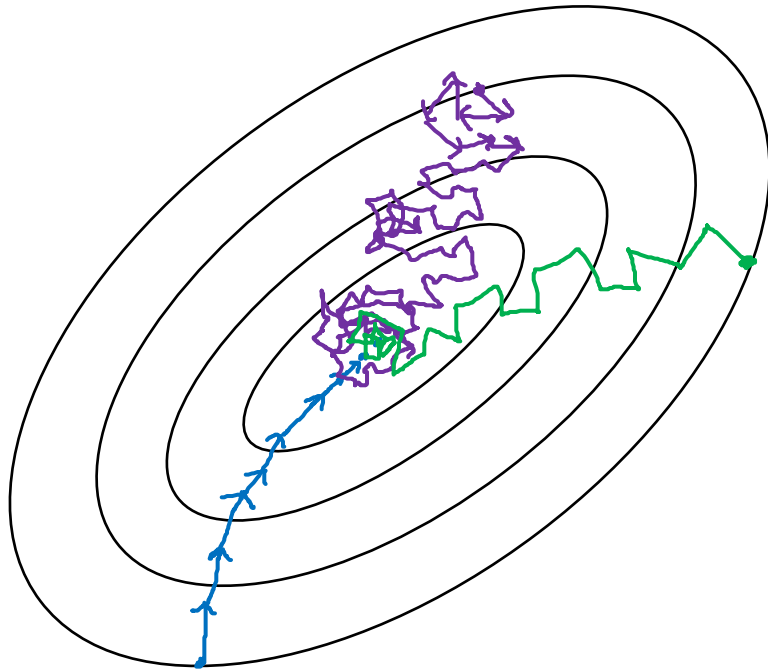
Choosing your mini-batch size

→ If mini-batch size = m : Batch gradient descent.

$$(X^{(13)}, Y^{(13)}) = (X, Y).$$

→ If mini-batch size = 1 : Stochastic gradient descent. Every example is its own mini-batch.
 $(X^{(13)}, Y^{(13)}) = (x^{(1)}, y^{(1)}) \dots (x^{(n)}, y^{(n)})$ mini-batch.

In practice: Somewhere in-between 1 and m



Stochastic
gradient
descent

↓
Loss spikes
from vectorization

In-between
(mini-batch size
not too big/small)

↓
Fastest learning.

- Vectorization.
($n=1000$)
- Make passes without
processing entire training set.

Batch
gradient descent
(mini-batch size = m)

↓
Too long
per iteration

Choosing your mini-batch size

If small toy set : Use batch gradient descent.
($m \leq 2000$)

Typical mini-batch sizes:

→ $64, 128, 256, 512$ $\frac{1024}{2^{10}}$
 $2^6 \quad 2^7 \quad 2^8 \quad 2^9$

Make sure mini-batch fit in CPU/GPU memory.
 $X^{(t)}, Y^{(t)}$