Optimization algorithms

Quiz, 10 questions

10/10 points (100%)

Congratulations! You passed!

Next Item

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points

1.
Which notation would you use to denote the 3rd layer's activations when the input is the 7th example from the 8th minibatch?

- $a^{[3]\{8\}(7)}$

Correct

- $a^{[8]\{7\}(3)}$
- $a^{[8]\{3\}(7)}$
- $a^{[3]\{7\}(8)}$

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points

2.
Which of these statements about mini-batch gradient descent do you agree with?

- You should implement mini-batch gradient descent without an explicit for-loop over different mini-batches, so that the algorithm processes all mini-batches at the same time (vectorization).
- One iteration of mini-batch gradient descent (computing on a single mini-batch) is faster than one iteration of batch gradient descent.

Correct

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- ○ Training one epoch (one pass through the training set) using mini-batch gradient descent is faster than training one epoch using batch gradient descent.

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1 / 1 points

3.

Why is the best mini-batch size usually not 1 and not m, but instead something in-between?

- ☐ If the mini-batch size is 1, you end up having to process the entire training set before making any progress.

Un-selected is correct

- ☐ If the mini-batch size is m, you end up with stochastic gradient descent, which is usually slower than mini-batch gradient descent.

Un-selected is correct

- ☐ If the mini-batch size is 1, you lose the benefits of vectorization across examples in the mini-batch.

Correct

- ☐ If the mini-batch size is m, you end up with batch gradient descent, which has to process the whole training set before making progress.

Correct

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1 / 1 points

4.

Suppose your learning algorithm's cost J

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, plotted as a function of the number of iterations, looks like this:

10/10 points (100%)

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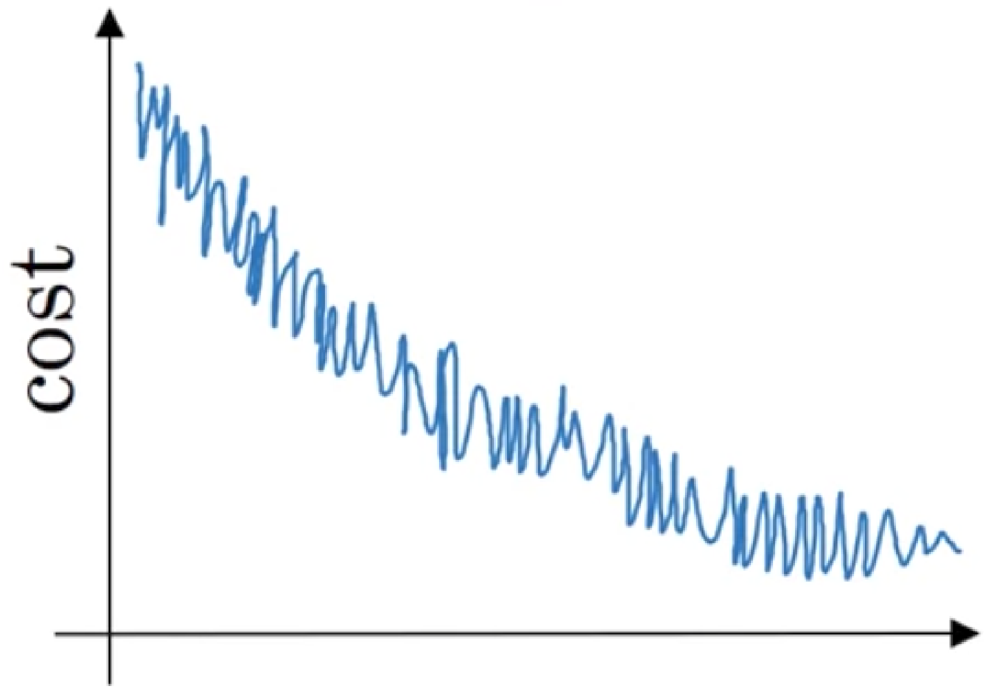

Which of the following do you agree with?

- If you're using mini-batch gradient descent, something is wrong. But if you're using batch gradient descent, this looks acceptable.
- If you're using mini-batch gradient descent, this looks acceptable. But if you're using batch gradient descent, something is wrong.

Correct

- Whether you're using batch gradient descent or mini-batch gradient descent, this looks acceptable.
- Whether you're using batch gradient descent or mini-batch gradient descent, something is wrong.

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points

5.

Suppose the temperature in Casablanca over the first three days of January are the same:

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Jan 1st: $\theta_1 = 10^oC$

Jan 2nd: $\theta_2 10^oC$

(We used Fahrenheit in lecture, so will use Celsius here in honor of the metric world.)

Say you use an exponentially weighted average with $\beta = 0.5$
to track the temperature: $v_0 = 0$
, $v_t = \beta v_{t-1} + (1-\beta)\theta_t$
. If v_2
is the value computed after day 2 without bias correction, and $v_2^{corrected}$
is the value you compute with bias correction. What are these values? (You might be able to do this without a calculator, but you don't actually need one. Remember what is bias correction doing.)

- $v_2 = 10$
, $v_2^{corrected} = 10$

- $v_2 = 7.5$
, $v_2^{corrected} = 7.5$

- $v_2 = 10$
, $v_2^{corrected} = 7.5$

- $v_2 = 7.5$
, $v_2^{corrected} = 10$

Correct

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points

6.

Which of these is NOT a good learning rate decay scheme? Here, t is the epoch number.

- $\alpha = 0.95^t \alpha_0$

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$\alpha = \frac{1}{\sqrt{t}}\alpha_0$

$\alpha = e^t\alpha_0$

Correct

$\alpha = \frac{1}{1+2*t}\alpha_0$

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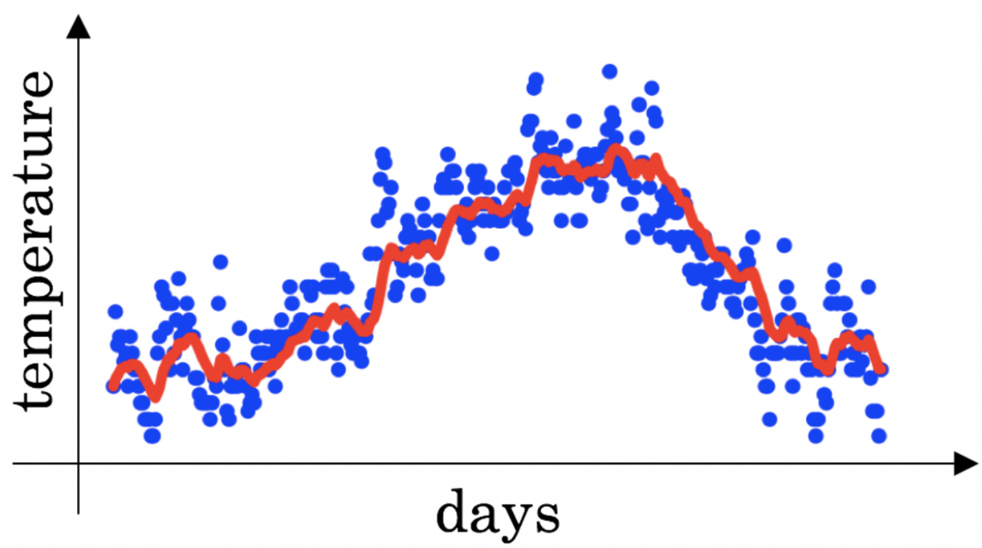
1 / 1 points

7.

You use an exponentially weighted average on the London temperature dataset. You use the following to track the temperature: $v_t = \beta v_{t-1} + (1 - \beta)\theta_t$
. The red line below was computed using $\beta = 0.9$
. What would happen to your red curve as you vary β
? (Check the two that apply)



Decreasing β
will shift the red line slightly to the right.

Un-selected is correct

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- [ ] Increasing β
will shift the red line slightly to the right.

Correct
True, remember that the red line corresponds to $\beta = 0.9$
. In lecture we had a green line $$\beta = 0.98) that is slightly shifted to the right.

- [ ] Decreasing β
will create more oscillation within the red line.

Correct
True, remember that the red line corresponds to $\beta = 0.9$
. In lecture we had a yellow line $$\beta = 0.98 that had a lot of oscillations.

- [ ] Increasing β
will create more oscillations within the red line.

Un-selected is correct

---

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points

8.

Consider this figure:

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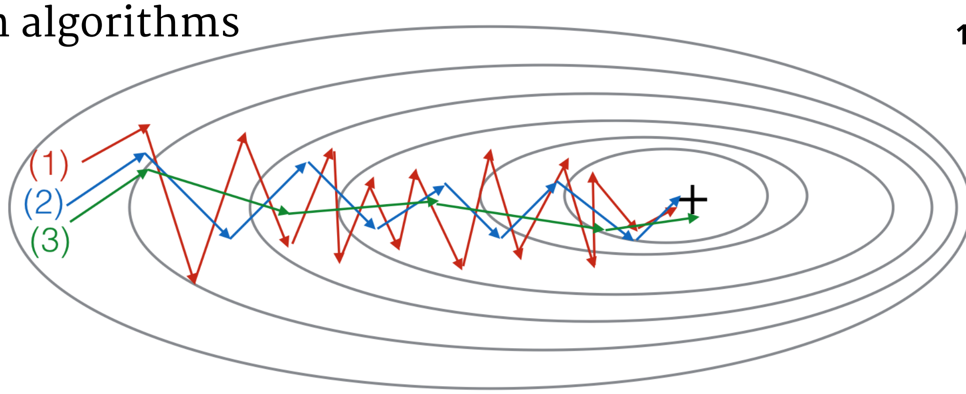

These plots were generated with gradient descent; with gradient descent with momentum (β *[Math Processing Error]* = 0.5) and gradient descent with momentum (β = 0.9). Which curve corresponds to which algorithm?

- (1) is gradient descent. (2) is gradient descent with momentum (small β). (3) is gradient descent with momentum (large β)

Correct

- (1) is gradient descent. (2) is gradient descent with momentum (large β) . (3) is gradient descent with momentum (small β)
- (1) is gradient descent with momentum (small β). (2) is gradient descent. (3) is gradient descent with momentum (large β)
- (1) is gradient descent with momentum (small β), (2) is gradient descent with momentum (small β), (3) is gradient descent

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points

9.

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Suppose batch gradient descent in a deep network is taking excessively long to find a value of the parameters that achieves a small value for the cost function $\mathcal{J}(W^{[1]}, b^{[1]}, \ldots, W^{[L]}, b^{[L]})$. Which of the following techniques could help find parameter values that attain a small value for $\mathcal{J}$? (Check all that apply)

- [ ] Try mini-batch gradient descent

Correct

- [ ] Try tuning the learning rate α

Correct

- [ ] Try using Adam

Correct

- [ ] Try initializing all the weights to zero

Un-selected is correct

- [ ] Try better random initialization for the weights

Correct

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1 / 1 points

10.

Which of the following statements about Adam is False?

- ( ) Adam combines the advantages of RMSProp and momentum
- ( ) The learning rate hyperparameter α