Feedback — XVIII. Application: Photo OCR

You submitted this quiz on **Thu 20 Jun 2013 12:57 PM PDT (UTC -0700)**. You got a score of **5.00** out of **5.00**.

Question 1

Suppose you are running a sliding window detector to find text in images. Your input images are 1000x1000 pixels. You will run your sliding windows detector at two scales, 10x10 and 20x20 (i.e., you will run your classifier on lots of 10x10 patches to decide if they contain text or not; and also on lots of 20x20 patches), and you will "step" your detector by 2 pixels each time. About how many times will you end up running your classifier on a single 1000x1000 test set image?

Your Answer		Score	Explanation
500,000	✔	1.00	With a stride of 2, you will run your classifier approximately 500 times for each dimension. Since you run the classifier twice (at two scales), you will run it 2 * 500 * 500 = 500,000 times.
100,000			
250,000			
1,000,000			
Total		1.00 / 1.00	

Question 2

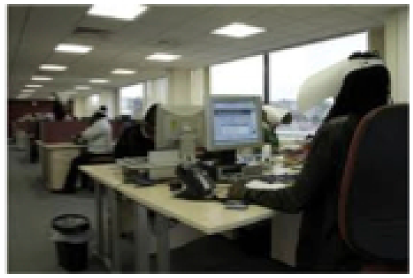
Suppose that you just joined a product team that has been developing a machine learning application, using $m = 1,000$ training examples. You discover that you have the option of hiring additional personnel to help collect and label data. You estimate that you would have to pay each of the labellers $10 per hour, and that each labeller can label 4 examples per minute. About how much will it cost to hire labellers to label 10,000 new training examples?

Your Answer		Score	Explanation
$400	✔	1.00	On labeller can label $4 \times 60 = 240$ examples in one hour. It will thus take him $10,000/240 \approx 40$ hours to complete 10,000 examples. At $10 an hour, this is $400.
$250			
$10,000			
$600			
Total		1.00 / 1.00	

Question 3

Suppose you are building an object classifier, that takes as input an image, and recognizes that image as either containing a car ($y = 1$) or not ($y = 0$). For example, here are a positive example and a negative example:

Positive example ($y = 1$)



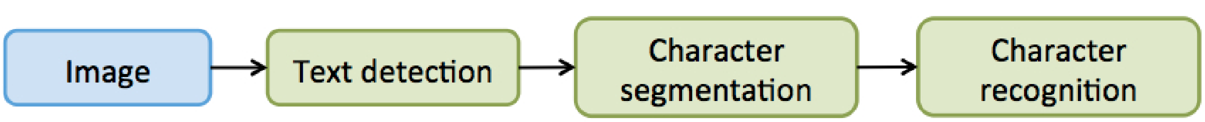
Negative example ($y = 0$)

After carefully analyzing the performance of your algorithm, you conclude that you need more positive ($y = 1$) training examples. Which of the following might be a good way to get additional positive examples?

Your Answer		Score	Explanation
Take a few images from your training set, and add random, gaussian noise to every pixel.			
Select two car images and average them to make a third example.			
Apply translations, distortions, and rotations to the images already in your training set.	✔	1.00	These geometric distortions are likely to occur in real-world images, so they are a good way to generate additional data.
Take a training example and set a random subset of its pixel to 0 to generate a new example.			
Total		1.00 / 1.00	

Question 4

Suppose you have a PhotoOCR system, where you have the following pipeline:



You have decided to perform a ceiling analysis on this system, and find the following:

Component	Accuracy
Overall System	70%
Text Detection	72%
Character Segmentation	82%
Character Recognition	100%

Which of the following statements are true?

Your Answer		Score	Explanation
☐ We should dedicate significant effort to collecting additional training data for the text detection system.	✔	0.25	A perfect text detection system improves overall performance by only 2%, so collecting additional data for that system is not a good investment of time.
☑ The potential benefit to having a significantly improved text detection system is small, and thus it may not be worth significant effort trying to improve it.	✔	0.25	Plugging in ground truth text detection improved the overall system by only 2%, so it is not a good candidate for development effort.
☐ The least promising component to work on is the character recognition system, since it is already obtaining 100% accuracy.	✔	0.25	The character recognition component is the most promising, as ground truth character recognition improves performance by 18% over feeding the current character recognition system ground truth character segmentation.
☑ If the text detection system was trained using gradient descent, running gradient descent for more iterations is unlikely to help much.	✔	0.25	Plugging in ground truth text detection improved the overall system by only 2%, so even if you could improve text detection performance with more gradient descent iterations, this would have minimal impact on the overall system performance.
Total		1.00 / 1.00	

Question 5

What are the benefits of performing a ceiling analysis? Check all that apply.

Your Answer		Score	Explanation
☐ If we have a low-performing component, the ceiling analysis can tell us if that component has a high bias problem or a high variance problem.	✔	0.25	We need to plot a learning curve to distinguish bias and variance problems.
☑ It gives us information about which components, if improved, are most likely to have a significant impact on the performance of the final system.	✔	0.25	The ceiling analysis gives us this information by comparing the baseline overall system performance with ground truth results from each component of the pipeline.
☑ It helps us decide on allocation of resources in terms of which component in a machine learning pipeline to spend more effort on.	✔	0.25	The ceiling analysis reveals which parts of the pipeline have the most room to improve the performance of the overall system.
☐ It is a way of providing additional training data to the algorithm.	✔	0.25	Ceiling analysis works with the data already present.
Total		1.00 / 1.00	