

Feedback — XVIII. Application: Photo OCR

[Help](#)

You submitted this quiz on **Mon 26 May 2014 10:35 AM IST**. 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 |
|--|-------------|---|
| <input checked="" type="radio"/> 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. |
| <input type="radio"/> 1,000,000 | | |
| <input type="radio"/> 100,000 | | |
| <input type="radio"/> 250,000 | | |
| 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 |
|-------------|-------|-------------|
|-------------|-------|-------------|

| | | |
|--|--------|--|
| <input checked="" type="radio"/> \$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. |
|--|--------|--|

| | | |
|--------------------------------|--|--|
| <input type="radio"/> \$10,000 | | |
|--------------------------------|--|--|

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| <input type="radio"/> \$250 | | |
|-----------------------------|--|--|

| | | |
|-----------------------------|--|--|
| <input type="radio"/> \$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 training example and set a random subset of its pixel to 0 to generate a new example.

☐ Select two car images and average them to make a third example.

☐ Take a few images from your training set, and add random, gaussian noise to every pixel.

☒ Mirror your training images across the vertical axis (so that a left-facing car now becomes a right-facing one).



1.00

A mirrored example is different from the original but equally likely to occur, so mirroring is a good way to generate new data.

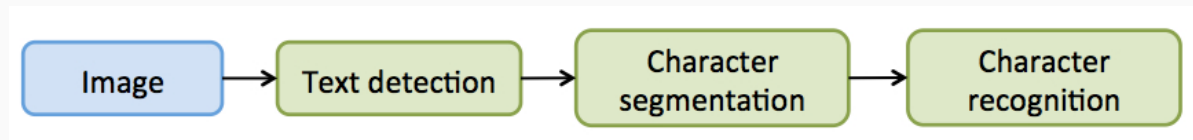
Total

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**

☒ If we conclude that the character recognition's errors



0.25

Since the biggest improvement comes from character recognition ground truth, we would like to improve the performance of that system. It the character recognition

are mostly due to the character recognition system having high variance, then it may be worth significant effort obtaining additional training data for character recognition.

system has high variance, additional data will improve its performance.

☐ The most promising component to work on is the text detection system, since it has the lowest performance (72%) and thus the biggest potential gain.

✓ 0.25

Text detection is the least promising component, as ground truth text detection improves overall system performance by only 2% over the baseline.

☒ 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.

☐ 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.

Total

1.00 /
1.00

Question 5

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

| Your Answer | Score | Explanation |
|---|---|--|
| <input type="checkbox"/> 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. |
| <input type="checkbox"/> It is a way of providing additional training data to the algorithm. |  0.25 | Ceiling analysis works with the data already present. |
| <input checked="" type="checkbox"/> 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. |
| <input checked="" type="checkbox"/> 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. |
| Total | 1.00 / 1.00 | |