

1 Machine Learning Application: Photo OCR

Question 1.

Suppose you are running a sliding window detector to find text in images. Your input images are 1000×1000 pixels. You will run your sliding windows detector at two scales, 10×10 and 20×20 (i.e., you will run your classifier on lots of 10×10 patches to decide if they contain text or not; and also on lots of 20×20 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 1000×1000 test set image?

CORRECT 500,000

250,000

1,000,000

100,000

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?

\$10,000

\$250

\$600

CORRECT \$400

Question 3.

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

CORRECT It can help indicate that certain components of a system might not be worth a significant amount of work improving, because even if it had perfect performance its impact on the overall system may be small.

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.

CORRECT It helps us decide on allocation of resources in terms of which component in a machine learning pipeline to spend more effort on.

It is a way of providing additional training data to the algorithm.

Question 4.

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:

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?

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

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

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.

Question 5.

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:

Which of the following statements are true?

SELECTED There is a large gain in performance possible in improving the character recognition system.

Performing the ceiling analysis shown here requires that we have ground-truth labels for the text detection, character segmentation and the character recognition systems.

WRONG The least promising component to work on is the character recognition system, since it is already obtaining 100% accuracy. *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.*

SELECTED 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.