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### Exam Professional Machine Learning Engineer All Questions

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## EXAM PROFESSIONAL MACHINE LEARNING ENGINEER TOPIC 1 QUESTION 122 DISCUSSI...

Actual exam question from Google's Professional Machine Learning Engineer

Question #: 122

Topic #: 1

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You recently built the first version of an image segmentation model for a self-driving car. After deploying the model, you observe a decrease in the area under the curve (AUC) metric. When analyzing the video recordings, you also discover that the model fails in highly congested traffic but works as expected when there is less traffic. What is the most likely reason for this result?

- A. The model is overfitting in areas with less traffic and underfitting in areas with more traffic.
- B. AUC is not the correct metric to evaluate this classification model.
- C. Too much data representing congested areas was used for model training.
- D. Gradients become small and vanish while backpropagating from the output to input nodes.

Show Suggested Answer

by [mil\\_spyro](#) at Dec. 13, 2022, 2:21 p.m.

### Comments

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[hybridpro](#) 1 month ago

**Selected Answer: B**

AOC makes sense in a binary classification problem, but that's not the case here. That is the biggest red flag right there in the question.

   upvoted 1 times

  **fitri001** 6 months ago

**Selected Answer: A**

Overfitting and Underfitting: Overfitting describes a model that performs well on the training data but struggles with unseen data. Underfitting signifies a model that hasn't learned enough patterns from the training data.

Congested Traffic as Unseen Data: If the training data primarily consisted of scenarios with less traffic, the model might not have been exposed to enough examples of congested situations. This would make congested traffic act like unseen data, leading to underfitting and poor performance.

   upvoted 3 times

  **andresvelasco** 1 year, 1 month ago

**Selected Answer: B**

very tricky, here is my view:

- A. The model is overfitting in areas with less traffic and underfitting in areas with more traffic. Most Voted  
> I dont think so because: "the model fails in highly congested traffic but works as expected when there is less traffic" which means it is NOT OVERFITTING with less traffic. Actually the contrary would make more sense.
- B. AUC is not the correct metric to evaluate this classification model.  
> My option. Image Segmentation is about ditinguishing objects, not sure AUC is right for this.
- C. Too much data representing congested areas was used for model training.  
> Cant be. THat would actually make it perform at least as good.
- D. Gradients become small and vanish while backpropagating from the output to input nodes.  
> No clue.

   upvoted 2 times

  **tavva\_prudhvi** 11 months, 2 weeks ago

Overfitting occurs when a model learns the details and noise in the training data to the extent that it negatively impacts the performance of the model on new data. If your training data included more examples of less congested areas, the model might have overfitted to these scenarios and, as a result, performs poorly in unrepresented or underrepresented situations, such as heavy traffic.

AUC (Area Under the Curve) is a widely used metric for evaluating the performance of classification models. However, it might not be the sole or most appropriate metric for a complex task like image segmentation in self-driving cars. Other metrics like Intersection over Union (IoU) or pixel accuracy might be more relevant for evaluating segmentation tasks. Still, this doesn't explain the model's performance drop in different traffic conditions.

   upvoted 2 times

  **PST21** 1 year, 3 months ago

**Selected Answer: D**

D. Gradients become small and vanish while backpropagating from the output to input nodes.




This issue is known as the vanishing gradient problem, which can occur during the training of deep neural networks. In highly congested traffic scenes, there might be complex patterns and details that the image segmentation model needs to capture. However, if the model architecture is too deep and the gradients become very small during backpropagation, the model may struggle to update its weights effectively to learn these complex patterns. As a result, the model may fail to correctly segment objects in congested traffic scenes, leading to a decrease in performance.

Vanishing gradients can prevent the model from effectively learning representations and features in the deeper layers of the network. It's possible that the model is working fine in less congested areas because the patterns are simpler and easier to learn, allowing the gradients to propagate more effectively.

   upvoted 2 times

  **maukaba** 1 year ago

There's a paper saying that: <https://www.sciencedirect.com/science/article/abs/pii/S0925231218313821>

   upvoted 1 times

  **andresvelasco** 1 year, 1 month ago

mmm, possibly

   upvoted 1 times

  **andresvelasco** 1 year, 1 month ago

dont think so because: "the model fails in highly congested traffic but works as expected when there is less traffic" which means it is NOT OVERFITTING with less traffic. Actually the contrary would make more sense.


   upvoted 1 times

  **M25** 1 year, 5 months ago

**Selected Answer: A**

Went with A

   upvoted 1 times

  **Antmal** 1 year, 6 months ago

**Selected Answer: A**

The most likely reason for this result is the model is overfitting in areas with less traffic and underfitting in areas with more traffic.



Probably because the model was trained on a dataset that did not have enough examples of congested traffic. As a result, the model is not able to generalise well. When the model is validated on congested traffic, it makes mistakes because it has not seen this type of data before.

   upvoted 1 times

  **andresvelasco** 1 year, 1 month ago

dont think so because: "the model fails in highly congested traffic but works as expected when there is less traffic" which means it is NOT OVERFITTING with less traffic. Actually the contrary would make more sense.

   upvoted 1 times

  **TNT87** 1 year, 7 months ago

**Selected Answer: A**

Answer A

   upvoted 1 times

  **andresvelasco** 1 year, 1 month ago

dont think so because: "the model fails in highly congested traffic but works as expected when there is less traffic" which means it is NOT OVERFITTING with less traffic. Actually the contrary would make more sense.



   upvoted 2 times

  **enghabeth** 1 year, 8 months ago

**Selected Answer: A**

the model was trained with bias




   upvoted 1 times

  **hiromi** 1 year, 10 months ago

**Selected Answer: A**

A

It's an example of overfitting/underfitting problem

   upvoted 3 times

  **mil\_spyro** 1 year, 10 months ago

**Selected Answer: A**

I vote A, it is likely that the model was trained on data that included mostly images of less congested traffic, and therefore did not generalize well to images of more congested traffic.

   upvoted 4 times

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