EXAM PROFESSIONAL MACHINE LEARNING ENGINEER TOPIC 1 QUESTION 10 DISCUSSIO..

Actual exam question from Google's Professional Machine Learning Engineer
Question #: 10
Topic #: 1
[All Professional Machine Learning Engineer Questions]

Your team needs to build a model that predicts whether images contain a driver's license, passport, or credit card. The data engineering team already built the pipeline and generated a dataset composed of 10,000 images with driver's licenses, 1,000 images with passports, and 1,000 images with credit cards. You now have to train a model with the following label map: [`˜drivers_license', `˜passport', `˜credit_card']. Which loss function should you use?

A. Categorical hinge

B. Binary cross-entropy

C. Categorical cross-entropy

D. Sparse categorical cross-entropy

Show Suggested Answer

by gcp2021go at *June 7, 2021, 6:11 p.m.*

Comments

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ransev Highly Voted 3 years, 4 months ago

Answer is C

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gcp2021go 3 years, 3 months ago

Use sparse categorical crossentropy when your classes are mutually exclusive (e.g. when each sample belongs exactly to one class) and categorical crossentropy when one sample can have multiple classes or labels are soft probabilities (like [0.5, 0.3, 0.2]).

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GogoG 3 years ago

Definitely C - the target variable label formulated in the question requires a categorical cross entropy loss function i.e. 3 columns 'drivers_license' , 'passport', 'credit_card' that can take values 1, 0. Meanwhile sparse categorical cross entropy would require the labels to be integer encoded in a single vector, for example, 'drivers_license' = 1, 'passport' = 2, 'credit_card' = 3.

upvoted 8 times

Jarek7 1 year, 3 months ago

Actually it is exactly the opposite. Your label map has 3 options which are mutually exclusive. A document cannot be both - a driver license and a passport. There is a SPARSE vector as output - only one of the categorical outputs is valid for a one example.

upvoted 1 times

Jarek7 1 year, 3 months ago

No, I'm sorry, I wrote it before checking - You were right. We use sparse categorical cross entropy when we have just an index (integer) as a label. The only difference is that it decodes the integer into one hot representation that suites to out DNN output.

upvoted 1 times

gcp2021go Highly Voted 3 years, 4 months ago

answer is D
https://machinelearningmastery.com/how-to-choose-loss-functions-when-training-deep-learning-neural-networks/

upvoted 10 times

ori5225 3 years, 2 months ago

Use sparse categorical crossentropy when your classes are mutually exclusive (e.g. when each sample belongs exactly to one class) and categorical crossentropy when one sample can have multiple classes or labels are soft probabilities (like [0.5, 0.3, 0.2]).

upvoted 3 times

giaZ 2 years, 6 months ago

Literally from the link you posted:
"A possible cause of frustration when using cross-entropy with classification problems with a large number of labels is the one hot encoding process. [...] This can mean that the target element of each training example may require a one hot encoded vector with tens or hundreds of thousands of zero values, requiring significant memory. Sparse cross-entropy addresses this by performing the same cross-entropy calculation of error, without requiring that the target variable be one hot encoded prior to training".
Here we have 3 categories...No problem doing one-hot encoding. Answer: C

upvoted 2 times

jkkim_jt Most Recent 3 days, 5 hours ago

Selected Answer: D

 Categorial Cross-Entropy for the multiple classification with one-hot-encoding labels
 Sparse Categorical Cross-Entropy for the multiple classification with index labels

upvoted 1 times

Prakzz 3 months, 3 weeks ago

Selected Answer: D

C needs the target to be One hot encoded already. Since it is not, the answer is D

upvoted 1 times

PhilipKoku 4 months, 2 weeks ago

Selected Answer: C

C) Multi-Class Classification (Three or More Classes):
Since you have three classes, you should use a multi-class loss function.
The most common choice for multi-class image classification is categorical cross-entropy2.
Categorical cross-entropy is designed for scenarios where each input belongs to exactly one class (i.e., mutually exclusive classes).
Therefore, the correct answer is C. Categorical cross-entropy. It's well-suited for multi-class classification tasks like this one.

References:
How to Choose Loss Functions When Training Deep Learning Neural Networks (https://machinelearningmastery.com/how-to-choose-loss-functions-when-training-deep-learning-neural-networks/)
Stack Exchange: How to know which loss function is suitable for image classification? (https://datascience.stackexchange.com/questions/58138/how-to-know-which-loss-function-is-suitable-for-image-classification)

upvoted 1 times

gscharly 6 months ago

Selected Answer: C

I'd go with C. Categorical cross entropy is used when classes are mutually exclusive. If the number of classes was very high, then we could use sparse categorical cross entropy.

upvoted 1 times

pinimichele01 6 months, 1 week ago

Selected Answer: D

Use sparse categorical crossentropy when your classes are mutually exclusive (e.g. when each sample belongs exactly to one class) and categorical crossentropy when one sample can have multiple classes or labels are soft probabilities (like [0.5, 0.3, 0.2]).

upvoted 2 times

pinimichele01 6 months ago

A. Categorical hinge : Mainly for SVM soft margins
B. Binary cross-entropy : for 2 class only
C. Categorical cross-entropy: Multi class but not necessarily Mutually exclusive
D. Sparse categorical cross-entropy : Multi class + Mutually exclusive only , saves memory too

upvoted 2 times

pinimichele01 6 months ago

https://www.tensorflow.org/api_docs/python/tf/keras/losses/categorical_crossentropy
https://www.tensorflow.org/api_docs/python/tf/keras/metrics/sparse_categorical_crossentropy

upvoted 1 times

Yan_X 6 months, 3 weeks ago

Selected Answer: C

C
D is for integer value instead of one-hot encoded vectors, in our question, it is 'drivers_license', 'passport', 'credit_card' one-hot.

upvoted 1 times

Paulus89 7 months, 3 weeks ago

Selected Answer: C

It depends on how the labels are encoded. If onehot use CCE. If its a single integer representing the class use SCCE
(Source: same as in the official (wrong) answer)
From the question it's not clear how the labels are encoded. But for just 3 classes there is no doubt it's better to go with one-hot encoding. Memory restrictions or a huge number of classes might point to SCCE

upvoted 1 times

Zwi3b3l 9 months ago

Selected Answer: D

You now HAVE TO to train a model with the following label map: [`~drivers_license', `~passport', `~credit_card'].

upvoted 2 times

Sum_Sum 11 months, 1 week ago

Selected Answer: C

If you are wondering between C & D - think about what "sparse" means
It is used when dealing with hundreds of categories

upvoted 1 times

Sahana_98 11 months, 4 weeks ago

Selected Answer: D

mutually exclusive classes

upvoted 1 times

syedsajjad 1 year ago

In this case, we have a multi-class classification problem with three classes: driver's license, passport, and credit card. Therefore, we should use the categorical cross-entropy loss function to train our model.

Sparse categorical cross-entropy is used for multi-class classification problems where the labels are represented in a sparse

matrix format. This is not the case in this problem.

upvoted 2 times

lalala_meow 1 year ago

Selected Answer: C

Only 3 categories of values being either T or F. They don't really need to be integer encoded, which differs sparse cross-entropy from categorical.

upvoted 1 times

Dan137 1 year, 1 month ago

Selected Answer: D

https://fmorenovr.medium.com/sparse-categorical-cross-entropy-vs-categorical-cross-entropy-ea01d0392d28

upvoted 1 times

Dan137 1 year, 1 month ago

categorical_crossentropy (cce) produces a one-hot array containing the probable match for each category,

sparse_categorical_crossentropy (scce) produces a category index of the most likely matching category.

upvoted 1 times

Venish 1 year, 2 months ago

The correct answer is: C. Categorical cross-entropy.

you are dealing with a multi-class classification problem where each image can belong to one of three classes: "driver's license," "passport," or "credit card." Categorical cross-entropy is the appropriate loss function for multi-class classification tasks. It measures the dissimilarity between the predicted class probabilities and the true class labels. It's designed to penalize larger errors in predicted probabilities and help the model converge towards more accurate predictions.

upvoted 1 times

harithacML 1 year, 3 months ago

Req : Multi class + mutually exclusive labels
A. Categorical hinge : Mainly for SVM soft margins
B. Binary cross-entropy : for 2 class only
C. Categorical cross-entropy: Multi class but not necessarily Mutually exclusive
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