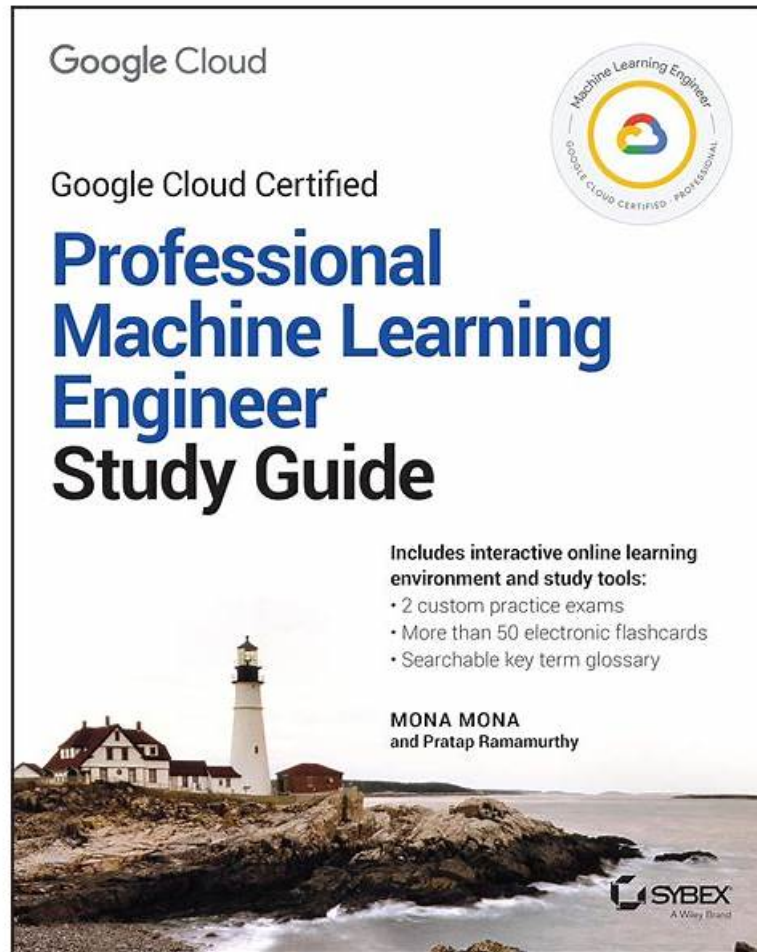


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Google Professional Machine Learning Engineer is a certification exam offered by Google Cloud. It is designed to test the skills and knowledge required to design, build, and deploy machine learning models on Google Cloud Platform. Professional-Machine-Learning-Engineer Exam is intended for individuals who have experience in machine learning and wish to demonstrate their proficiency in designing and implementing machine learning models using Google Cloud technologies.

Understanding functional and technical aspects of Professional Machine Learning Engineer - Google ML Solution Architecture

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- Logging/management
- Choose appropriate Google Cloud software components
- Monitoring

- Feature engineering
- SDLC best practices
- Data connections
- Automation
- Exploration/analysis
- Design architecture that complies with regulatory and security concerns
- Serving
- Choose appropriate Google Cloud hardware components
- Optimizing data use and storage
- Design reliable, scalable, highly available ML solution
- Identifying potential regulatory issues
- A variety of component types - data collection; data management

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Google Professional Machine Learning Engineer Exam is a certification exam designed to validate an individual's expertise in machine learning engineering. Professional-Machine-Learning-Engineer exam aims to assess the candidate's ability to create and deploy highly scalable, robust, and maintainable machine learning models using Google Cloud Platform technologies. Professional-Machine-Learning-Engineer Exam also tests the candidate's proficiency in designing and implementing machine learning architectures, solving business problems using machine learning, and optimizing machine learning workflows.

Google Professional Machine Learning Engineer Sample Questions (Q74-Q79):

NEW QUESTION # 74

You are going to train a DNN regression model with Keras APIs using this code:

How many trainable weights does your model have? (The arithmetic below is correct.)

- A. $501 * 256 + 257 * 128 + 128 * 2 = 161408$
- B. $500 * 256 * 0.25 + 256 * 128 * 0.25 + 128 * 2 = 40448$
- **C. $500 * 256 + 256 * 128 + 128 * 2 = 161024$**
- D. $501 * 256 + 257 * 128 + 2 = 161154$

Answer: C

Explanation:

The number of trainable weights in a DNN regression model with Keras APIs can be calculated by multiplying the number of input units by the number of output units for each layer, and adding the number of bias units for each layer. The bias units are usually equal to the number of output units, except for the last layer, which does not have bias units if the activation function is softmax 1 . In this code, the model has three layers: a dense layer with 256 units and relu activation, a dropout layer with 0.25 rate, and a dense layer with

2 units and softmax activation. The input shape is 500. Therefore, the number of trainable weights is:

* For the first layer: $500 \text{ input units} * 256 \text{ output units} + 256 \text{ bias units} = 128256$

* For the second layer: The dropout layer does not have any trainable weights, as it only randomly sets some of the input units to zero to prevent overfitting 2 .

* For the third layer: $256 \text{ input units} * 2 \text{ output units} + 0 \text{ bias units} = 512$ The total number of trainable weights is $128256 + 512 = 161024$. Therefore, the correct answer is B.

References:

How to calculate the number of parameters for a Convolutional Neural Network?
Dropout (keras.io)

NEW QUESTION # 75

You are training an object detection model using a Cloud TPU v2. Training time is taking longer than expected. Based on this simplified trace obtained with a Cloud TPU profile, what action should you take to decrease training time in a cost-efficient way?

- A. Move from Cloud TPU v2 to Cloud TPU v3 and increase batch size.
- B. Move from Cloud TPU v2 to 8 NVIDIA V100 GPUs and increase batch size.
- C. Rewrite your input function to resize and reshape the input images.
- D. Rewrite your input function using parallel reads, parallel processing, and prefetch.

Answer: D

Explanation:

The trace in the question shows that the training time is taking longer than expected. This is likely due to the input function not being optimized. To decrease training time in a cost-efficient way, the best option is to rewrite the input function using parallel reads, parallel processing, and prefetch. This will allow the model to process the data more efficiently and decrease training time.

Reference:

[Cloud TPU Performance Guide]

[Data input pipeline performance guide]

NEW QUESTION # 76

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: ['driverslicense', 'passport', 'credit_card']. Which loss function should you use?

- A. Sparse categorical cross-entropy
- B. Categorical hinge
- C. Categorical cross-entropy
- D. Binary cross-entropy

Answer: C

Explanation:

Categorical cross-entropy is a loss function that is suitable for multi-class classification problems, where the target variable has more than two possible values. Categorical cross-entropy measures the difference between the true probability distribution of the target classes and the predicted probability distribution of the model. It is defined as:

$$L = - \sum(y_i * \log(p_i))$$

where y_i is the true probability of class i , and p_i is the predicted probability of class i . Categorical cross-entropy penalizes the model for making incorrect predictions, and encourages the model to assign high probabilities to the correct classes and low probabilities to the incorrect classes.

For the use case of building a model that predicts whether images contain a driver's license, passport, or credit card, categorical cross-entropy is the appropriate loss function to use. This is because the problem is a multi-class classification problem, where the target variable has three possible values: ['drivers_license', 'passport', 'credit_card']. The label map is a list that maps the class names to the class indices, such that 'drivers_license' corresponds to index 0, 'passport' corresponds to index 1, and 'credit_card' corresponds to index 2. The model should output a probability distribution over the three classes for each image, and the categorical cross-entropy loss function should compare the output with the true labels. Therefore, categorical cross-entropy is the best loss function for this use case.

NEW QUESTION # 77

You work at a bank. You have a custom tabular ML model that was provided by the bank's vendor. The training data is not available due to its sensitivity. The model is packaged as a Vertex AI Model serving container which accepts a string as input for each prediction instance. In each string the feature values are separated by commas. You want to deploy this model to production for online predictions, and monitor the feature distribution over time with minimal effort. What should you do?

- A. 1 Refactor the serving container to accept key-value pairs as input format.
2. Upload the model to Vertex AI Model Registry and deploy the model to a Vertex AI endpoint.
3. Create a Vertex AI Model Monitoring job with feature drift detection as the monitoring objective.
- B. 1 Refactor the serving container to accept key-value pairs as input format.
2 Upload the model to Vertex AI Model Registry and deploy the model to a Vertex AI endpoint.
3. Create a Vertex AI Model Monitoring job with feature skew detection as the monitoring objective.
- C. 1 Upload the model to Vertex AI Model Registry and deploy the model to a Vertex AI endpoint.
2 Create a Vertex AI Model Monitoring job with feature skew detection as the monitoring objective and provide an instance schema.
- **D. 1 Upload the model to Vertex AI Model Registry and deploy the model to a Vertex Ai endpoint.
2. Create a Vertex AI Model Monitoring job with feature drift detection as the monitoring objective, and provide an instance schema.**

Answer: D

Explanation:

The best option for deploying a custom tabular ML model to production for online predictions, and monitoring the feature distribution over time with minimal effort, using a model that was provided by the bank's vendor, the training data is not available due to its sensitivity, and the model is packaged as a Vertex AI Model serving container which accepts a string as input for each prediction instance, is to upload the model to Vertex AI Model Registry and deploy the model to a Vertex AI endpoint, create a Vertex AI Model Monitoring job with feature drift detection as the monitoring objective, and provide an instance schema. This option allows you to leverage the power and simplicity of Vertex AI to serve and monitor your model with minimal code and configuration. Vertex AI is a unified platform for building and deploying machine learning solutions on Google Cloud. Vertex AI can deploy a trained model to an online prediction endpoint, which can provide low-latency predictions for individual instances. Vertex AI can also provide various tools and services for data analysis, model development, model deployment, model monitoring, and model governance. A Vertex AI Model Registry is a resource that can store and manage your models on Vertex AI. A Vertex AI Model Registry can help you organize and track your models, and access various model information, such as model name, model description, and model labels. A Vertex AI Model serving container is a resource that can run your custom model code on Vertex AI. A Vertex AI Model serving container can help you package your model code and dependencies into a container image, and deploy the container image to an online prediction endpoint. A Vertex AI Model serving container can accept various input formats, such as JSON, CSV, or TFRecord. A string input format is a type of input format that accepts a string as input for each prediction instance. A string input format can help you encode your feature values into a single string, and separate them by commas. By uploading the model to Vertex AI Model Registry and deploying the model to a Vertex AI endpoint, you can serve your model for online predictions with minimal code and configuration. You can use the Vertex AI API or the gcloud command-line tool to upload the model to Vertex AI Model Registry, and provide the model name, model description, and model labels. You can also use the Vertex AI API or the gcloud command-line tool to deploy the model to a Vertex AI endpoint, and provide the endpoint name, endpoint description, endpoint labels, and endpoint resources. A Vertex AI Model Monitoring job is a resource that can monitor the performance and quality of your deployed models on Vertex AI. A Vertex AI Model Monitoring job can help you detect and diagnose issues with your models, such as data drift, prediction drift, training/serving skew, or model staleness. Feature drift is a type of model monitoring metric that measures the difference between the distributions of the features used to train the model and the features used to serve the model over time. Feature drift can indicate that the online data is changing over time, and the model performance is degrading. By creating a Vertex AI Model Monitoring job with feature drift detection as the monitoring objective, and providing an instance schema, you can monitor the feature distribution over time with minimal effort. You can use the Vertex AI API or the gcloud command-line tool to create a Vertex AI Model Monitoring job, and provide the monitoring objective, the monitoring frequency, the alerting threshold, and the notification channel. You can also provide an instance schema, which is a JSON file that describes the features and their types in the prediction input data. An instance schema can help Vertex AI Model Monitoring parse and analyze the string input format, and calculate the feature distributions and distance scores¹.

The other options are not as good as option A, for the following reasons:

* Option B: Uploading the model to Vertex AI Model Registry and deploying the model to a Vertex AI endpoint, creating a Vertex AI Model Monitoring job with feature skew detection as the monitoring objective, and providing an instance schema would not help you monitor the changes in the online data over time, and could cause errors or poor performance. Feature skew is a type of model monitoring metric that measures the difference between the distributions of the features used to train the model and the features used to serve the model at a given point in time. Feature skew can indicate that the model is not trained on the representative data, or that the data is changing over time. By creating a Vertex AI Model Monitoring job with feature skew detection as the monitoring objective, and providing an instance schema, you can monitor the feature distribution at a given point in time with minimal effort. However, uploading the model to Vertex AI Model Registry and deploying the model to a Vertex AI endpoint, creating a Vertex AI Model Monitoring job with feature skew detection as the monitoring objective, and providing an instance schema would not help you monitor the changes in the online data over time, and could cause errors or poor performance. You would need to use the Vertex AI API or the gcloud command-line tool to upload the model to Vertex AI Model Registry, deploy the model to a Vertex AI endpoint, create a Vertex AI Model Monitoring job, and provide an instance schema. Moreover, this option would not monitor the feature drift, which is a more direct and relevant metric for measuring the changes in the online data over time, and the model

performance and quality¹.

* Option C: Refactoring the serving container to accept key-value pairs as input format, uploading the model to Vertex AI Model Registry and deploying the model to a Vertex AI endpoint, creating a Vertex AI Model Monitoring job with feature drift detection as the monitoring objective would require more skills and steps than uploading the model to Vertex AI Model Registry and deploying the model to a Vertex AI endpoint, creating a Vertex AI Model Monitoring job with feature drift detection as the monitoring objective, and providing an instance schema. A key-value pair input format is a type of input format that accepts a key-value pair as input for each prediction instance. A key-value pair input format can help you specify the feature names and values in a JSON object, and separate them by colons. By refactoring the serving container to accept key-value pairs as input format, uploading the model to Vertex AI Model Registry and deploying the model to a Vertex AI endpoint, creating a Vertex AI Model Monitoring job with feature drift detection as the monitoring objective, you can serve and

* monitor your model with minimal code and configuration. You can write code to refactor the serving container to accept key-value pairs as input format, and use the Vertex AI API or the gcloud command-line tool to upload the model to Vertex AI Model Registry, deploy the model to a Vertex AI endpoint, and create a Vertex AI Model Monitoring job. However, refactoring the serving container to accept key-value pairs as input format, uploading the model to Vertex AI Model Registry and deploying the model to a Vertex AI endpoint, creating a Vertex AI Model Monitoring job with feature drift detection as the monitoring objective would require more skills and steps than uploading the model to Vertex AI Model Registry and deploying the model to a Vertex AI endpoint, creating a Vertex AI Model Monitoring job with feature drift detection as the monitoring objective, and providing an instance schema. You would need to write code, refactor the serving container, upload the model to Vertex AI Model Registry, deploy the model to a Vertex AI endpoint, and create a Vertex AI Model Monitoring job. Moreover, this option would not use the instance schema, which is a JSON file that can help Vertex AI Model Monitoring parse and analyze the string input format, and calculate the feature distributions and distance scores¹.

* Option D: Refactoring the serving container to accept key-value pairs as input format, uploading the model to Vertex AI Model Registry and deploying the model to a Vertex AI endpoint, creating a Vertex AI Model Monitoring job with feature skew detection as the monitoring objective would require more skills and steps than uploading the model to Vertex AI Model Registry and deploying the model to a Vertex AI endpoint, creating a Vertex AI Model Monitoring job with feature drift detection as the monitoring objective, and providing an instance schema, and would not help you monitor the changes in the online data over time, and could cause errors or poor performance. Feature skew is a type of model monitoring metric that measures the difference between the distributions of the features used to train the model and the features used to serve the model at a given point in time. Feature skew can indicate that the model is not trained on the representative data, or that the data is changing over time. By creating a Vertex AI Model Monitoring job with feature skew detection as the monitoring objective, you can monitor the feature distribution at a given point in time with minimal effort. However, refactoring the serving container to accept key-value pairs as input format, uploading the model to Vertex AI Model Registry and deploying the model to a Vertex AI endpoint, creating a Vertex AI Model Monitoring job with feature skew detection as the monitoring objective would require more skills and steps than uploading the model to Vertex AI Model Registry and deploying the model to a Vertex AI endpoint, creating a Vertex AI Model Monitoring job with feature drift detection as the monitoring objective, and providing an instance schema, and would not help you monitor the changes in the online data over time, and could cause errors or poor performance. You would need to write code, refactor the serving container, upload the model to Vertex AI Model Registry, deploy the model to a Vertex AI endpoint, and create a Vertex AI Model Monitoring job. Moreover, this option would not monitor the feature drift, which is a more direct and relevant metric for measuring the changes in the online data over time, and the model performance and quality¹.

References:

* Using Model Monitoring | Vertex AI | Google Cloud

NEW QUESTION # 78

You work for a magazine distributor and need to build a model that predicts which customers will renew their subscriptions for the upcoming year. Using your company's historical data as your training set, you created a TensorFlow model and deployed it to AI Platform. You need to determine which customer attribute has the most predictive power for each prediction served by the model. What should you do?

- A. Stream prediction results to BigQuery. Use BigQuery's CORR(X1, X2) function to calculate the Pearson correlation coefficient between each feature and the target variable.
- **B. Use the What-If tool in Google Cloud to determine how your model will perform when individual features are excluded. Rank the feature importance in order of those that caused the most significant performance drop when removed from the model.**
- C. Use the AI Explanations feature on AI Platform. Submit each prediction request with the 'explain' keyword to retrieve feature attributions using the sampled Shapley method.
- D. Use AI Platform notebooks to perform a Lasso regression analysis on your model, which will eliminate features that do not provide a strong signal.

Answer: B

NEW QUESTION # 79

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