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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 (Q28-Q33):

NEW QUESTION # 28

You are developing a custom image classification model in Python. You plan to run your training application on Vertex AI. Your input dataset contains several hundred thousand small images. You need to determine how to store and access the images for training. You want to maximize data throughput and minimize training time while reducing the amount of additional code. What should you do?

- A. Store image files in Cloud Storage and access them directly.
- **B. Store image files in Cloud Storage and access them by using serialized records.**
- C. Store image files in Cloud Filestore and access them directly by using an NFS mount point.
- D. Store image files in Cloud Filestore, and access them by using serialized records.

Answer: B

Explanation:

Cloud Storage is a scalable and cost-effective storage service for any type of data. By storing image files in Cloud Storage, you can access them from anywhere and avoid the overhead of managing your own storage infrastructure. However, accessing image files directly from Cloud Storage can be slow and inefficient, especially for large-scale training. A better option is to use serialized records, such as TFRecord or Apache Avro, which are binary formats that store multiple images and their labels in a single file. Serialized records can improve the data throughput and reduce the network latency, as well as enable data compression and sharding. You can use TensorFlow or Apache Beam APIs to create and read serialized records from Cloud Storage. This solution requires minimal code changes and can speed up your training time significantly. Reference:

Cloud Storage | Google Cloud

TFRecord and tf.Example | TensorFlow Core

Apache Avro 1.10.2 Specification

Using Apache Beam with Cloud Storage | Cloud Storage

NEW QUESTION # 29

Your company manages an e-commerce platform and has a large dataset of customer reviews. Each review has a positive, negative, or neutral label. You need to quickly prototype a sentiment analysis model that accurately predicts the sentiment labels of new customer reviews while minimizing time and cost. What should you do?

- A. Use the Vertex AI Text embeddings API to vectorize the text, and train a regression model by using AutoML to predict sentiment scores.
- B. Train a sentiment analysis model by using a BERT-based model, and fine-tune the model by using domain-specific customer reviews.
- **C. Use the Natural Language API for real-time sentiment analysis.**
- D. Use AutoML to train a multi-class classification model that predicts sentiment labels based on the training data.

Answer: C

Explanation:

The keywords here are "quickly prototype" and "minimize time and cost."

* Natural Language API: Google's pre-trained Natural Language API provides out-of-the-box sentiment analysis. It requires zero training time, zero infrastructure management, and no labeling effort. This is the fastest and most cost-effective way to get a baseline/prototype.

* Why other options are incorrect:

* Option A: Fine-tuning a BERT model is computationally expensive and requires significant engineering time.

* Option C: AutoML is a great secondary step if the API is not accurate enough, but it still requires time to train and evaluate, making it slower than the pre-trained API.

* Option D: Vectorizing text and training a regression model is unnecessarily complex for a standard sentiment classification task.

NEW QUESTION # 30

You have successfully deployed to production a large and complex TensorFlow model trained on tabular data. You want to predict the lifetime value (LTV) field for each subscription stored in the BigQuery table named `subscription` in the project named `my-fortune500-company-project`.

You have organized all your training code, from preprocessing data from the BigQuery table up to deploying the validated model to the Vertex AI endpoint, into a TensorFlow Extended (TFX) pipeline. You want to prevent prediction drift, i.e., a situation when a feature data distribution in production changes significantly over time. What should you do?

- **A. Add a model monitoring job where 10% of incoming predictions are sampled 24 hours.**

- B. Implement continuous retraining of the model daily using Vertex AI Pipelines.
- C. Add a model monitoring job where 10% of incoming predictions are sampled every hour.
- D. Add a model monitoring job where 90% of incoming predictions are sampled 24 hours.

Answer: A

Explanation:

Option A is incorrect because implementing continuous retraining of the model daily using Vertex AI Pipelines is not the most efficient way to prevent prediction drift. Vertex AI Pipelines is a service that allows you to create and run scalable and portable ML pipelines on Google Cloud¹. You can use Vertex AI Pipelines to retrain your model daily using the latest data from the BigQuery table. However, this option may be unnecessary or wasteful, as the data distribution may not change significantly every day, and retraining the model may consume a lot of resources and time. Moreover, this option does not monitor the model performance or detect the prediction drift, which are essential steps for ensuring the quality and reliability of the model.

Option B is correct because adding a model monitoring job where 10% of incoming predictions are sampled 24 hours is the best way to prevent prediction drift. Model monitoring is a service that allows you to track the performance and health of your deployed models over time². You can use model monitoring to sample a fraction of the incoming predictions and compare them with the ground truth labels, which can be obtained from the BigQuery table or other sources. You can also use model monitoring to compute various metrics, such as accuracy, precision, recall, or F1-score, and set thresholds or alerts for them. By using model monitoring, you can detect and diagnose the prediction drift, and decide when to retrain or update your model. Sampling 10% of the incoming predictions every 24 hours is a reasonable choice, as it balances the trade-off between the accuracy and the cost of the monitoring job.

Option C is incorrect because adding a model monitoring job where 90% of incoming predictions are sampled 24 hours is not an optimal way to prevent prediction drift. This option has the same advantages as option B, as it uses model monitoring to track the performance and health of the deployed model. However, this option is not cost-effective, as it samples a very large fraction of the incoming predictions, which may incur a lot of storage and processing costs. Moreover, this option may not improve the accuracy of the monitoring job significantly, as sampling 10% of the incoming predictions may already provide a representative sample of the data distribution.

Option D is incorrect because adding a model monitoring job where 10% of incoming predictions are sampled every hour is not a necessary way to prevent prediction drift. This option also has the same advantages as option B, as it uses model monitoring to track the performance and health of the deployed model. However, this option may be excessive, as it samples the incoming predictions too frequently, which may not reflect the actual changes in the data distribution. Moreover, this option may incur more storage and processing costs than option B, as it generates more samples and metrics.

Reference:

Vertex AI Pipelines documentation

Model monitoring documentation

[Prediction drift]

[TensorFlow Extended documentation]

[BigQuery documentation]

[Vertex AI documentation]

NEW QUESTION # 31

You have developed a BigQuery ML model that predicts customer churn and deployed the model to Vertex AI Endpoints. You want to automate the retraining of your model by using minimal additional code when model feature values change. You also want to minimize the number of times that your model is retrained to reduce training costs. What should you do?

- A. 1. Enable request-response logging on Vertex AI Endpoints
2. Schedule a TensorFlow Data Validation job to monitor training/serving skew
3. Execute model retraining if there is significant distance between the distributions
- **B. 1. Create a Vertex AI Model Monitoring job configured to monitor prediction drift.
2. Configure alert monitoring to publish a message to a Pub/Sub queue when a monitoring alert is detected.
3. Use a Cloud Function to monitor the Pub/Sub queue, and trigger retraining in BigQuery**
- C. 1. Create a Vertex AI Model Monitoring job configured to monitor training/serving skew
2. Configure alert monitoring to publish a message to a Pub/Sub queue when a monitoring alert is detected
3. Use a Cloud Function to monitor the Pub/Sub queue, and trigger retraining in BigQuery.
- D. 1. Enable request-response logging on Vertex AI Endpoints.
2. Schedule a TensorFlow Data Validation job to monitor prediction drift
3. Execute model retraining if there is significant distance between the distributions.

Answer: B

Explanation:

The best option for automating the retraining of your model by using minimal additional code when model feature values change, and minimizing the number of times that your model is retrained to reduce training costs, is to create a Vertex AI Model Monitoring job configured to monitor prediction drift, configure alert monitoring to publish a message to a Pub/Sub queue when a monitoring alert is detected, and use a Cloud Function to monitor the Pub/Sub queue, and trigger retraining in BigQuery. This option allows you to leverage the power and simplicity of Vertex AI, Pub/Sub, and Cloud Functions to monitor your model performance and retrain your model when needed. 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 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. Prediction drift is a type of model monitoring metric that measures the difference between the distributions of the predictions generated by the model on the training data and the predictions generated by the model on the online data. Prediction drift can indicate that the model performance is degrading, or that the online data is changing over time. By creating a Vertex AI Model Monitoring job configured to monitor prediction drift, you can track the changes in the model predictions, and compare them with the expected predictions. Alert monitoring is a feature of Vertex AI Model Monitoring that can notify you when a monitoring metric exceeds a predefined threshold. Alert monitoring can help you set up rules and conditions for triggering alerts, and choose the notification channel for receiving alerts. Pub/Sub is a service that can provide reliable and scalable messaging and event streaming on Google Cloud. Pub/Sub can help you publish and subscribe to messages, and deliver them to various Google Cloud services, such as Cloud Functions. A Pub/Sub queue is a resource that can hold messages that are published to a Pub/Sub topic. A Pub/Sub queue can help you store and manage messages, and ensure that they are delivered to the subscribers. By configuring alert monitoring to publish a message to a Pub/Sub queue when a monitoring alert is detected, you can send a notification to a Pub/Sub topic, and trigger a downstream action based on the alert. Cloud Functions is a service that can run your stateless code in response to events on Google Cloud. Cloud Functions can help you create and execute functions without provisioning or managing servers, and pay only for the resources you use. A Cloud Function is a resource that can execute a piece of code in response to an event, such as a Pub/Sub message. A Cloud Function can help you perform various tasks, such as data processing, data transformation, or data analysis. BigQuery is a service that can store and query large-scale data on Google Cloud. BigQuery can help you analyze your data by using SQL queries, and perform various tasks, such as data exploration, data transformation, or data visualization. BigQuery ML is a feature of BigQuery that can create and execute machine learning models in BigQuery by using SQL queries.

BigQuery ML can help you build and train various types of models, such as linear regression, logistic regression, k-means clustering, matrix factorization, and deep neural networks. By using a Cloud Function to monitor the Pub/Sub queue, and trigger retraining in BigQuery, you can automate the retraining of your model by using minimal additional code when model feature values change. You can write a Cloud Function that listens to the Pub/Sub queue, and executes a SQL query to retrain your model in BigQuery ML when a prediction drift alert is received. By retraining your model in BigQuery ML, you can update your model parameters and improve your model performance and accuracy.

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

* Option A: Enabling request-response logging on Vertex AI Endpoints, scheduling a TensorFlow Data Validation job to monitor prediction drift, and executing model retraining if there is significant distance between the distributions would require more skills and steps than creating a Vertex AI Model Monitoring job configured to monitor prediction drift, configuring alert monitoring to publish a message to a Pub/Sub queue when a monitoring alert is detected, and using a Cloud Function to monitor the Pub/Sub queue, and trigger retraining in BigQuery. Request-response logging is a feature of Vertex AI Endpoints that can record the requests and responses that are sent to and from the online prediction endpoint. Request-response logging can help you collect and analyze the online prediction data, and troubleshoot any issues with your model. TensorFlow Data Validation is a tool that can analyze and validate your data for machine learning. TensorFlow Data Validation can help you explore, understand, and clean your data, and detect various data issues, such as data drift, data skew, or data anomalies.

Prediction drift is a type of data issue that measures the difference between the distributions of the predictions generated by the model on the training data and the predictions generated by the model on the online data. Prediction drift can indicate that the model performance is degrading, or that the online data is changing over time. By enabling request-response logging on Vertex AI Endpoints, and scheduling a TensorFlow Data Validation job to monitor prediction drift, you can collect and analyze the online prediction data, and compare the distributions of the predictions. However, enabling request-response logging on Vertex AI Endpoints, scheduling a TensorFlow Data Validation job to monitor prediction drift, and executing model retraining if there is significant distance between the distributions would require more skills and steps than creating a Vertex AI Model Monitoring job configured to monitor prediction drift, configuring alert monitoring to publish a message to a Pub/Sub queue when a monitoring alert is detected, and using a Cloud Function to monitor the Pub/Sub queue, and trigger retraining in BigQuery. You would need to write code, enable and configure the request-response logging, create and run the TensorFlow Data Validation job, define and measure the distance between the distributions, and execute the model retraining. Moreover, this option would not automate the retraining of your model, as you would need to manually check the prediction drift and trigger the retraining.

* Option B: Enabling request-response logging on Vertex AI Endpoints, scheduling a TensorFlow Data Validation job to monitor training/serving skew, and executing model retraining if there is significant distance between the distributions would not help you monitor the changes in the model feature values, and could cause errors or poor performance. Training/serving skew is a type of

data issue that measures the difference between the distributions of the features used to train the model and the features used to serve the model. Training/serving skew can indicate that the model is not trained on the representative data, or that the data is changing over time. By enabling request-response logging on Vertex AI Endpoints, and scheduling a TensorFlow Data Validation job to monitor training/serving skew, you can collect and analyze the online prediction data, and compare the distributions of the features. However, enabling request-response logging on Vertex AI Endpoints, scheduling a TensorFlow Data Validation job to monitor training/serving skew, and executing model retraining if there is significant distance

* between the distributions would not help you monitor the changes in the model feature values, and could cause errors or poor performance. You would need to write code, enable and configure the request-response logging, create and run the TensorFlow Data Validation job, define and measure the distance between the distributions, and execute the model retraining. Moreover, this option would not monitor the prediction drift, which is a more direct and relevant metric for measuring the model performance and quality².

* Option D: Creating a Vertex AI Model Monitoring job configured to monitor training/serving skew, configuring alert monitoring to publish a message to a Pub/Sub queue when a monitoring alert is detected, and using a Cloud Function to monitor the Pub/Sub queue, and trigger retraining in BigQuery would not help you monitor the changes in the model feature values, and could cause errors or poor performance. Training/serving skew is a type of data issue that measures the difference between the distributions of the features used to train the model and the features used to serve the model.

Training/serving 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 configured to monitor training/serving skew, you can track the changes in the model features, and compare them with the expected features. However, creating a Vertex AI Model Monitoring job configured to monitor training/serving skew, configuring alert monitoring to publish a message to a Pub/Sub queue when a monitoring alert is detected, and using a Cloud Function to monitor the Pub/Sub queue, and trigger retraining in BigQuery would not help you monitor the changes in the model feature values, and could cause errors or poor performance. You would need to write code, create and configure the Vertex AI Model Monitoring job, configure the alert monitoring, create and configure the Pub/Sub queue, and write a Cloud Function to trigger the retraining. Moreover, this option would not monitor the prediction drift, which is a more direct and relevant metric for measuring the model performance and quality¹.

References:

* Preparing for Google Cloud Certification: Machine Learning Engineer, Course 3: Production ML Systems, Week 4: ML Governance

* Google Cloud Professional Machine Learning Engineer Exam Guide, Section 3: Scaling ML models in production

NEW QUESTION # 32

You work for a large hotel chain and have been asked to assist the marketing team in gathering predictions for a targeted marketing strategy. You need to make predictions about user lifetime value (LTV) over the next 30 days so that marketing can be adjusted accordingly. The customer dataset is in BigQuery, and you are preparing the tabular data for training with AutoML Tables. This data has a time signal that is spread across multiple columns. How should you ensure that AutoML fits the best model to your data?

- A. Manually combine all columns that contain a time signal into an array Allow AutoML to interpret this array appropriately Choose an automatic data split across the training, validation, and testing sets
- B. Submit the data for training without performing any manual transformations Allow AutoML to handle the appropriate transformations Choose an automatic data split across the training, validation, and testing sets
- **C. Submit the data for training without performing any manual transformations, and indicate an appropriate column as the Time column Allow AutoML to split your data based on the time signal provided, and reserve the more recent data for the validation and testing sets**
- D. Submit the data for training without performing any manual transformations Use the columns that have a time signal to manually split your data Ensure that the data in your validation set is from 30 days after the data in your training set and that the data in your testing set is from 30 days after your validation set

Answer: C

Explanation:

This answer is correct because it allows AutoML Tables to handle the time signal in the data and split the data accordingly. This ensures that the model is trained on the historical data and evaluated on the more recent data, which is consistent with the prediction task. AutoML Tables can automatically detect and handle temporal features in the data, such as date, time, and duration. By specifying the Time column, AutoML Tables can also perform time-series forecasting and use the time signal to generate additional features, such as seasonality and trend. References:

* [AutoML Tables: Preparing your training data]

* [AutoML Tables: Time-series forecasting]

NEW QUESTION # 33

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