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To be eligible to take the Amazon MLS-C01 exam, candidates must have a minimum of one year of experience using AWS technology in a machine learning context. They should also have experience with machine learning frameworks such as TensorFlow and PyTorch, as well as programming languages such as Python and R.

The AWS Certified Machine Learning - Specialty exam is a certification program offered by Amazon Web Services (AWS) that validates the skills of professionals in the field of machine learning. AWS Certified Machine Learning - Specialty certification is designed for individuals who have a strong understanding of the foundations of machine learning and are proficient in building and deploying machine learning solutions on AWS. AWS-Certified-Machine-Learning-Specialty Exam covers a wide range of topics, including data engineering, data pre-processing, feature engineering, model selection and training, and deployment and monitoring of machine learning models.

Amazon AWS Certified Machine Learning - Specialty Sample Questions (Q268-Q273):

NEW QUESTION # 268
An ecommerce company is automating the categorization of its products based on images. A data scientist has trained a computer vision model using the Amazon SageMaker image classification algorithm. The images for each product are classified according to specific product lines. The accuracy of the model is too low when categorizing new products. All of the product images have the same dimensions and are stored within an Amazon S3 bucket. The company wants to improve the model so it can be used for new products as soon as possible.
Which steps would improve the accuracy of the solution? (Choose three.)

- A. Use a SageMaker notebook to implement the normalization of pixels and scaling of the images. Store the new dataset in Amazon S3.
- B. Use the SageMaker semantic segmentation algorithm to train a new model to achieve improved accuracy.
- C. Use Amazon Rekognition Custom Labels to train a new model.
- D. Use the Amazon Rekognition DetectLabels API to classify the products in the dataset.
- E. Augment the images in the dataset. Use open-source libraries to crop, resize, flip, rotate, and adjust the brightness and contrast of the images.
- F. Check whether there are class imbalances in the product categories, and apply oversampling or undersampling as required. Store the new dataset in Amazon S3.

Answer: C,E,F

Explanation:
Option C is correct because augmenting the images in the dataset can help the model learn more features and generalize better to new products. Image augmentation is a common technique to increase the diversity and size of the training data.
Option E is correct because Amazon Rekognition Custom Labels can train a custom model to detect specific objects and scenes that are relevant to the business use case. It can also leverage the existing models from Amazon Rekognition that are trained on tens of millions of images across many categories.
Option F is correct because class imbalance can affect the performance and accuracy of the model, as it can cause the model to be biased towards the majority class and ignore the minority class. Applying oversampling or undersampling can help balance the classes and improve the model's ability to learn from the data.
Option A is incorrect because the semantic segmentation algorithm is used to assign a label to every pixel in an image, not to classify the whole image into a category. Semantic segmentation is useful for applications such as autonomous driving, medical imaging, and satellite imagery analysis.
Option B is incorrect because the DetectLabels API is a general-purpose image analysis service that can detect objects, scenes, and concepts in an image, but it cannot be customized to the specific product lines of the ecommerce company. The DetectLabels API is based on the pre-trained models from Amazon Rekognition, which may not cover all the categories that the company needs.
Option D is incorrect because normalizing the pixels and scaling the images are preprocessing steps that should be done before training the model, not after. These steps can help improve the model's convergence and performance, but they are not sufficient to increase the accuracy of the model on new products.
References:
1: Image Augmentation - Amazon SageMaker
2: Amazon Rekognition Custom Labels Features
3: [Handling Imbalanced Datasets in Machine Learning]

4: [Semantic Segmentation - Amazon SageMaker]
5: [DetectLabels - Amazon Rekognition]
6: [Image Classification - MXNet - Amazon SageMaker]
7: [https://towardsdatascience.com/handling-imbalanced-datasets-in-machine-learning-7a0e84220f28]
8: [https://docs.aws.amazon.com/sagemaker/latest/dg/semantic-segmentation.html]
9: [https://docs.aws.amazon.com/rekognition/latest/dg/API_DetectLabels.html]
10: [https://docs.aws.amazon.com/sagemaker/latest/dg/image-classification.html]
11: [https://towardsdatascience.com/handling-imbalanced-datasets-in-machine-learning-7a0e84220f28]
12: [https://docs.aws.amazon.com/sagemaker/latest/dg/semantic-segmentation.html]
13: [https://docs.aws.amazon.com/rekognition/latest/dg/API_DetectLabels.html]
14: [https://docs.aws.amazon.com/sagemaker/latest/dg/image-classification.html]
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16: [https://docs.aws.amazon.com/sagemaker/latest/dg/semantic-segmentation.html]
17: [https://docs.aws.amazon.com/rekognition/latest/dg/API_DetectLabels.html]
18: [https://docs.aws.amazon.com/sagemaker/latest/dg/image-classification.html]

NEW QUESTION # 269
While reviewing the histogram for residuals on regression evaluation data a Machine Learning Specialist notices that the residuals do not form a zero-centered bell shape as shown What does this mean?

- A. The dataset cannot be accurately represented using the regression model
- B. The model is predicting its target values perfectly.
- C. The model might have prediction errors over a range of target values.
- D. There are too many variables in the model

Answer: C

Explanation:
Residuals are the differences between the actual and predicted values of the target variable in a regression model. A histogram of residuals is a graphical tool that can help evaluate the performance and assumptions of the model. Ideally, the histogram of residuals should have a zero-centered bell shape, which indicates that the residuals are normally distributed with a mean of zero and a constant variance. This means that the model has captured the true relationship between the input and output variables, and that the errors are random and unbiased. However, if the histogram of residuals does not have a zero-centered bell shape, as shown in the image, this means that the model might have prediction errors over a range of target values. This is because the residuals do not form a symmetrical and homogeneous distribution around zero, which implies that the model has some systematic bias or heteroscedasticity. This can affect the accuracy and validity of the model, and indicate that the model needs to be improved or modified.

References:
Residual Analysis in Regression - Statistics By Jim
How to Check Residual Plots for Regression Analysis - dummies
Histogram of Residuals - Statistics How To

NEW QUESTION # 270
A company wants to predict the classification of documents that are created from an application. New documents are saved to an Amazon S3 bucket every 3 seconds. The company has developed three versions of a machine learning (ML) model within Amazon SageMaker to classify document text. The company wants to deploy these three versions to predict the classification of each document.
Which approach will meet these requirements with the LEAST operational overhead?

- A. Deploy all the models to a single SageMaker endpoint. Treat each model as a production variant.
  Configure an S3 event notification that invokes an AWS Lambda function when new documents are created. Configure the Lambda function to call each production variant and return the results of each model.
- B. Deploy each model to its own SageMaker endpoint. Create three AWS Lambda functions. Configure each Lambda function to call a different endpoint and return the results. Configure three S3 event notifications to invoke the Lambda functions when new documents are created.
- C. Configure an S3 event notification that invokes an AWS Lambda function when new documents are created. Configure the Lambda function to create three SageMaker batch transform jobs, one batch transform job for each model for each document.
- D. Deploy each model to its own SageMaker endpoint Configure an S3 event notification that invokes an AWS Lambda function when new documents are created. Configure the Lambda function to call each endpoint and return the results of each model.

Answer: A

Explanation:
The approach that will meet the requirements with the least operational overhead is to deploy all the models to a single SageMaker endpoint, treat each model as a production variant, configure an S3 event notification that invokes an AWS Lambda function when new documents are created, and configure the Lambda function to call each production variant and return the results of each model.
This approach involves the following steps:
* Deploy all the models to a single SageMaker endpoint. Amazon SageMaker is a service that can build, train, and deploy machine learning models. Amazon SageMaker can deploy multiple models to a single endpoint, which is a web service that can serve predictions from the models. Each model can be treated as a production variant, which is a version of the model that runs on one or more instances. Amazon SageMaker can distribute the traffic among the production variants according to the specified weights1.
* Treat each model as a production variant. Amazon SageMaker can deploy multiple models to a single endpoint, which is a web service that can serve predictions from the models. Each model can be treated as a production variant, which is a version of the model that runs on one or more instances. Amazon SageMaker can distribute the traffic among the production variants according to the specified weights1.
* Configure an S3 event notification that invokes an AWS Lambda function when new documents are created. Amazon S3 is a service that can store and retrieve any amount of data. Amazon S3 can send event notifications when certain actions occur on the objects in a bucket, such as object creation, deletion, or modification. Amazon S3 can invoke an AWS Lambda function as a destination for the event notifications. AWS Lambda is a service that can run code without provisioning or managing servers2.
* Configure the Lambda function to call each production variant and return the results of each model.
AWS Lambda can execute the code that can call the SageMaker endpoint and specify the production variant to invoke. AWS Lambda can use the AWS SDK or the SageMaker Runtime API to send requests to the endpoint and receive the predictions from the models. AWS Lambda can return the results of each model as a response to the event notification3.
The other options are not suitable because:
* Option A: Configuring an S3 event notification that invokes an AWS Lambda function when new documents are created, configuring the Lambda function to create three SageMaker batch transform jobs, one batch transform job for each model for each document, will incur more operational overhead than using a single SageMaker endpoint. Amazon SageMaker batch transform is a service that can process large datasets in batches and store the predictions in Amazon S3. Amazon SageMaker batch transform is not suitable for real-time inference, as it introduces a delay between the request and the response. Moreover, creating three batch transform jobs for each document will increase the complexity and cost of the solution4.
* Option C: Deploying each model to its own SageMaker endpoint, configuring an S3 event notification that invokes an AWS Lambda function when new documents are created, configuring the Lambda function to call each endpoint and return the results of each model, will incur more operational overhead than using a single SageMaker endpoint. Deploying each model to its own endpoint will increase the number of resources and endpoints to manage and monitor. Moreover, calling each endpoint separately will increase the latency and network traffic of the solution5.

* Option D: Deploying each model to its own SageMaker endpoint, creating three AWS Lambda functions, configuring each Lambda function to call a different endpoint and return the results, configuring three S3 event notifications to invoke the Lambda functions when new documents are created, will incur more operational overhead than using a single SageMaker endpoint and a single Lambda function. Deploying each model to its own endpoint will increase the number of resources and endpoints to manage and monitor. Creating three Lambda functions will increase the complexity and cost of the solution. Configuring three S3 event notifications will increase the number of triggers and destinations to manage and monitor6.
References:
* 1: Deploying Multiple Models to a Single Endpoint - Amazon SageMaker
* 2: Configuring Amazon S3 Event Notifications - Amazon Simple Storage Service
* 3: Invoke an Endpoint - Amazon SageMaker
* 4: Get Inferences for an Entire Dataset with Batch Transform - Amazon SageMaker
* 5: Deploy a Model - Amazon SageMaker
* 6: AWS Lambda

NEW QUESTION # 271
A web-based company wants to improve its conversion rate on its landing page. Using a large historical dataset of customer visits, the company has repeatedly trained a multi-class deep learning network algorithm on Amazon SageMaker. However, there is an overfitting problem: training data shows 90% accuracy in predictions, while test data shows 70% accuracy only.
The company needs to boost the generalization of its model before deploying it into production to maximize conversions of visits to purchases.
Which action is recommended to provide the HIGHEST accuracy model for the company's test and validation data?

- A. Increase the randomization of training data in the mini-batches used in training
- B. Allocate a higher proportion of the overall data to the training dataset
- C. Apply L1 or L2 regularization and dropouts to the training
- D. Reduce the number of layers and units (or neurons) from the deep learning network

Answer: D

NEW QUESTION # 272
An online delivery company wants to choose the fastest courier for each delivery at the moment an order is placed. The company wants to implement this feature for existing users and new users of its application. Data scientists have trained separate models with XGBoost for this purpose, and the models are stored in Amazon S3. There is one model fof each city where the company operates. The engineers are hosting these models in Amazon EC2 for responding to the web client requests, with one instance for each model, but the instances have only a 5% utilization in CPU and memory, ...operation engineers want to avoid managing unnecessary resources.
Which solution will enable the company to achieve its goal with the LEAST operational overhead?

- A. Prepare a Docker container based on the prebuilt images in Amazon SageMaker. Replace the existing instances with separate SageMaker endpoints. one for each city where the company operates. Invoke the endpoints from the web client, specifying the URL and EndpomtName parameter according to the city of each request.
- B. Prepare an Amazon SageMaker Docker container based on the open-source multi-model server.
  Remove the existing instances and create a multi-model endpoint in SageMaker instead, pointing to the S3 bucket containing all the models Invoke the endpoint from the web client at runtime, specifying the TargetModel parameter according to the city of each request.
- C. Keep only a single EC2 instance for hosting all the models. Install a model server in the instance and load each model by pulling it from Amazon S3. Integrate the instance with the web client using Amazon API Gateway for responding to the requests in real time, specifying the target resource according to the city of each request.
- D. Create an Amazon SageMaker notebook instance for pulling all the models from Amazon S3 using the boto3 library. Remove the existing instances and use the notebook to perform a SageMaker batch transform for performing inferences offline for all the possible users in all the cities. Store the results in different files in Amazon S3. Point the web client to the files.

Answer: B

Explanation:
The best solution for this scenario is to use a multi-model endpoint in Amazon SageMaker, which allows hosting multiple models on the same endpoint and invoking them dynamically at runtime. This way, the company can reduce the operational overhead of managing multiple EC2 instances and model servers, and leverage the scalability, security, and performance of SageMaker hosting services. By using a multi-model endpoint, the company can also save on hosting costs by improving endpoint utilization and paying

only for the models that are loaded in memory and the API calls that are made. To use a multi-model endpoint, the company needs to prepare a Docker container based on the open-source multi-model server, which is a framework-agnostic library that supports loading and serving multiple models from Amazon S3. The company can then create a multi-model endpoint in SageMaker, pointing to the S3 bucket containing all the models, and invoke the endpoint from the web client at runtime, specifying the TargetModel parameter according to the city of each request. This solution also enables the company to add or remove models from the S3 bucket without redeploying the endpoint, and to use different versions of the same model for different cities if needed. References:
* Use Docker containers to build models
* Host multiple models in one container behind one endpoint
* Multi-model endpoints using Scikit Learn
* Multi-model endpoints using XGBoost

NEW QUESTION # 273
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