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Designing and Implementing a Data Science Solution on Azure

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QUESTION 1

HOTSPOT

You are preparing to use the Azure ML SDK to run an experiment and need to create compute. You run the following code:

```
from azureml.core.compute import ComputeTarget, AmlCompute
from azureml.core.compute_target import ComputeTargetException
ws = Workspace.from_config()
cluster_name = 'aml-cluster'
try:
    training_compute = ComputeTarget(workspace=ws, name=cluster_name)
except ComputeTargetException:
    compute_config = AmlCompute.provisioning_configuration(vm_size='STANDARD_D2_V2', vm_priority='lowpriority',
max_nodes=4)
    training_compute = ComputeTarget.create(ws, cluster_name, compute_config)
    training_compute.wait_for_completion(show_output=True)
```

For each of the following statements, select Yes if the statement is true. Otherwise, select No.

NOTE: Each correct selection is worth one point.

Hot Area:

	Yes	No
If a training cluster named aml-cluster already exists in the workspace, it will be deleted and replaced.	○	○
The `wait_for_completion()` method will not return until the aml-cluster compute has four active nodes.	○	○
If the code creates a new aml-cluster compute target, it may be preempted due to capacity constraints.	○	○
The aml-cluster compute target is deleted from the workspace after the training experiment completes.	○	○

Correct Answer:

	Yes	No
If a training cluster named aml-cluster already exists in the workspace, it will be deleted and replaced.	○	○
The `wait_for_completion()` method will not return until the aml-cluster compute has four active nodes.	○	○
If the code creates a new aml-cluster compute target, it may be preempted due to capacity constraints.	○	○
The aml-cluster compute target is deleted from the workspace after the training experiment completes.	○	○

Box 1: No

If a training cluster already exists it will be used.

Box 2: Yes

The wait_for_completion method waits for the current provisioning operation to finish on the cluster.

Box 3: Yes

Low Priority VMs use Azure\\'s excess capacity and are thus cheaper but risk your run being pre-empted.

Box 4: No

Need to use training_compute.delete() to deprovision and delete the AmlCompute target.

Reference:

https://notebooks.azure.com/azureml/projects/azureml-getting-started/html/how-to-use-azureml/training/train-on-amlcompute/train-on-amlcompute.ipynb

https://docs.microsoft.com/en-us/python/api/azureml-core/azureml.core.compute.computetarget

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QUESTION 2

DRAG DROP

You need to implement an early stopping criteria policy for model training.

Which three code segments should you use to develop the solution? To answer, move the appropriate code segments from the list of code segments to the answer area and arrange them in the correct order.

NOTE: More than one order of answer choices is correct. You will receive credit for any of the correct orders you select.

Select and Place:

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Code segments

```
early_termination_policy =
TruncationSelectionPolicy(evaluation_interval=1,
truncation_percentage=20, delay_evaluation=5)
```

```
import TruncationSelectionPolicy
```

```
from azureml.train.hyperdrive
```

```
import BanditPolicy
```

```
early_termination_policy = BanditPolicy
(slack_factor = 0.1, evaluation_interval=1,
delay_evaluation=5)
```

Answer Area

Correct Answer:

Code segments

```
import BanditPolicy
```

```
early_termination_policy = BanditPolicy
(slack_factor = 0.1, evaluation_interval=1,
delay_evaluation=5)
```

Answer Area

```
from azureml.train.hyperdrive
```

```
import TruncationSelectionPolicy
```

```
early_termination_policy =
TruncationSelectionPolicy(evaluation_interval=1,
truncation_percentage=20, delay_evaluation=5)
```

You need to implement an early stopping criterion on models that provides savings without terminating promising jobs.

Truncation selection cancels a given percentage of lowest performing runs at each evaluation interval. Runs are compared based on their performance on the primary metric and the lowest X% are terminated.

Example:

from azureml.train.hyperdrive import TruncationSelectionPolicy

early_termination_policy = TruncationSelectionPolicy(evaluation_interval=1, truncation_percentage=20, delay_evaluation=5)

Incorrect Answers:

Bandit is a termination policy based on slack factor/slack amount and evaluation interval. The policy early terminates

any runs where the primary metric is not within the specified slack factor / slack amount with respect to the best performing

training run.

Example:

from azureml.train.hyperdrive import BanditPolicy

early_termination_policy = BanditPolicy(slack_factor = 0.1, evaluation_interval=1, delay_evaluation=5

References:

https://docs.microsoft.com/en-us/azure/machine-learning/service/how-to-tune-hyperparameters

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QUESTION 3

HOTSPOT

You are using the Azure Machine Learning Service to automate hyperparameter exploration of your neural network classification model.

You must define the hyperparameter space to automatically tune hyperparameters using random sampling according to following requirements:

1.

The learning rate must be selected from a normal distribution with a mean value of 10 and a standard deviation of 3.

2.

Batch size must be 16, 32 and 64.

3.

Keep probability must be a value selected from a uniform distribution between the range of 0.05 and 0.1.

You need to use the param_sampling method of the Python API for the Azure Machine Learning Service.

How should you complete the code segment? To answer, select the appropriate options in the answer area.

NOTE: Each correct selection is worth one point.

Hot Area:

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Answer Area
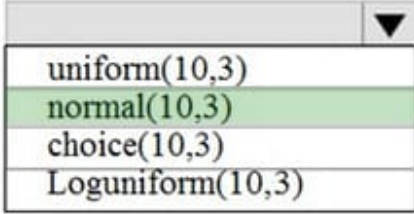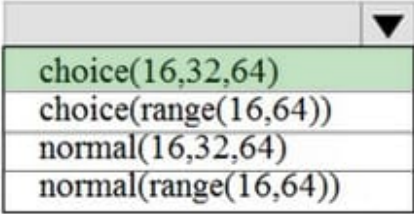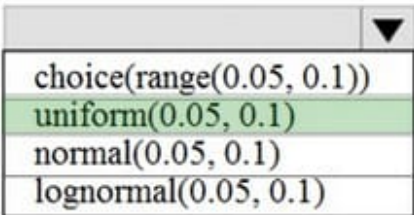
```
from azureml.train.hyperdrive import RandomParameterSampling
param_sampling = RandomParameterSampling( {

    "learning_rate" :  [ ▼ ] ,
                       uniform(10,3)
                       normal(10,3)
                       choice(10,3)
                       Loguniform(10,3)

    "batch_size":      [ ▼ ] ,
                       choice(16,32,64)
                       choice(range(16,64))
                       normal(16,32,64)
                       normal(range(16,64))

    "keep_probability" :  [ ▼ ]
                       choice(range(0.05, 0.1))
                       uniform(0.05, 0.1)
                       normal(0.05, 0.1)
                       lognormal(0.05, 0.1)

    }
)
```

Correct Answer:

Answer Area

```
from azureml.train.hyperdrive import RandomParameterSampling
param_sampling = RandomParameterSampling( {
```

"learning_rate" : [▼] ,

uniform(10,3)
normal(10,3)
choice(10,3)
Loguniform(10,3)

"batch_size": [▼] ,

choice(16,32,64)
choice(range(16,64))
normal(16,32,64)
normal(range(16,64))

"keep_probability" : [▼]

choice(range(0.05, 0.1))
uniform(0.05, 0.1)
normal(0.05, 0.1)
lognormal(0.05, 0.1)

```
        }
)
```

In random sampling, hyperparameter values are randomly selected from the defined search space. Random sampling allows the search space to include both discrete and continuous hyperparameters.

Example:

from azureml.train.hyperdrive import RandomParameterSampling

param_sampling = RandomParameterSampling({ "learning_rate": normal(10, 3), "keep_probability": uniform(0.05, 0.1), "batch_size": choice(16, 32, 64) }

Reference: https://docs.microsoft.com/en-us/azure/machine-learning/service/how-to-tune-hyperparameters

QUESTION 4

You need to consider the underlined segment to establish whether it is accurate.

To improve the amount of low incidence cases in a dataset, you should make use of the SMOTE module.

Select "No adjustment required" if the underlined segment is accurate. If the underlined segment is inaccurate, select the accurate option.

A. No adjustment required.

B. Remove Duplicate Rows

C. Join Data

D. Edit Metadata

Correct Answer: A

Use the SMOTE module in Azure Machine Learning Studio to increase the number of underrepresented cases in a dataset used for machine learning. SMOTE is a better way of increasing the number of rare cases than simply duplicating existing cases.

Reference: https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/smote

QUESTION 5

You are implementing hyperparameter tuning by using Bayesian sampling for an Azure ML Python SDK v2-based model training from a notebook. The notebook is in an Azure Machine Learning workspace. The notebook uses a training

script that runs on a compute cluster with 20 nodes.

The code implements Bandit termination policy with slack_factor set to 02 and a sweep job with max_concurrent_trials set to 10.

You must increase effectiveness of the tuning process by improving sampling convergence.

You need to select which sampling convergence to use.

What should you select?

A. Set the value of slack.factor of earty.termination policy to 0.1.

B. Set the value of max_concurrent_trials to 4.

C. Set the value of slack_factor of eartyjermination policy to 0.9.

D. Set the value of max.concurrentjrials to 20.

Correct Answer: C

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