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QUESTION 18

Which ONE of the following types of coverage SHOULD be used if test cases need to cause each neuron to achieve both positive and negative activation values?

SELECT ONE OPTION
* Value coverage
* Threshold coverage
* Sign change coverage
* Neuron coverage

Coverage for Neuron Activation Values:Sign change coverage is used to ensure that test cases cause each neuron to achieve both positive and negative activation values. This type of coverage ensures that the neurons are thoroughly tested under different activation states.

Reference:ISTQB_CT-AI_Syllabus_v1.0, Section 6.2 Coverage Measures for Neural Networks, which details different types of coverage measures, including sign change coverage.

QUESTION 19

Which ONE of the following options is the MOST APPROPRIATE stage of the ML workflow to set model and algorithm hyperparameters?

SELECT ONE OPTION
* Evaluating the model
* Deploying the model
* Tuning the model
* Data testing

Setting model and algorithm hyperparameters is an essential step in the machine learning workflow, primarily occurring during the tuning phase.

* Evaluating the model (A): This stage involves assessing the model’s performance using metrics and does not typically include the setting of hyperparameters.

* Deploying the model (B): Deployment is the stage where the model is put into production and used in real-world applications. Hyperparameters should already be set before this stage.

* Tuning the model (C): This is the correct stage where hyperparameters are set. Tuning involves adjusting the hyperparameters to optimize the model’s performance.

* Data testing (D): Data testing involves ensuring the quality and integrity of the data used for training and testing the model. It does not include setting hyperparameters.

Hence, the most appropriate stage of the ML workflow to set model and algorithm hyperparameters isC.

Tuning the model.

References:

* ISTQB CT-AI Syllabus Section 3.2 on the ML Workflow outlines the different stages of the ML process, including the tuning phase where hyperparameters are set.

* Sample Exam Questions document, Question #31 specifically addresses the stage in the ML workflow where hyperparameters are configured.

QUESTION 20

Which ONE of the following statements correctly describes the importance of flexibility for Al systems?

SELECT ONE OPTION
* Al systems are inherently flexible.
* Al systems require changing of operational environments; therefore, flexibility is required.
* Flexible Al systems allow for easier modification of the system as a whole.
* Self-learning systems are expected to deal with new situations without explicitly having to program for it.

Flexibility in AI systems is crucial for various reasons, particularly because it allows for easier modification and adaptation of the

system as a whole.

* AI systems are inherently flexible (A): This statement is not correct. While some AI systems may be designed to be flexible, they are not inherently flexible by nature. Flexibility depends on the system’s design and implementation.

* AI systems require changing operational environments; therefore, flexibility is required (B): While it’s true that AI systems may need to operate in changing environments, this statement does not directly address the importance of flexibility for the modification of the system.

* Flexible AI systems allow for easier modification of the system as a whole (C): This statement correctly describes the importance of flexibility. Being able to modify AI systems easily is critical for their maintenance, adaptation to new requirements, and improvement.

* Self-learning systems are expected to deal with new situations without explicitly having to program for it (D): This statement relates to the adaptability of self-learning systems rather than their overall flexibility for modification.

Hence, the correct answer isC. Flexible AI systems allow for easier modification of the system as a whole.

References:

* ISTQB CT-AI Syllabus Section 2.1 on Flexibility and Adaptability discusses the importance of flexibility in AI systems and how it enables easier modification and adaptability to new situations.

* Sample Exam Questions document, Question #30 highlights the importance of flexibility in AI systems.

QUESTION 21

An image classification system is being trained for classifying faces of humans. The distribution of the data is

70% ethnicity A and 30% for ethnicities B, C and D. Based ONLY on the above information, which of the following options BEST describes the situation of this image classification system?

SELECT ONE OPTION
* This is an example of expert system bias.
* This is an example of sample bias.
* This is an example of hyperparameter bias.
* This is an example of algorithmic bias.
* A. This is an example of expert system bias.

* Expert system bias refers to bias introduced by the rules or logic defined by experts in the system, not by the data distribution.

* B. This is an example of sample bias.

* Sample bias occurs when the training data is not representative of the overall population that the model will encounter in practice. In this case, the over-representation of ethnicity A (70%) compared to B, C, and D (30%) creates a sample bias, as the model may become biased towards better performance on ethnicity A.

* C. This is an example of hyperparameter bias.

* Hyperparameter bias relates to the settings and configurations used during the training process, not the data distribution itself.

* D. This is an example of algorithmic bias.

* Algorithmic bias refers to biases introduced by the algorithmic processes and decision-making rules, not directly by the distribution of training data.

Based on the provided information, optionB(sample bias) best describes the situation because the training data is skewed towards ethnicity A, potentially leading to biased model performance.

QUESTION 22

Upon testing a model used to detect rotten tomatoes, the following data was observed by the test engineer, based on certain number of tomato images.

Confusion Matrix	Actually Rotten	Actually Fresh
Predicted Rotten	45	8
Predicted Fresh	5	42

For this confusion matrix which combinations of values of accuracy, recall, and specificity respectively is CORRECT?

SELECT ONE OPTION
* 0.87.0.9. 0.84
* 1,0.87,0.84
* 1,0.9, 0.8
* 0.84.1,0.9

To calculate the accuracy, recall, and specificity from the confusion matrix provided, we use the following formulas:

* Confusion Matrix:

* Actually Rotten: 45 (True Positive), 8 (False Positive)

* Actually Fresh: 5 (False Negative), 42 (True Negative)

* Accuracy:

* Accuracy is the proportion of true results (both true positives and true negatives) in the total population.

* Formula: Accuracy=TP+TNTP+TN+FP+FNtext{Accuracy} = frac{TP + TN}{TP + TN + FP + FN}Accuracy=TP+TN+FP+FNTP+TN

* Calculation: Accuracy=45+4245+42+8+5=87100=0.87text{Accuracy} = frac{45 + 42}{45 + 42 + 8 + 5} = frac{87}{100} = 0.87Accuracy=45+42+8+545+42=10087=0.87

* Recall (Sensitivity):

* Recall is the proportion of true positive results in the total actual positives.

* Formula: Recall=TPTP+FNtext{Recall} = frac{TP}{TP + FN}Recall=TP+FNTP

* Calculation: Recall=4545+5=4550=0.9text{Recall} = frac{45}{45 + 5} = frac{45}{50} =

0.9Recall=45+545=5045=0.9

* Specificity:

* Specificity is the proportion of true negative results in the total actual negatives.

* Formula: Specificity=TNTN+FPtext{Specificity} = frac{TN}{TN + FP}Specificity=TN+FPTN

* Calculation: Specificity=4242+8=4250=0.84text{Specificity} = frac{42}{42 + 8} =

frac{42}{50} = 0.84Specificity=42+842=5042=0.84

Therefore, the correct combinations of accuracy, recall, and specificity are 0.87, 0.9, and 0.84 respectively.

References:

* ISTQB CT-AI Syllabus, Section 5.1, Confusion Matrix, provides detailed formulas and explanations for calculating various metrics including accuracy, recall, and specificity.

* “ML Functional Performance Metrics” (ISTQB CT-AI Syllabus, Section 5).

QUESTION 23

Pairwise testing can be used in the context of self-driving cars for controlling an explosion in the number of combinations of parameters.

Which ONE of the following options is LEAST likely to be a reason for this incredible growth of parameters?

SELECT ONE OPTION
* Different Road Types
* Different weather conditions
* ML model metrics to evaluate the functional performance
* Different features like ADAS, Lane Change Assistance etc.

Pairwise testing is used to handle the large number of combinations of parameters that can arise in complex systems like self-driving cars. The question asks which of the given options isleast likelyto be a reason for the explosion in the number of parameters.

* Different Road Types (A): Self-driving cars must operate on various road types, such as highways, city streets, rural roads, etc. Each road type can have different characteristics, requiring the car’s system to adapt and handle different scenarios. Thus, this is a significant factor contributing to the growth of parameters.

* Different Weather Conditions (B): Weather conditions such as rain, snow, fog, and bright sunlight significantly affect the performance of self-driving cars. The car’s sensors and algorithms must adapt to these varying conditions, which adds to the

number of parameters that need to be considered.

* ML Model Metrics to Evaluate Functional Performance (C): While evaluating machine learning (ML) model performance is crucial, it does not directly contribute to the explosion of parameter combinations in the same way that road types, weather conditions, and car features do. Metrics are used to measure and assess performance but are not themselves variable conditions that the system must handle.

* Different Features like ADAS, Lane Change Assistance, etc. (D): Advanced Driver Assistance Systems (ADAS) and other features add complexity to self-driving cars. Each feature can have multiple settings and operational modes, contributing to the overall number of parameters.

Hence, theleast likelyreason for the incredible growth in the number of parameters isC. ML model metrics to evaluate the functional performance.

References:

* ISTQB CT-AI Syllabus Section 9.2 on Pairwise Testing discusses the application of this technique to manage the combinations of different variables in AI-based systems, including those used in self-driving cars.

* Sample Exam Questions document, Question #29 provides context for the explosion in parameter combinations in self-driving cars and highlights the use of pairwise testing as a method to manage this complexity.

QUESTION 24

Which ONE of the following tests is LEAST likely to be performed during the ML model testing phase?

SELECT ONE OPTION
* Testing the accuracy of the classification model.
* Testing the API of the service powered by the ML model.
* Testing the speed of the training of the model.
* Testing the speed of the prediction by the model.

The question asks which test is least likely to be performed during the ML model testing phase. Let’s consider each option:

* Testing the accuracy of the classification model (A): Accuracy testing is a fundamental part of the ML model testing phase. It ensures that the model correctly classifies the data as intended and meets the required performance metrics.

* Testing the API of the service powered by the ML model (B): Testing the API is crucial, especially if the ML model is deployed as part of a service. This ensures that the service integrates well with other systems and that the API performs as expected.

* Testing the speed of the training of the model (C): This is least likely to be part of the ML model testing phase. The speed of training is more relevant during the development phase when optimizing and tuning the model. During testing, the focus is more on the model’s performance and behavior rather than how quickly it was trained.

* Testing the speed of the prediction by the model (D): Testing the speed of prediction is important to ensure that the model meets performance requirements in a production environment, especially for real-time applications.

References:

* ISTQB CT-AI Syllabus Section 3.2 on ML Workflow and Section 5 on ML Functional Performance Metrics discuss the focus of testing during the model testing phase, which includes accuracy and prediction speed but not the training speed.

QUESTION 25

A software component uses machine learning to recognize the digits from a scan of handwritten numbers. In the scenario above, which type of Machine Learning (ML) is this an example of?

SELECT ONE OPTION
* Reinforcement learning
* Regression
* Classification
* Clustering

Recognizing digits from a scan of handwritten numbers using machine learning is an example of classification.

Here’s a breakdown:

* Classification: This type of machine learning involves categorizing input data into predefined classes.

In this scenario, the input data (handwritten digits) are classified into one of the 10 digit classes (0-9).

* Why Not Other Options:

* Reinforcement Learning: This involves learning by interacting with an environment to achieve a goal, which does not fit the problem of recognizing digits.

* Regression: This is used for predicting continuous values, not discrete categories like digit recognition.

* Clustering: This involves grouping similar data points together without predefined classes, which is not the case here.

References:The explanation is based on the definitions of different machine learning types as outlined in the ISTQB CT-AI syllabus, specifically under supervised learning and classification.

QUESTION 26

Which ONE of the following options describes the LEAST LIKELY usage of Al for detection of GUI changes due to changes in test objects?

SELECT ONE OPTION
* Using a pixel comparison of the GUI before and after the change to check the differences.
* Using a computer vision to compare the GUI before and after the test object changes.
* Using a vision-based detection of the GUI layout changes before and after test object changes.
* Using a ML-based classifier to flag if changes in GUI are to be flagged for humans.

A: Using a pixel comparison of the GUI before and after the change to check the differences.

* Pixel comparison is a traditional method and does not involve AI. It compares images at the pixel level, which can be effective but is not an intelligent approach. It is not considered an AI usage and is the least likely usage of AI for detecting GUI changes.

B: Using computer vision to compare the GUI before and after the test object changes.

* Computer vision involves using AI techniques to interpret and process images. It is a likely usage of AI for detecting changes in the GUI.

C: Using vision-based detection of the GUI layout changes before and after test object changes.

* Vision-based detection is another AI technique where the layout and structure of the GUI are analyzed to detect changes. This is a typical application of AI.

D: Using a ML-based classifier to flag if changes in GUI are to be flagged for humans.

* An ML-based classifier can intelligently determine significant changes and decide if they need human review, which is a sophisticated AI application.

QUESTION 27

“BioSearch” is creating an Al model used for predicting cancer occurrence via examining X-Ray images. The accuracy of the model in isolation has been found to be good. However, the users of the model started complaining of the poor quality of results, especially inability to detect real cancer cases, when put to practice in the diagnosis lab, leading to stopping of the usage of the model.

A testing expert was called in to find the deficiencies in the test planning which led to the above scenario.

Which ONE of the following options would you expect to MOST likely be the reason to be discovered by the test expert?

SELECT ONE OPTION
* A lack of similarity between the training and testing data.
* The input data has not been tested for quality prior to use for testing.
* A lack of focus on choosing the right functional-performance metrics.
* A lack of focus on non-functional requirements testing.

The question asks which deficiency is most likely to be discovered by the test expert given the scenario of poor real-world performance despite good isolated accuracy.

* A lack of similarity between the training and testing data (A): This is a common issue in ML where the model performs well on training data but poorly on real-world data due to a lack of representativeness in the training data. This leads to poor generalization to new, unseen data.

* The input data has not been tested for quality prior to use for testing (B): While data quality is important, this option is less likely to be the primary reason for the described issue compared to the representativeness of training data.

* A lack of focus on choosing the right functional-performance metrics (C): Proper metrics are crucial, but the issue described seems more related to the data mismatch rather than metric selection.

* A lack of focus on non-functional requirements testing (D): Non-functional requirements are important, but the scenario specifically mentions issues with detecting real cancer cases, pointing more towards data issues.

References:

* ISTQB CT-AI Syllabus Section 4.2 on Training, Validation, and Test Datasets emphasizes the importance of using representative datasets to ensure the model generalizes well to real-world data.

* Sample Exam Questions document, Question #40 addresses issues related to data representativeness and model generalization.

QUESTION 28

The activation value output for a neuron in a neural network is obtained by applying computation to the neuron.

Which ONE of the following options BEST describes the inputs used to compute the activation value?

SELECT ONE OPTION
* Individual bias at the neuron level, activation values of neurons in the previous layer, and weights assigned to the connections between the neurons.
* Activation values of neurons in the previous layer, and weights assigned to the connections between the neurons.
* Individual bias at the neuron level, and weights assigned to the connections between theneurons.
* Individual bias at the neuron level, and activation values of neurons in the previous layer.

In a neural network, the activation value of a neuron is determined by a combination of inputs from the previous layer, the weights of the connections, and the bias at the neuron level. Here’s a detailed breakdown:

* Inputs for Activation Value:

* Activation Values of Neurons in the Previous Layer:These are the outputs from neurons in the preceding layer that serve as inputs to the current neuron.

* Weights Assigned to the Connections:Each connection between neurons has an associated weight, which determines the strength and direction of the input signal.

* Individual Bias at the Neuron Level:Each neuron has a bias value that adjusts the input sum, allowing the activation function to be shifted.

* Calculation:

* The activation value is computed by summing the weighted inputs from the previous layer and adding the bias.

* Formula: z=(wiai)+bz = sum (w_i cdot a_i) + bz=(wiai)+b, where wiw_iwi are the weights, aia_iai are the activation values from the previous layer, and bbb is the bias.

* The activation function (e.g., sigmoid, ReLU) is then applied to this sum to get the final activation value.

* Why Option A is Correct:

* Option A correctly identifies all components involved in computing the activation value: the individual bias, the activation values of the previous layer, and the weights of the connections.

* Eliminating Other Options:

* B. Activation values of neurons in the previous layer, and weights assigned to the connections between the neurons: This option misses the bias, which is crucial.

* C. Individual bias at the neuron level, and weights assigned to the connections between the neurons: This option misses the activation values from the previous layer.

* D. Individual bias at the neuron level, and activation values of neurons in the previous layer:

This option misses the weights, which are essential.

References:

* ISTQB CT-AI Syllabus, Section 6.1, Neural Networks, discusses the components and functioning of neurons in a neural network.

* “Neural Network Activation Functions” (ISTQB CT-AI Syllabus, Section 6.1.1).

QUESTION 29

Which ONE of the following is the BEST option to optimize the regression test selection and prevent the regression suite from growing large?

SELECT ONE OPTION
* Identifying suitable tests by looking at the complexity of the test cases.
* Using of a random subset of tests.
* Automating test scripts using Al-based test automation tools.
* Using an Al-based tool to optimize the regression test suite by analyzing past test results
* A. Identifying suitable tests by looking at the complexity of the test cases.

* While complexity analysis can help in selecting important test cases, it does not directly address the issue of optimizing the entire regression suite effectively.

* B. Using a random subset of tests.

* Randomly selecting test cases may miss critical tests and does not ensure an optimized regression suite. This approach lacks a systematic method for ensuring comprehensive coverage.

* C. Automating test scripts using AI-based test automation tools.

* Automation helps in running tests efficiently but does not inherently optimize the selection of tests to prevent the suite from growing too large.

* D. Using an AI-based tool to optimize the regression test suite by analyzing past test results.

* This is the most effective approach as AI-based tools can analyze historical test data, identify patterns, and prioritize tests that are more likely to catch defects based onpast results. This method ensures an optimized and manageable regression test suite by focusing on the most impactful test cases.

Therefore, the correct answer isDbecause using an AI-based tool to analyze past test results is the best option to optimize regression test selection and manage the size of the regression suite effectively.

QUESTION 30

Written requirements are given in text documents, which ONE of the following options is the BEST way to generate test cases from these requirements?

SELECT ONE OPTION
* Natural language processing on textual requirements
* Analyzing source code for generating test cases

* Machine learning on logs of execution
* GUI analysis by computer vision

When written requirements are given in text documents, the best way to generate test cases is by using Natural Language Processing (NLP). Here’s why:

* Natural Language Processing (NLP): NLP can analyze and understand human language. It can be used to process textual requirements to extract relevant information and generate test cases. This method is efficient in handling large volumes of textual data and identifying key elements necessary for testing.

* Why Not Other Options:

* Analyzing source code for generating test cases: This is more suitable for white-box testing where the code is available, but it doesn’t apply to text-based requirements.

* Machine learning on logs of execution: This approach is used for dynamic analysis based on system behavior during execution rather than static textual requirements.

* GUI analysis by computer vision: This is used for testing graphical user interfaces and is not applicable to text-based requirements.

References:This aligns with the methodology discussed in the syllabus under the section on using AI for generating test cases from textual requirements.

QUESTION 31

“AllerEgo” is a product that uses sell-learning to predict the behavior of a pilot under combat situation for a variety of terrains and enemy aircraft formations. Post training the model was exposed to the real- world data and the model was found to bebehaving poorly. A lot of data quality tests had been performed on the data to bring it into a shape fit for training and testing.

Which ONE of the following options is least likely to describes the possible reason for the fall in the performance, especially when considering the self-learning nature of the Al system?

SELECT ONE OPTION
* The difficulty of defining criteria for improvement before the model can be accepted.
* The fast pace of change did not allow sufficient time for testing.
* The unknown nature and insufficient specification of the operating environment might have caused the poor performance.
* There was an algorithmic bias in the Al system.

* A. The difficulty of defining criteria for improvement before the model can be accepted.

* Defining criteria for improvement is a challenge in the acceptance of AI models, but it is not directly related to the performance drop in real-world scenarios. It relates more to the evaluation and deployment phase rather than affecting the model’s real-time performance post-deployment.

* B. The fast pace of change did not allow sufficient time for testing.

* This can significantly affect the model’s performance. If the system is self-learning, it needs to adapt quickly, and insufficient testing time can lead to incomplete learning and poor performance.

* C. The unknown nature and insufficient specification of the operating environment might have caused the poor performance.

* This is highly likely to affect performance. Self-learning AI systems require detailed specifications of the operating environment to

adapt and learn effectively. If the environment is insufficiently specified, the model may fail to perform accurately in real-world scenarios.

* D. There was an algorithmic bias in the AI system.

* Algorithmic bias can significantly impact the performance of AI systems. If the model has biases, it will not perform well across different scenarios and data distributions.

Given the context of the self-learning nature and the need for real-time adaptability, optionAis least likely to describe the fall in performance because it deals with acceptance criteria rather than real-time performance issues.

QUESTION 32

A ML engineer is trying to determine the correctness of the new open-source implementation *X”, of a supervised regression algorithm implementation. R-Square is one of the functional performance metrics used to determine the quality of the model.

Which ONE of the following would be an APPROPRIATE strategy to achieve this goal?

SELECT ONE OPTION
* Add 10% of the rows randomly and create another model and compare the R-Square scores of both the model.
* Train various models by changing the order of input features and verify that the R-Square score of these models vary significantly.
* Compare the R-Square score of the model obtained using two different implementations that utilize two different programming languages while using the same algorithm and the same training and testing data.
* Drop 10% of the rows randomly and create another model and compare the R-Square scores of both the models.
* A. Add 10% of the rows randomly and create another model and compare the R-Square scores of both the models.

* Adding more data to the training set can affect the R-Square score, but it does not directly verify the correctness of the implementation.

* B. Train various models by changing the order of input features and verify that the R-Square score of these models vary significantly.

* Changing the order of input features should not significantly affect the R-Square score if the implementation is correct, but this approach is more about testing model robustness rather than correctness of the implementation.

* C. Compare the R-Square score of the model obtained using two different implementations that utilize two different programming languages while using the same algorithm and the same training and testing data.

* This approach directly compares the performance of two implementations of the same algorithm.

If both implementations produce similar R-Square scores on the same training and testing data, it suggests that the new implementation “X” is correct.

* D. Drop 10% of the rows randomly and create another model and compare the R-Square scores of both the models.

* Dropping data can lead to variations in the R-Square score but does not directly verify the

* correctness of the implementation.

Therefore, optionCis the most appropriate strategy because it directly compares the performance of the new implementation “X” with another implementation using the same algorithm and datasets, which helps in verifying the correctness of the implementation.

QUESTION 33

Which ONE of the following options does NOT describe a challenge for acquiring test data in ML systems?

SELECT ONE OPTION
* Compliance needs require proper care to be taken of input personal data.
* Nature of data constantly changes with lime.
* Data for the use case is being generated at a fast pace.
* Test data being sourced from public sources.

Challenges for Acquiring Test Data in ML Systems:Compliance needs, the changing nature of data over time, and sourcing data from public sources are significant challenges. Data being generated quickly is generally not a challenge; it can actually be beneficial as it provides more data for training and testing.

Reference:ISTQB_CT-AI_Syllabus_v1.0, Sections on Data Preparation and Data Quality Issues.