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## ISTQB CT-AI Exam Syllabus Topics:

Topic	Details
Topic 1	<ul style="list-style-type: none"> <li>Methods and Techniques for the Testing of AI-Based Systems: In this section, the focus is on explaining how the testing of ML systems can help prevent adversarial attacks and data poisoning.</li> </ul>
Topic 2	<ul style="list-style-type: none"> <li>Test Environments for AI-Based Systems: This section is about factors that differentiate the test environments for AI-based</li> </ul>
Topic 3	<ul style="list-style-type: none"> <li>systems from those required for conventional systems.</li> </ul>
Topic 4	<ul style="list-style-type: none"> <li>Testing AI-Based Systems Overview: In this section, focus is given to how system specifications for AI-based systems can create challenges in testing and explain automation bias and how this affects testing.</li> </ul>
Topic 5	<ul style="list-style-type: none"> <li>ML Functional Performance Metrics: In this section, the topics covered include how to calculate the ML functional performance metrics from a given set of confusion matrices.</li> </ul>
Topic 6	<ul style="list-style-type: none"> <li>Quality Characteristics for AI-Based Systems: This section covers topics covered how to explain the importance of flexibility and adaptability as characteristics of AI-based systems and describes the vitality of managing evolution for AI-based systems. It also covers how to recall the characteristics that make it difficult to use AI-based systems in safety-related applications.</li> </ul>
Topic 7	<ul style="list-style-type: none"> <li>Using AI for Testing: In this section, the exam topics cover categorizing the AI technologies used in software testing.</li> </ul>
Topic 8	<ul style="list-style-type: none"> <li>Neural Networks and Testing: This section of the exam covers defining the structure and function of a neural network including a DNN and the different coverage measures for neural networks.</li> </ul>
Topic 9	<ul style="list-style-type: none"> <li>ML: Data: This section of the exam covers explaining the activities and challenges related to data preparation. It also covers how to test datasets create an ML model and recognize how poor data quality can cause problems with the resultant ML model.</li> </ul>

## ISTQB Certified Tester AI Testing Exam Sample Questions (Q19-Q24):

### NEW QUESTION # 19

A transportation company operates three types of delivery vehicles in its fleet. The vehicles operate at different speeds (slow, medium, and fast). The transportation company is attempting to optimize scheduling and has created an AI-based program to plan routes for its vehicles using records from the medium-speed vehicle traveling to selected destinations. The test team uses this data in metamorphic testing to test the accuracy of the estimated travel times created by the AI route planner with the actual routes and times.

Which of the following describes the next phase of metamorphic testing?

- A. The team tests the time required for the fast and slow vehicles to travel the same route as the medium vehicle. Then, by calculating the speed difference, they then predict how much faster or slower the vehicles will travel. That information is then used to verify that the arrival time of the vehicles meets the expected result.
- B. The team uses an AI system to select the most dissimilar routes. With this information, any of the AI routes can be metaphorically transformed into a fast or slow route.
- C. The team uses the same AI route planner to create routes that are longer and shorter but follow the same track. Finally, by driving the fast vehicles on the long routes and slow vehicles on the short routes and vice versa, the AI system will have enough information to infer travel times for all vehicles on all routes.
- D. The team decomposes each route into the relevant components that affect the travel time such as traffic density and vehicle power. The team then uses statistical analysis to characterize the influence of each component to calculate the fast and slow vehicle route times.

### Answer: A

Explanation:

Metamorphic Testing (MT) is a testing technique that verifies AI-based systems by generating follow-up test cases based on existing test cases. These follow-up test cases adhere to a Metamorphic Relation (MR), ensuring that if the system is functioning correctly, changes in input should result in predictable changes in output.

- \* Metamorphic testing works by transforming source test cases into follow-up test cases
- \* Here, the source test case involves testing the medium-speed vehicle's travel time.
- \* The follow-up test cases are derived by extrapolating travel times for fast and slow vehicles using predictable relationships based on speed differences.
- \* MR states that modifying input should result in a predictable change in output
- \* Since the speed of the vehicle is a known factor, it is possible to predict the new arrival times and verify whether they follow expected trends.
- \* This is a direct application of metamorphic testing principles
- \* In route optimization systems, metamorphic testing often applies transformations to speed, distance, or conditions to verify expected outcomes.
- \* (B) Decomposing each route into traffic density and vehicle power#
- \* While useful for statistical analysis, this approach does not generate follow-up test cases based on a defined metamorphic relation (MR).
- \* (C) Selecting dissimilar routes and transforming them into a fast or slow route#
- \* This does not follow metamorphic testing principles, which require predictable transformations.
- \* (D) Running fast vehicles on long routes and slow vehicles on short routes#
- \* This method does not maintain a controlled MR and introduces too many uncontrolled variables.
- \* Metamorphic testing generates follow-up test cases based on a source test case. "MT is a technique aimed at generating test cases which are based on a source test case that has passed. One or more follow-up test cases are generated by changing (metamorphizing) the source test case based on a metamorphic relation (MR)."
- \* MT has been used for testing route optimization AI systems. "In the area of AI, MT has been used for testing image recognition, search engines, route optimization and voice recognition, among others." Why Option A is Correct? Why Other Options are Incorrect? References from ISTQB Certified Tester AI Testing Study Guide Thus, option A is the correct answer, as it aligns with the principles of metamorphic testing by modifying input speeds and verifying expected results.

### NEW QUESTION # 20

Which ONE of the following combinations of Training, Validation, Testing data is used during the process of learning/creating the model?

SELECT ONE OPTION

- A. Training data \* test data
- B. Validation data - test data
- C. **Training data - validation data - test data**
- D. Training data - validation data

### Answer: C

Explanation:

The process of developing a machine learning model typically involves the use of three types of datasets:

Training Data: This is used to train the model, i.e., to learn the patterns and relationships in the data.

Validation Data: This is used to tune the model's hyperparameters and to prevent overfitting during the training process.

Test Data: This is used to evaluate the final model's performance and to estimate how it will perform on unseen data.

Let's analyze each option:

A . Training data - validation data - test data

This option correctly includes all three types of datasets used in the process of creating and validating a model. The training data is used for learning, validation data for tuning, and test data for final evaluation.

B . Training data - validation data

This option misses the test data, which is crucial for evaluating the model's performance on unseen data after the training and validation phases.

C . Training data - test data

This option misses the validation data, which is important for tuning the model and preventing overfitting during training.

D . Validation data - test data

This option misses the training data, which is essential for the initial learning phase of the model.

Therefore, the correct answer is A because it includes all necessary datasets used during the process of learning and creating the

model: training, validation, and test data.

### NEW QUESTION # 21

A company is using a spam filter to attempt to identify which emails should be marked as spam. Detection rules are created by the filter that causes a message to be classified as spam. An attacker wishes to have all messages internal to the company be classified as spam. So, the attacker sends messages with obvious red flags in the body of the email and modifies the "from" portion of the email to make it appear that the emails have been sent by company members. The testers plan to use exploratory data analysis (EDA) to detect the attack and use this information to prevent future adversarial attacks.

How could EDA be used to detect this attack?

- A. EDA can detect and remove the false emails
- B. EDA cannot be used to detect the attack
- C. EDA can help detect the outlier emails from the real emails
- D. EDA can restrict how many inputs can be provided by unique users

#### Answer: C

Explanation:

The syllabus explains that EDA can be used to analyze data to identify outliers and unusual patterns, which can indicate adversarial attacks like data poisoning:

"Testing to detect data poisoning is possible using EDA, as poisoned data may show up as outliers." (Reference: ISTQB CT-AI Syllabus v1.0, Section 9.1.2, page 67 of 99)

### NEW QUESTION # 22

Which ONE of the following characteristics is the least likely to cause safety related issues for an AI system?

SELECT ONE OPTION

- A. Self-learning
- B. Robustness
- C. High complexity
- D. Non-determinism

#### Answer: B

Explanation:

The question asks which characteristic is least likely to cause safety-related issues for an AI system. Let's evaluate each option:

\* Non-determinism (A): Non-deterministic systems can produce different outcomes even with the same inputs, which can lead to unpredictable behavior and potential safety issues.

\* Robustness (B): Robustness refers to the ability of the system to handle errors, anomalies, and unexpected inputs gracefully. A robust system is less likely to cause safety issues because it can maintain functionality under varied conditions.

\* High complexity (C): High complexity in AI systems can lead to difficulties in understanding, predicting, and managing the system's behavior, which can cause safety-related issues.

\* Self-learning (D): Self-learning systems adapt based on new data, which can lead to unexpected changes in behavior. If not properly monitored and controlled, this can result in safety issues.

References:

\* ISTQB CT-AI Syllabus Section 2.8 on Safety and AI discusses various factors affecting the safety of AI systems, emphasizing the importance of robustness in maintaining safe operation.

### NEW QUESTION # 23

Which of the following problems would best be solved using the supervised learning category of regression?

- A. Predicting shopper purchasing behavior based on the category of shopper and the positioning of promotional displays within a store
- B. Determining the optimal age for a chicken's egg-laying production using input data of the chicken's age and average daily egg production for one million chickens
- C. Recognizing a knife in carry-on luggage at a security checkpoint in an airport scanner
- D. Determining if an animal is a pig or a cow based on image recognition

**Answer: B**

### Explanation:

The syllabus states:

"Supervised learning... divides problems into two categories: classification and regression. Regression is used when the problem requires the ML model to predict a numeric output, for example predicting the age of a person based on their habits." (Reference: ISTQB CT-AI Syllabus v1.0, Section 3.1.1, Page 26 of 99)

## NEW QUESTION # 24

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