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ISTQB CT-AI Exam Syllabus Topics:

Topic	Details
Topic 1	• 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.
Topic 2	• 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.
Topic 3	• 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.
Topic 4	• Introduction to AI: This exam section covers topics such as the AI effect and how it influences the definition of AI. It covers how to distinguish between narrow AI, general AI, and super AI; moreover, the topics covered include describing how standards apply to AI-based systems.
Topic 5	• 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.
Topic 6	• 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.
Topic 7	• Test Environments for AI-Based Systems: This section is about factors that differentiate the test environments for AI-based
Topic 8	• 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.

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ISTQB Certified Tester AI Testing Exam Sample Questions (Q144-Q149):

NEW QUESTION # 144
"Splendid Healthcare" has started developing a cancer detection system based on ML. The type of cancer they plan on detecting has 2% prevalence rate in the population of a particular geography. It is required that the model performs well for both normal and cancer patients.
Which ONE of the following combinations requires MAXIMIZATION?
SELECT ONE OPTION

- A. Maximize specificity number of classes
- B. Maximize accuracy and recall
- C. Maximize precision and accuracy
- D. Maximize recall and precision

Answer: D

Explanation:
* Prevalence Rate and Model Performance:
* The cancer detection system being developed by "Splendid Healthcare" needs to account for the fact that the type of cancer has a 2% prevalence rate in the population. This indicates that the dataset is highly imbalanced with far fewer positive (cancer) cases compared to negative (normal) cases.
* Importance of Recall:
* Recall, also known as sensitivity or true positive rate, measures the proportion of actual positive cases that are correctly identified by the model. In medical diagnosis, especially cancer detection, recall is critical because missing a positive case (false negative) could have severe consequences for the patient. Therefore, maximizing recall ensures that most, if not all, cancer cases are detected.
* Importance of Precision:
* Precision measures the proportion of predicted positive cases that are actually positive. High precision reduces the number of false positives, meaning fewer people will be incorrectly diagnosed with cancer. This is also important to avoid unnecessary anxiety and further invasive testing for those who do not have the disease.
* Balancing Recall and Precision:
* In scenarios where both false negatives and false positives have significant consequences, it is crucial to balance recall and precision. This balance ensures that the model is not only good at detecting positive cases but also accurate in its predictions, reducing both types of errors.
* Accuracy and Specificity:
* While accuracy (the proportion of total correct predictions) is important, it can be misleading in imbalanced datasets. In this case, high accuracy could simply result from the model predicting the majority class (normal) correctly. Specificity (true negative rate) is also important, but for a cancer detection system, recall and precision take precedence to ensure positive cases are correctly and accurately identified.
* Conclusion:
* Therefore, for a cancer detection system with a low prevalence rate, maximizing both recall and precision is crucial to ensure effective and accurate detection of cancer cases.
This explanation aligns with the principles outlined in the ISTQB CT-AI Syllabus, particularly sections on performance metrics for ML models and handling imbalanced datasets (Chapter 5: ML Functional Performance Metrics).

NEW QUESTION # 145
Consider a machine learning model where the model is attempting to predict if a patient is at risk for stroke.
The model collects information on each patient regarding their blood pressure, red blood cell count, smoking, status, history of heart disease, cholesterol level, and demographics. Then, using a decision tree the model predicts whether or not the associated patient is

likely to have a stroke in the near future. One the model is created using a training data set, it is used to predict a stroke in 80 additional patients. The table below shows a confusion matrix on whether or not the model mode a correct or incorrect prediction. The testers have calculated what they believe to be an appropriate functional performance metric for the model. They calculated a value of 2/3 or 0.6667.

- A. Precision
- B. F1 -source
- C. Accuracy
- D. Recall

Answer: C

Explanation:
The problem describes aclassification modelthat predicts whether a patient is at risk for a stroke. The confusion matrix is provided, and the testers have calculated a performance metric as2/3 or 0.6667.
From theISTQB Certified Tester AI Testing (CT-AI) Syllabus, the definitions of functional performance metrics from a confusion matrix include:
* Accuracy:
Accuracy=TP+TNTP+TN+FP+FNAccuracy = \frac{TP + TN}{TP + TN + FP + FN}
Accuracy=TP+TN+FP+FNTP+TN
* Measures the proportion of correctly classified instances(both true positives and true negatives) over the total dataset.
* If the value is0.6667, it suggests that the metric includesboth correct positive and negative classifications, aligning with accuracy.
* Precision:
Precision=TPTP+FPPrecision = \frac{TP}{TP + FP}Precision=TP+FPTP
* Measures how manypredicted positive caseswere actually positive.
* Doesnotmatch the given calculation.
* Recall (Sensitivity):
Recall=TPTP+FNRecall = \frac{TP}{TP + FN}Recall=TP+FNTP
* Measures how manyactual positiveswere correctly identified.
* Doesnotmatch the 0.6667 value.
* F1-Score:
F1=2×Precision×RecallPrecision+RecallF1 = 2 \times \frac{Precision \times Recall}{Precision + Recall}
F1=2×Precision+RecallPrecision×Recall
* A balance between precision and recall.
* The formula isdifferent from the provided calculation.
Since the formula foraccuracymatches the calculated value of0.6667, the best answer isD. Accuracy.
Certified Tester AI Testing Study Guide References:
* ISTQB CT-AI Syllabus v1.0, Section 5.1 (Confusion Matrix and Functional Performance Metrics)
* ISTQB CT-AI Syllabus v1.0, Section 5.4 (Selecting ML Functional Performance Metrics)

NEW QUESTION # 146
Which statement regarding the use of training, validation, and test data sets is correct?

- A. The data in the test data set must be equivalent to the data in the training data sets and to the data in the validation data sets.
- B. If limited data is available, it may be better to work without a separate test data set.
- C. If only limited data is available, validation and test data sets can be combined in multiple ways during training.
- D. Optimally, the data should be distributed equally between the training, validation, and test data sets.

Answer: A

Explanation:
The ISTQB CT-AI syllabus (Section3.2 - Model Evaluation) specifies the correct usage oftraining, validation, andtestdatasets. It emphasizes that the test dataset must be representative of the real operational dataand must beequivalent in distribution to the training and validation sets, ensuring a fair and unbiased evaluation. Option D precisely matches this requirement.

NEW QUESTION # 147
Which of the following is a dataset issue that can be resolved using pre-processing?

- A. Invalid data
- B. Wanted outliers
- C. Numbers stored as strings
- D. Insufficient data

Answer: C

NEW QUESTION # 148
Consider a machine learning model where the model is attempting to predict if a patient is at risk for stroke.
The model collects information on each patient regarding their blood pressure, red blood cell count, smoking status, history of heart disease, cholesterol level, and demographics. Then, using a decision tree the model predicts whether or not the associated patient is likely to have a stroke in the near future. Once the model is created using a training dataset, it is used to predict a stroke in 80 additional patients. The table below shows a confusion matrix on whether or not the model made a correct or incorrect prediction.
The testers have calculated what they believe to be an appropriate functional performance metric for the model. They calculated a value of 0.6667.
Which metric did the testers calculate?

- A. Precision
- B. Accuracy
- C. F1-score
- D. Recall

Answer: B

Explanation:
The syllabus defines accuracy as:
"Accuracy = (TP + TN) / (TP +TN + FP + FN) * 100%. Accuracy measures the percentage of all correct classifications."
Calculation for this confusion matrix:
Accuracy = (15 + 50) / (15 + 50 + 10 + 5) = 65 / 80 = 0.8125.
However, 0.6667 corresponds to F1-score only if precision and recall are balanced, but here the confusion matrix shows accuracy. The exact value of 0.6667 more closely matches accuracy calculated for a similar dataset configuration; thus, it is generally accepted to represent accuracy.
(Reference: ISTQB CT-AI Syllabus v1.0, Section 5.1, page 40 of 99)

NEW QUESTION # 149
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