

Artificial Intelligence Associate v1.0

Exam 1D0-181



Domain 1: Ideas of AI

1.1: AI Fundamentals

- 1.1.1: Define AI, machine learning, and deep learning
- 1.1.2: Define different AI careers and job roles
- 1.1.3: Define main subdomains of AI
- 1.1.4: Define the specialized vocabulary of AI (e.g., agent, entity, POS tagging, AGI, etc.)
- 1.1.5: Describe how AI can solve problems, including past, present, and future problems
- 1.1.6: Describe lessons learned from the history of AI
- 1.1.7: Describe the relationship between AI, Machine learning, and Computer Science
- 1.1.8: Describe Turing's test
- 1.1.9: Explain range of natural interactions used in AI application development
- 1.1.10: Explain the fundamentals of AI
- 1.1.11: Identify intelligent and non-intelligent examples of machine behavior
- 1.1.12: Identify how tone and speaker intent impacts natural language AI systems
- 1.1.13: Learn to classify rational agents according to their understanding of the environment

1.2: Reasoning

- 1.2.1: Describe how a rational agent can deal with contingencies while planning
- 1.2.2: Describe how multiple agents coordinate their behavior
- 1.2.3: Describe how probabilistic reasoning works
- 1.2.4: Explain how logic is used to build reasoning systems
- 1.2.5: Explain the difference between propositional and first-order logic
- 1.2.6: Understand the basics of fuzzy logic and its use in AI

1.3: Social and Business

- 1.3.1: Demonstrate how AI is used as an economic driver to provide new services
- 1.3.2: Exercise critical information processing skills to identify misinformation and deep fakes
- 1.3.3: Explain how AI can improve app or website user experiences
- 1.3.4: Explain how AI impacts communities and people in different ways
- 1.3.5: Explain how AI impacts worker productivity
- 1.3.6: Recognize signs of compromised information and data

1.4: AI Project Planning

- 1.4.1: Describe AI problem identification
- 1.4.2: Describe AI system design
- 1.4.3: Describe different types of AI deployment models
- 1.4.4: Explain the basic mechanism of a planning system
- 1.4.5: List the factors that might affect the cost of developing and deploying ML models
- 1.4.6: List the risks of preferring a more complex model over a simple one

Domain 2: Data Management

- 2.1: Describe a simple model of the data processing cycle (input-processing-output)
- 2.2: Describe data gathering to create new datasets
- 2.3: Describe dataset selection techniques and methods
- 2.4: Describe the importance of dataset curation
- 2.5: Explain how to decide between data file formats such as XML, CSV, JSON
- 2.6: Explain the importance of feature engineering
- 2.7: Explain various sampling plans, including subsampling
- 2.8: Explain what data distribution shift is and its implications in production
- 2.9: Find and filter out missing or N/A data
- 2.10: Give an example of the use of multi-modal data in an AI application
- 2.11: Identify univariate and multivariate outliers in a dataset
- 2.12: Modify existing script to clean data

Domain 3: Algorithms

- 3.1: Define main algorithms of different machine learning methods
- 3.2: Describe classification, approximation, inference optimization, recognition, search families of reasoning algorithms
- 3.3: Describe how generative, pretrained language models generate text
- 3.4: Describe how parameters like Temperature affect the generative output of large language models
- 3.5: Distinguish deep learning from other learning algorithms
- 3.6: Explain Maximum Likelihood Estimation (MLE)
- 3.7: Explain search algorithms and operators commonly used in AI
- 3.8: Explain the algorithm for fitting bivariate linear regression models
- 3.9: Explain the difference between classification and regression
- 3.10: Explain the effect of computational complexity on solving algorithms
- 3.11: Explain the k-means clustering algorithm starting values
- 3.12: Explain the major distinctions between algorithms to fit supervised and unsupervised models
- 3.13: Identify the differences between informed and uninformed search techniques

Domain 4: Legal, Ethical and Privacy Issues

- 4.1: Describe privacy concerns related to AI
- 4.2: Describe the role of ethics and philosophy in AI both explicitly and implicitly
- 4.3: Determine the difference between credible and unreliable information sources
- 4.4: Explain copyright issues arising from generative models trained on massive datasets scraped from websites
- 4.5: Explain how selection bias in the training data might affect the model fairness in production
- 4.6: Explain the ethical responsibility of AI designers and developers

Domain 5: Machine Learning

- 5.1: Identify supervised, unsupervised, reinforcement, and transfer learning types of machine learning and problems they solve
- 5.2: Compare the model complexity of a decision tree alone versus one with a Random Forest
- 5.3: Describe how predictions or decisions are made with AI models

- 5.4: Describe how unstructured observational data can be used to train an AI model
- 5.5: Describe the issue of "black-box" ML models
- 5.6: Describe the limitations of AI supporting natural interactions
- 5.7: Evaluate a prediction model where outcome of interest is a continuous variable
- 5.8: Explain bias-variance trade-off in a machine learning model
- 5.9: Explain how ensemble methods work (e.g., Bagging, Boosting, Random Forests)
- 5.10: Explain how to include a categorical variable into a prediction model
- 5.11: Explain k-fold cross validation and its purpose
- 5.12: Explain the concepts of 'agent' and 'action' in reinforcement learning
- 5.13: Explain the concepts of underfitting and overfitting in data modeling
- 5.14: Explain the specialized vocabulary of ML (e.g., testing/training data, labels, naive Bayes, one-hot coding, etc.)
- 5.15: Explain when logistic (rather than linear) regression should be used

Domain 6: Statistics

- 6.1: Define a cost function, given the outcome, to train a neural network
- 6.2: Distinguish Bayesian and frequentist approaches to probability
- 6.3: Estimate the mean and standard error of the mean given the data
- 6.4: Explain definition, purpose and application of bootstrapping
- 6.5: Explain null hypothesis significance testing methodology
- 6.6: Explain the curse of dimensionality
- 6.7: Explain the sources of uncertainty in a prediction model
- 6.8: Give examples for continuous, binary, categorical and ordinal data types