

Level: 1st year "Mathematics"
Module: Introduction to Artificial Intelligence

Date: 14/05/2026
Duration: 1h30m

Exam n°2

Typical-correction

Comprehension questions

(12 points)

Complete the following expressions

- Artificial intelligence (AI) is a field of computer science that allows machines (algorithms) to simulate human intelligence. **(0.5 p)**
- What is the difference between AI, machine learning, and deep learning? **(0.75 p)**
AI: wide field of intelligent systems.
Machine Learning: a subset of AI where systems learn from data.
Deep Learning: a subset of machine learning using neural networks with many layers.
- Based on the given data, there are two primary categories of machine learning algorithms: **(1 p)**
 - In Supervised learning, the data are labeled.
 - In Unsupervised learning, the data are unlabeled.
- Data can be of many types; it can be structured or unstructured. **(0.5 p)**
- In machine learning, more data always improves learning and leads to better performance **(0.5 p)**
- Data preprocessing is a crucial step that enhances accuracy and reliability. Explain at least four techniques used in this step. **(1 p)**
Data Cleaning: remove errors, missing values.
Normalization: scale values.
Integration: merge datasets.
Reduction: remove irrelevant features.
- AI improves creativity by generating ideas quickly. **(0.25 p)**
- AI scheduling mainly helps to optimize time. **(0.25 p)**
- The Todoist tool is mainly used for task organization. **(0.25 p)**
- Brainstorming is a group problem-solving technique that requires free thinking. **(0.5 p)**
- A plagiarism detector identifies copied human works (if text matches existing, human-authored content), while an AI detector identifies machine-generated text. **(0.5 p)**
- Bias is one of the most significant problems in AI; it can emerge particularly during data collection, where the dataset may appear imbalanced. **(0.5 p)**
- What is the difference between Elicit and Scholarcy tools? **(0.5 p)**
Elicit: used to find and analyze research papers via a request entered by the user.
Scholarcy: used to summarize and simplify documents.
- When using academic databases or AI-powered search tools, an intelligent query means formulating a clear, organized, and precise search request to obtain relevant and high-quality results. **(0.5 p)**

15. Using the 5W + H method, analyze the problem: **(1.5 p)**
“Students have low performance in AI exams.”
Who: Students. What: low performance. Where: exams. When: evaluation period. Why: poor preparation. How: improve study methods.
16. K-Nearest Neighbors (KNN) is a simple supervised machine-learning algorithm. Explain the workflow of this algorithm. **(1 p)**
KNN classifies data points (samples) based on their k closest neighbors in the dataset. The idea is that similar points are near each other. In a classification task, the algorithm uses distance metrics, such as Euclidean distance, to find neighbors and a majority vote of its neighbors' labels to determine the appropriate label.
17. Explain the full ML pipeline and identify potential error (problem) points. **(2 p)**
- Data Collection : gather the data.**
 - Preprocessing: clean and prepare the date.**
 - Training: train the model using training dataset.**
 - Evaluation: test the model using test dataset**
 - Deployment: use the generated (trained and tested) model in the real world.**
- Error points:
- Poor data (imbalanced, noisy ...)**
 - Choose the wrong model.**

Case study analysis (8 points)

Case 1. A hospital uses an Artificial Intelligence system that analyzes **X-ray images** to detect tumors (exist “1”, not-exist “0”).

Questions

- Identify the AI domain
Computer Vision. Because the system analyzes images to detect tumors. (0.5 p)
- Is this Weak or Strong AI? Justify
Weak AI. Because it performs a specific task (tumor detection). (1 p)
- Is this Symbolic or Connectionist AI?
Connectionist AI. Uses deep learning to learn from a large image dataset. (1 p)
- What type of learning is used?
Supervised learning. (0.5 p)

Case 2. A chatbot answers student questions and improves its performance over time by utilizing large amounts of text data.

Questions:

- Identify the AI domain
Natural Language Processing (NLP). (0.5 p)
- Is this Symbolic or Connectionist AI?
Connectionist AI, based on neural networks and large language models. (1 p)
- Explain why it is not Strong AI **(1 p)**
It lacks consciousness. It cannot think like humans in all areas.

Case 3. Propose a real-world AI system and classify it according to:

- | | | |
|----|--|----------------|
| | Face recognition system. | (1 p) |
| 1. | AI type (weak/strong)
Weak AI. | (0.5 p) |
| 2. | AI domain
Computer vision. | (0.5 p) |
| 3. | Learning type
Supervised learning. | (0.5 p) |