El Oued University
Faculty of Exact Sciences
Department of Computer Science

Correction type

Full name: .....
Specialty: .....
Duration 1:30h. - Year: 2024/2025

Semestrial Exam of Machine Learning for IoT

Part1 - 9pts -:

Select the right answer:

0,75 for each

1- Which of the following BEST describes the Internet of Things (IoT)?
- ☐ A network of interconnected computers.
- ☑ A network of physical objects embedded with sensors and software, enabling data exchange.
- ☐ A new type of internet browser.
- ☐ A social media platform for devices.

2- Which of these is NOT a typical layer in an IoT reference model?
- ☐ Application Layer
- ☑ Presentation Layer
- ☐ Network/Connectivity Layer
- ☐ Device/Hardware Layer

3- The data generated by IoT devices is often characterized by: (Select all that apply)
- ☐ Small volumes
- ☑ Continuous streams
- ☑ Autocorrelation (time-series data)
- ☐ Static and unchanging nature

4- Which of the following metrics is typically used for evaluating regression models? (Select all that apply)
- ☐ Accuracy
- ☑ Mean Squared Error (MSE)
- ☑ R-squared (R^2)
- ☐ Precision and Recall

5- Which of the following metrics is typically used for evaluating classification models? (Select all that apply)
- ☑ Accuracy
- ☐ Mean Squared Error (MSE)
- ☑ R-squared (R^2)
- ☑ Precision and Recall

6- Which of the following techniques can be used to handle imbalanced datasets? (Select all that apply)
- ☐ Data normalization
- ☑ Oversampling the minority class
- ☑ Undersampling the majority class
- ☐ Feature selection

7- Which type of neural network is best suited for processing sequential data like time series? (Select all that apply)
- ☐ Faster-RCNN
- ☑ RNN
- ☐ CNN
- ☑ LSTM

8- Transfer learning involves:
- ☐ Training a model from scratch
- ☑ Using a pre-trained model for a new task
- ☐ Reducing the size of the dataset
- ☐ Simplifying the model architecture

9- Which metric is NOT typically used for resource constraint assessment in IoT?
- ☐ Memory footprint
- ☐ Processing power (MIPS/FLOPS)
- ☑ Network bandwidth of the training data
- ☐ Energy budget

10- Which of the following is NOT a temporal metric for IoT model evaluation?
- ☐ Inference latency
- ☐ Warm-up time
- ☑ Accuracy
- ☐ Time to first prediction

11- Which dimensionality reduction technique is useful for extracting features from time series data?
- ☐ Feature Selection
- ☐ Principal Component Analysis (PCA)
- ☐ Sensor Fusion
- ☑ All of the above

12- Overfitting in deep learning refers to:
- ☐ A model that is too simple
- ☐ A model that performs poorly on both training and test data
- ☑ A model that memorizes the training data
- ☐ A model that generalizes well

Part2 - 7pts -:

The following are steps involved in a machine learning project. Arrange them in the correct sequence:

A.	Evaluate model performance on a test set.	1- C
B.	Select relevant features from the preprocessed data.	2- E
C.	Collect raw data from various sources.	3- B
D.	Deploy the final model to production.	4- G
E.	Handle missing values and outliers in the collected data.	5- F
F.	Tune model hyperparameters using cross-validation.	6- A
G.	Train the chosen model on the training data.	7- D
H.	Monitor the deployed model's performance and retrain if necessary.	8- H

3

Matching the following terms with their corresponding descriptions:
Terms: - **CNN – LSTM – RELU – Supervised learning – Unsupervised learning – Overfitting – Underfitting – Feature Engineering**

Term	Description
Supervised learning	Learning from labeled data to predict outputs.
Feature Engineering	The process of creating new features from existing ones to improve model performance.
Under fitting	Model is too simple and performs poorly on both training and test data.
unsupervised	Learning from unlabeled data to find patterns.
CNN	Used for image classification, object detection, and image segmentation.
Over fitting	Model performs well on training data but poorly on unseen data.
RELU	popular activation function that helps mitigate the vanishing gradient problem.
LSTM	Used for natural language processing, speech recognition, and time series analysis.

A

Part3 – 4pts- :

In the mini project we did in the Practical work -**TP**-,from which track you chose for the project (Track A: IoT Sensor Data Analysis or Track B: IoT Visual Inspection Systems). Provide the following details about your choice:

1- The dataset(s) you selected. TP 0,5
2- The specific use case(s) you addressed. – Supervised or not , Classification or regression ... - TP 0,75
3- The data preprocessing and the features engineering relevant to your implementation. TP 0,75
4- The model architecture you use. TP 0,5
5- The optimization techniques you applied and why. TP 0,75
6- The tool or method you used for training and edge deployment simulation. TP 0,75