Exam for course 2

Surname :
Firstname :
Please report your answers on this page only. Questions are on the following pages.

Question 1 (G-2.1) : Challenges of supervised learning

Question 2 (G-2.2) : Overfitting

1.
2.
3.

Question 3 (G-2.3) : Supervised learning

Question 4 (B-2.1) : Challenges of supervised learning

Question 5 (B-2.2) : VC dimension

Question 6 (B-2.3) : Open questions in supervised learning

[Green] Question 1 : Challenges of supervised learning

Explain in a few words what the Riemannian manifolds problem means in the context of supervised learning.

[Green] Question 2 : Overfitting

For each of the following propositions, report if it corresponds to a case of *underfitting*, *overfitting* or none of them.

1. On a challenge with two classes, the fact to obtain 50% accuracy on the training set.
2. The fact to generalize perfectly on unseen example with 100% accuracy
3. The fact to learn numerical answers to a math exam by heart and not be able to produce answers for a new instance of the same exam.

[Green] Question 3 : Supervised learning

Indicate which of the following propositions correspond to a supervised learning problem :

1. Learning to recognize objects in images through annotated examples
2. Learning to recognize objects in images by looking at tons of unlabelled images
3. Learning to detect tumors in medical signals with a big collection of mixed unlabelled healthy/nonhealthy examples
4. Learning to detect tumors in medical signals with examples of healthy signals on one part and unhealthy on the other part

[Blue] Question 4 : Challenges of supervised learning

Cite at least 4 challenges of supervised learning seen during class.

[Blue] Question 5 : VC dimension

What is the VC dimension of hyperplanes to shatter points with $d = 3$?

[Blue] Question 6 : Open questions in supervised learning

Explain briefly what the choice of hyperparameters problem is about.