

Name: \_\_\_\_\_

Introduction to Machine Learning

Exam A

Neptun: \_\_\_\_\_

2024.12.17.

1. (10 points) What does the "IKEA test" (designed to test Artificial General Intelligence) consist of?
2. (10 points) What is the supervised learning method? Draw a figure to introduce the mechanism of the method!
3. (10 points) What are the main types of deep reinforcement learning algorithms? What is the goal of each approach?
4. (20 points) A genetic algorithm uses binary coded individuals. In a given generation, there are 6 individuals. The individuals and their fitness values are as follows:

$x_1 = [0110111001]$ , fitness: 5  
 $x_2 = [0101100101]$ , fitness: 27  
 $x_3 = [1010011100]$ , fitness: 30  
 $x_4 = [0010010011]$ , fitness: 33  
 $x_5 = [1101101100]$ , fitness: 5  
 $x_6 = [1010101010]$ , fitness: 100

Using a roulette wheel selection, calculate the expected number of copies of each individual in the crossover while maintaining a constant population size, i.e., select 6 parents, which will be the parents during the crossover! Illustrate the crossover with the selected parent individuals, and then also show the mutation with uniform mutation, assuming a mutation probability of 5% per bit!

5. (15 points) What components affect the weight modification in Perceptron's training algorithm?
6. (15 points) In the Schelling model, what will agent A do, if its tolerance level is 45% and its color is RED and it is in the following neighborhood:

RED	BLUE	RED
BLUE	Agent A	BLUE
RED	BLUE	RED