You have a problem that is NP-hard and you decide to attempt to solve it with Ant Colony Optimisation. In what sort of problem you need to transform it?

Select one or more:

☐ Into a classification problem.

☐ You don't need to transform it, just let the algorithm to do it for you.

☑ In a problem of identifying the optimal path in an oriented graph. ✔

☐ Into the knapsack problem.

Your answer is correct.

The correct answer is: In a problem of identifying the optimal path in an oriented graph.

Consider two individuals (represented as permutations) of size 9 and apply an order crossover to them.

| 1 , 4 , 6 , 2 , 3 , 8 , 5 , 7 , 9 |

| 2 , 1 , 9 , 6 , 5 , 4 , 7 , 8 , 3 |

What is the proper result if the cut poits are after the 3-rd and 6-th position?

Select one or more:

| 1 , 9 , 6 , 8 , 2 , 3 , 5 , 4 , 7 |

| 1 , 2 , 3 , 5 , 4 , 6 , 8 , 7 , 9 |

☐

| 1 , 9 , 8 , 2 , 3 , 5 , 6 , 4 , 7 |

| 1 , 2 , 6 , 5 , 4 , 3 , 8 , 7 , 9 |

☐

2 , 1 , 9 , 2 , 3 , 8 , 7 , 8 , 3

1 , 4 , 6 , 6 , 5 , 4 , 5 , 7 , 9

✗

1 , 9 , 6 , 2 , 3 , 8 , 5 , 4 , 7

1 , 2 , 3 , 6 , 5 , 4 , 8 , 7 , 9

Your answer is incorrect.

1 , 9 , 6 , 2 , 3 , 8 , 5 , 4 , 7

1 , 2 , 3 , 6 , 5 , 4 , 8 , 7 , 9

The correct answer is:

Many AI methods are based on examples from nature.

Particle Swarm Optimisation is based on:

Select one or more:

- ☐ In the theory of evolution.
- ☑ The behaviour of birds or murmuration of fish. ✔
- ☐ This method is not inspired from nature as other AI methods.
- ☐ The random movements of particles.

Your answer is correct.

The correct answer is: The behaviour of birds or murmuration of fish.

You design an Evolutionary Algorithm for a given problem using a Generationist model. Select thecorrect properties of sunch model that must be reflected within your application:

Select one or more:

☑ Each individual survives a generation only. ✔

☑ a set of parents is totally replaced by the set of offsprings. ✔

☑ At each generation it creates μ offsprings. ✔

☐ A bad offspring is replaced by it's parent.

Your answer is correct.

The correct answers are: At each generation it creates μ offsprings., Each individual survives a generation only., a set of parents is totally replaced by the set of offsprings.
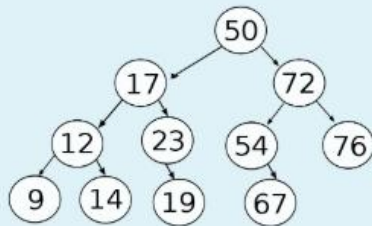
In what order during a BFS search the nodes from the following tree will be visited?

Select one or more:

- ☑ 50, 17, 72, 12, 23, 54, 76, 9, 14, 19, 67 ✔
- ☐ 50, 72, 17, 76, 54, 23, 12, 64, 19, 14, 9
- ☐ 50, 17, 72, 54, 76, 12, 23, 9, 14, 19, 67
- ☐ None of the before options is correct.

Your answer is partially correct.

You have correctly selected 1.
The correct answers are: 50, 17, 72, 12, 23, 54, 76, 9, 14, 19, 67, 50, 72, 17, 76, 54, 23, 12, 64, 19, 14, 9

Match each description of a method with its name.

The best ant only deposits pheromones after a solution is complete constructed. Deposited pheromones is limited to a given range.

[MaxMin Ant System ⬍]

✔

All the ants deposit pheromones after a solution is complete constructed.

[Ant Colony System ⬍]

✘

All the ants deposit pheromones at each step of solution construction. The best ant only deposits pheromone after the solution is complete constructed.

[Ant System ⬍]

✘

Your answer is partially correct.

You have correctly selected 1.

The correct answer is: The best ant only deposits pheromones after a solution is complete constructed. Deposited pheromones is limited to a given range. → MaxMin Ant System, All the ants deposit pheromones after a solution is complete constructed. → Ant System, All the ants deposit pheromones at each step of solution construction. The best ant only deposits pheromone after the solution is complete constructed. → Ant Colony System

Choose the correct caracteristics for the binary representation, primary used in Evolutionary Computation:

Select one or more:

- ☐ There is usually an encoder and a decoder that allow the user to understand the store information.

- ☐ Other values can apear within a binary representation but through survival selection and adjustments they are removed.

- ☑ These representations are lists of zero and one. ✔

- ☑ Once a bit riches a certain value (0 or 1) a cut is performed in order to preserve the genotip of the indiviual represented binary. ✖

Your answer is incorrect.

The correct answers are: These representations are lists of zero and one., There is usually an encoder and a decoder that allow the user to understand the store information.

When computing a velocity for a particle, using a PSO method, you have a parameter **inertia**. Specify the correct properties of this parameter.

Select one or more:

- ☑ Can be constant or descending. ✔
- ☑ Forces the particle to move in the same direction until now. ✔
- ☐ Forces the particle to move towards its best position.
- ☑ Balance the search between global exploration and local exploration. ✔

Your answer is correct.

The correct answers are: Forces the particle to move in the same direction until now., Balance the search between global exploration and local exploration., Can be constant or descending.

Match the caracteristics of an Artificial Neural Network with a real neural network.

soma	processing ⇕	✖
axon	input ⇕	✖
synapse	output ⇕	✖
activation	node ⇕	✖
dendrite	weighted connection ⇕	✖

Your answer is incorrect.

The correct answer is: soma → node, axon → output, synapse → weighted connection, activation → processing, dendrite → input

How you initialise an Artificial Neural Network?

Select one or more:

☐ There is no initialization, the network will learn from the dataset the initial values.

☐ The inputs will be zero.

☑ Radomly assign values to the weights. ✔

☐ Randomly assign values to the outputs.

Your answer is correct.

The correct answer is: Radomly assign values to the weights.

For a binary representation match the proper answers to the given questions.

What crossover can you use? | The knapsack problem. ⬍ | ✖

What problem can be solved easy with a binary representation? | The knapsack problem. ⬍ | ✔

Your answer is partially correct.

You have correctly selected 1.

The correct answer is: What crossover can you use? → Uniform crossover, What problem can be solved easy with a binary representation? → The knapsack problem.

You want to train an Artificial Neural Network for a complex classification problem. The information from the dataset is labeled in four classes. Each entry is composed from an array of five attributes and a label. What is a possible structure for this problem?

Select one:

- ⦿ 5 : 6 : 4 ✔
- ◯ 7 : 6 : 4
- ◯ 5 : 6 : 2
- ◯ 6 : 4

Your answer is correct.

The correct answer is: 5 : 6 : 4

Check the correct affirmations regarding a population of individuals in an Evolutionary algoithm.

Select one or more:

☐ The candidates to solutions should be uniformly distributed in the search space (if it is possible).

☐ The population doesn't change its contents during the entire run of the algorithm.

☑ The population is randomly assingned in the begining of the algorithm. ✔

☑ The reproduction pool is selected from the current population. ✔

Your answer is partially correct.

You have correctly selected 2.

The correct answers are: The candidates to solutions should be uniformly distributed in the search space (if it is possible)., The population is randomly assingned in the begining of the algorithm., The reproduction pool is selected from the current population.

Consider a permuation of n elements as representation for the "n - Queen" problem. Please check all the cathegories where this representation belongs

Select one or more:

- ☐ non - binary, discrete
- ☐ continuous
- ☑ tree based ✖
- ☐ class - based
- ☐ binary

Your answer is incorrect.

The correct answer is: non - binary, discrete

Consider the following formula:

$$v_{id} = w * v_{id} + c_1 * rand() * (p_{Bestd} - x_{id}) + c_2 * rand() * (g_{Bestd} - x_{id})$$

Check the correct statements related to this formula.

Select one or more:

☑ c_1 and c_2 will be determined by the algorithm while running.

✗

☐ v_{id} is the velocity of a particle.

☐ You can find in this formula the current position and also the best position of a particle.

☐ It updates the position of the particle.

Your answer is incorrect.

The correct answers are: v_{id} is the velocity of a particle.

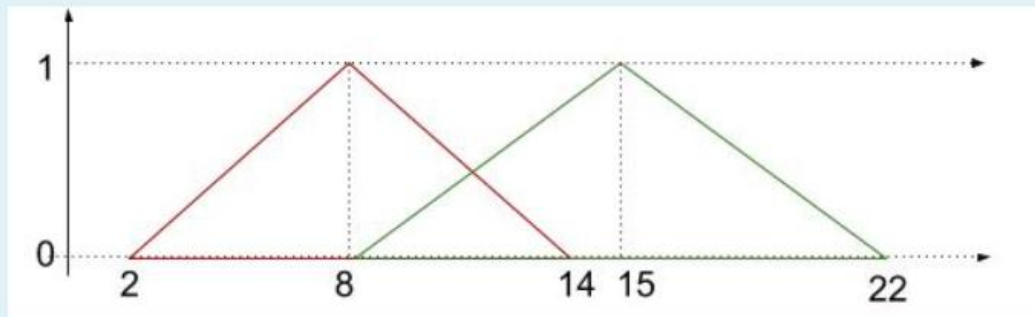, You can find in this formula the current position and also the best position of a particle.

Consider the fuzzy classes described by the following diagram

Compute the membership degree of value 10 to bouth classes (red and green).

Select one:

○ $\mu_{red}(10) = 0.66$ and $\mu_{green}(10) = 2.85$

◉ $\mu_{red}(10) = 0.25$ and $\mu_{green}(10) = 0.75$

✗

○ $\mu_{red}(10) = 2$ and $\mu_{green}(10) = 0.5$

○ $\mu_{red}(10) = 0$ and $\mu_{green}(10) = 0$

Your answer is incorrect.

The correct answer is: $\mu_{red}(10) = 0.66$ and $\mu_{green}(10) = 2.85$

In a feed foward Artificial Neural Network there are connections between nodes from the same layer.

Select one:

○ True

◉ False ✔

The correct answer is 'False'.

Check some of the possible activation functions from an Artificial Neural Network.

Select one or more:

- ☑ Gaussian function ✔
- ☑ Linear function ✔
- ☑ Sigmoid function ✔
- ☐ Error function
- ☑ Constant function ✔

Your answer is correct.

The correct answers are: Sigmoid function, Constant function, Linear function, Gaussian function

You attempt to solve a problem that fits a binary representation with a PSO. What will you change in order to conserve the representation while you adapt the particles' positions using the velocity?

Select one or more:
- ☑ The process of updating the particle's position. ✔
- ☐ Reset the particle position every time you get out of the domain.
- ☑ Reduce the inertia so the new update position will not exceed the domain. ✘
- ☐ The evaluation of the best particle.

Your answer is partially correct.

You have selected too many options.
The correct answer is: The process of updating the particle's position.

The Ant Colony Optimisation (based on the social behaviour of ants) has same particularities. Check the correct statements from the following list.

Select one or more:
- ☑ The worst indivituals are replaced with the best ones. ✖
- ☐ The search is guided by the variation operators towards the ant queen.
- ☐ The search operators are constructive ones, adding elements in solution.
- ☑ The search is cooperative, guided by the relative quality of individuals. ✔

Your answer is incorrect.

The correct answers are: The search is cooperative, guided by the relative quality of individuals., The search operators are constructive ones, adding elements in solution.

When adding a new element to the partial solution within an Ant Colony Optimisation Algorithm the following elements can be considered (check all correct ones):

Select one or more:

☑ probability of crossover ✖

☐ pheromone matrix

☑ Coefficient of the trail importance ✔

☐ Coefficient of visibility importance

☐ visibility of the nodes

Your answer is incorrect.

The correct answers are: pheromone matrix, visibility of the nodes, Coefficient of the trail importance, Coefficient of visibility importance

During the fire process within an artificial neuron the following processes take place (order is unimportant):

Select one or more:

☑ Performs a simple computation through an activation function ✔

☑ compute the weighted sum of inputs ✔

☑ Compute the difference between the real output and the computed output. ✖

☑ Modify the weights such to obtain better results ✖

Your answer is incorrect.

The correct answers are: compute the weighted sum of inputs, Performs a simple computation through an activation function

You design an Ant Colony Optimisation algorithm. What are the aspects relatated to each ant that must be considered?

Select one or more:

- ☑ The and has a memory. ✔
- ☑ While constructing the path avoids nodes that already have an ant in them. ✘
- ☐ Cooperates with other ants through the pheromone trail
- ☐ Moves (in the search space) and put some pheromones on its path.

Your answer is incorrect.

The correct answers are: The and has a memory., Cooperates with other ants through the pheromone trail, Moves (in the search space) and put some pheromones on its path.

A solution for a problem that you have is prepresented as a binary array of 8 elements. After a mutation you get the following mutated offspring:

(1,1,1,0,1,0,0,1)

Considering that you used a week mutation, check the possible parent(s).

Select one or more:

- ☑ (1,1,1,0,1,0,0,1) ✔
- ☐ (0,0,0,1,0,1,1,0)
- ☑ (0,0,1,0,1,0,0,1) ✗
- ☐ (1,1,1,0,1,0,1,1)

Your answer is incorrect.

The correct answers are: (1,1,1,0,1,0,0,1), (1,1,1,0,1,0,1,1)

A fitness function for a given problems aims to:

Select one or more:

- ☑ Associates a value to each candidate solution. ✔
- ☐ Determins if the problem is properly defined.
- ☐ Combines individuals with similar caracteristics.
- ☐ Reflects the adaptation to environment

Your answer is partially correct.

You have correctly selected 1.

The correct answers are: Associates a value to each candidate solution., Reflects the adaptation to environment

Match for an artificial neuron the name of the training rule with its characteristics.

perceptron's algorithm | Determine the quality of the model create for these weights for a single input data ⬦ | ✔

gradient descent | Determine the quality of the model create for these weights for all input data ⬦ | ✔

Your answer is correct.

The correct answer is: perceptron's algorithm → Determine the quality of the model create for these weights for a single input data, gradient descent → Determine the quality of the model create for these weights for all input data

The knowledge base of a RBS in uncertain environments contains:

Select one or more:

☐ Representations of the optimum solutions

☑ Rules ✔

☑ Facts ✔

☐ Positions

Your answer is correct.

The correct answers are: Facts, Rules

The Defuzzification is the transformation each fuzzy region into a crisp value.

Select one:

◉ True ✔

○ False

The correct answer is 'True'.

Ccnsider a complete Artificial Neural Network with the structure 4:6:2.

How many weights will have the forth artificial neuron from the hidden layer?

Select one:

- ○ 4
- ◉ 6 ✗
- ○ 2
- ○ 12

Your answer is incorrect.

The correct answer is: 4

The coding type of a possible solution influences the following aspects from the AE's design:

Select one or more:

☐ it forces the user to have a binary crossover

☐ the type of variation oerators

☐ the expression of the fitness function

☑ the number of individuals from the population pool ✖

Your answer is incorrect.

The correct answers are: the type of variation oerators, the expression of the fitness function

You have to choose a stop condition for your PSO algorithm. Check the correct possibilities:

Select one or more:

☑ You never stop, this sort of algorithm runs forever adapting itself. ✖

☑ When you found the parameters c_1 and c_2.

✖

☐ When you reach a predefined number of iterations.

☐ After you evaluate for a previous establish number of times the fitness function.

Your answer is incorrect.

The correct answers are: When you reach a predefined number of iterations., After you evaluate for a previous establish number of times the fitness function.

Check the specific elements for the Particle Swarm Optimisation method!

Select one or more:

- ☐ Inertia
- ☐ Memory
- ☑ Velocity ✔
- ☑ Position ✔

Your answer is partially correct.

You have correctly selected 2.

The correct answers are: Inertia, Velocity, Position, Memory

In each iteration of an Ant colony Optimisation Algorithm we have the following steps (check the good ones, order does not matter):

Select one or more:
- ☐ Increase the partial solution by an element.
- ☑ Change the pheromone trail on the paths traversed. ✔
- ☐ We perform a mutation to the ant's partial solution.
- ☑ Initialisation. ✔

Your answer is partially correct.

You have correctly selected 2.
The correct answers are: Initialisation., Increase the partial solution by an element., Change the pheromone trail on the paths traversed.

Is cooperation part of a Particle Swarm Optimisation algorithm?

Select one:

⦿ True ✔

◯ False

The correct answer is 'True'.

Partially correct

Mark 25.00 out
of 50.00

⚑ Flag question

How do ants indirectly communicate in an Ant Colony Optimisation algorithm?

Select one or more:

☐ They do not communicate indirectly.

☑ By changing the chemical repository. ✔

☐ The ants send signals to other ants not to follow them within the partial path.

☐ Accessing the pheromone matrix.

Your answer is partially correct.

You have correctly selected 1.
The correct answers are: By changing the chemical repository., Accessing the pheromone matrix.

What is the correspondace of an *individual* in evolutionary computation?

Select one or more:

- ☐ A methaphor for an animal from a herd of solutions.
- ☑ A possible candidate to be a solution for our problem. ✔
- ☐ The problem solution evolved by random naturaly processes.
- ☐ An simple artificial lifeform that exisists inside the computer, with its aim to solve out problems.

Your answer is correct.

The correct answer is: A possible candidate to be a solution for our problem.

Assign the proper order number to the steps for constructing a fuzzy system.

Define the inputs and the outputs	1	⬍	✔
Construct a base of rules	2	⬍	✔
Interpret the result	6	⬍	✔
Defuzzificate the result	5	⬍	✔
Aggregate the results	4	⬍	✔
Evaluate the rules	3	⬍	✔

Your answer is correct.

The correct answer is: Define the inputs and the outputs → 1, Construct a base of rules → 2, Interpret the result → 6, Defuzzificate the result → 5, Aggregate the results → 4, Evaluate the rules → 3

Match the right correspondences between fuzzy logic and boolean logic.

Negation   difference ⬍ ✔

Disjunction   maximum ⬍ ✔

Conjunction   minimum ⬍ ✔

Your answer is correct.

The correct answer is: Negation → difference, Disjunction → maximum, Conjunction → minimum

Which of the following problems can be solved with a perceptron?

Select one or more:

- ☐ Facial recognition.

- ☑ Logic "AND". ✔

- ☐ Any problem that implies a linear separation of the space.

- ☐ XOR.

Your answer is partially correct.

You have correctly selected 1.
The correct answers are: Logic "AND"., Any problem that implies a linear separation of the space.

Consider an Artificial Neural Network that must be trained with the Backpropagation algorithm. Check the correct statements for this algorithm.

Select one or more:

☐ Modify the structure by adding or subtracting nodes from the hidden layer.

☑ Distribute the errors on all connections proportional to the weights and modify the weights ✔

☐ Forward propagate the information and determine the output of each neuron

☑ Establish and backward propagate the error ✔

Your answer is partially correct.

You have correctly selected 2.

The correct answers are: Forward propagate the information and determine the output of each neuron, Establish and backward propagate the error, Distribute the errors on all connections proportional to the weights and modify the weights