**QUIZ 1 INTRODUCTION TO AI**

Resultat for dette forsøket: **4** av 4

**Spørsmål 1**

**1 / 1 poeng**

What is a linear combination?

**Riktig!**



Weighted sum



Target function



Learning model

**Spørsmål 2**

**1 / 1 poeng**

Which questions below can be answered by using classification?



"What are the relative impacts of age, gender, and diet on body weight?"

**Riktig!**



"Is it profitable to invest in the stock market?"

**Riktig!**



"How much money will I make playing the stock market?"

**Riktig!**



"Is my salary enough to get a home loan?"

**Riktig!**



Find a solution to the inequality: x + y > 0

**Spørsmål 3**

**1 / 1 poeng**

What do we minimize by solving the optimization problem?

**Riktig!**



Objective function



Learning coefficients



Loss function

**Spørsmål 4**

**1 / 1 poeng**

Why do we store intermediate results in dynamic programming?

**Riktig!**



To speed up the runtime of the program



To gain space in memory



To increase the readability of the code

**QUIZ 2 GRADIENT DESCENT**

Resultat for dette forsøket: **3** av 3

**Spørsmål 1**

**1 / 1 poeng**

Find the derivative of the function Q

Ditt svar:

-3x^2 - 10x - 3

**Spørsmål 2**

**1 / 1 poeng**

Assume that the learning rate is h=0.5 and the initial point is x0=−1.

Perform three steps of the gradient descent. Write down the result of each step (x1,x2,x3)

Ditt svar:

[-1, -3.0, -3.0, -3.0]

**Spørsmål 3**

**1 / 1 poeng**

Did you reach the minimum?

Explain your answer

Ditt svar:

Yes Q(-3) is the minimal.  
The gradient got the same answer three times in a row so it is stuck at the minimal point.

The point however is a so called saddle point so if the function had more points to it, it might have been stuck in a local minimal instead of reaching another true minimal.

**QUIZ 3 NAÏVE BAYES CLASSIFIER**

**Instruksjoner**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Long** | **Sweet** | **Yellow** | **Total** |
| **Banana** | 350 | 350 | 300 | 400 |
| **Orange** | 0 | 150 | 200 | 300 |
| **Other** | 100 | 200 | 50 | 300 |
| **Total** | 450 | 700 | 550 | 1000 |

The table above represents the data on 1000 pieces of fruit.

As you can see from the data, 400 of the fruits are bananas, 300 are oranges and the rest are some other fruits.

The fruit can be **long**or not, **sweet**or not, and **yellow**or not.

The data provided is sufficient to predict the class of another fruit as it is introduced.

NB: Do the calculations by hand and provide formulas in your answer

Resultat for dette forsøket: **3** av 3

**Spørsmål 1**

**1 / 1 poeng**

Identify features (x1, x2, x3) and classes (C0, C1, C2)

C0 -  , C1 -  , C2 - 

X1 -  , X2 -  , X3 - 

**Spørsmål 2**

**1 / 1 poeng**

Calculate the likelihood of each type of fruit to be long, or sweet, or yellow (**P(long∣Banana**), **P(sweet∣Banana**), etc.)

(9 values in total)

Ditt svar:

P(long|banana) = 350/400 = 0.87

P(sweet|banana) = 350/400 = 0.87

P(yellow|banana) = 300/400 = 0.75

P(long|orange) = 0/300 = 0

P(sweet|orange) = 150/300 = 0.5

P(yellow|orange) = 200/300 = 0.6

P(long|other) = 100/300 = 0.33

P(sweet|other) = 200/300 = 0.6

P(yellow|other) = 50/300 = 0.17

**Spørsmål 3**

**1 / 1 poeng**

Use a Naïve Bayes classifier to predict the class of the new fruit, if you know that it is yellow, long and sweet.

Explain your answer.

Ditt svar:

Use a Naïve Bayes classifier to predict the class of the new fruit, if you know that it is yellow, long and sweet.

Explain your answer.

Ditt svar:  
  
Using Naïve Bayes to inspect:  
P(other | long, sweet, yellow) = 100/300 \* 200/300 \* 50/300 \* 300/1000 = 0.011

P(banana | long, sweet, yellow) = 350/400 \* 350/400 \* 300/400 \* 400/1000 = 0.23

P(orange| long, sweet, yellow) = 0/300 \* 150/300 \* 200/300 \* 400/1000 = 0

We can therefore see that the new fruit should be classified as a banana, as it has the highest probability.

**QUIZ 4 SUPERVISED AND UNSUPERVISED LEARNING**

Resultat for dette forsøket: **7** av 7

**Spørsmål 1**

**1 / 1 poeng**

Which one of the statements below is correct?

**Riktig!**



In supervised learning, the dataset consists of input variables X and output variables Y.



In unsupervised learning, the goal is to obtain a mapping function.



Classification and regression are common tasks in unsupervised learning.



None.

**Spørsmål 2**

**1 / 1 poeng**

In supervised learning, in order to develop a reliable model, we pay attention to:



The model complexity



The distribution of model’s predictions



The model accuracy

**Riktig!**



All the above

**Spørsmål 3**

**1 / 1 poeng**

We trained our model to solve a classification task. As we look at the model’s performance, we notice that it performs poorly on both training and test datasets. What is the problem?



The model is overfitting

**Riktig!**



The model is suffering from high bias problem



The model is underfitting



The model is suffering from high variance problem

**Spørsmål 4**

**1 / 1 poeng**

K-nearest neighbors is ….... algorithm that can be used to predict the ….... or ….... values.



Unsupervised learning, group, continuous



Unsupervised learning, class, discrete

**Riktig!**



Supervised learning, class, continuous



Supervised learning, group, discrete

**Spørsmål 5**

**1 / 1 poeng**

In k-nearest neighbors, what happens when we increase the K value?



The boundaries become rough

**Riktig!**



The boundaries become smoother



The algorithm classifies all data points in one class



It will not affect the overall result

**Spørsmål 6**

**1 / 1 poeng**

Which of the following statements are True?

1. In a dataset with multi features, each column is a feature vector
2. K-means is a lazy, non-parametric algorithm
3. The centroid in K-means algorithm remains same during the learning process
4. The K value in both KNN and K-means algorithms is the number of classes.



A and C



D



B

**Riktig!**



None the above

**Spørsmål 7**

**1 / 1 poeng**

Which of the following distance measure can we use in K-means algorithm?

1. Hamming distance
2. Euclidean distance
3. Manhattan distance



A



A and B



C and B



All the above

**QUIZ 5 SWARM INTELLIGENCE**

Resultat for denne quizen: **2,5** av 3

Innlevert 12. sep. i 11.10

Dette forsøket tok under 1 minutt

**Spørsmål 1**

**0,5 / 1 poeng**

Which of the statements below are true? Select everyone you think are correct.

**Riktig!**



Each member of a swarm must be aware of its surroundings and abilities



Members of a swarm are slaves and can only act based on a single master

**Du svarte**



Each member only do the minimal work required to complete a task



The size of a swarm is always fixed, and does not change

**Riktig!**



Even if members are removed from the swarm, the task should be completed by the remaining members

**Spørsmål 2**

**1 / 1 poeng**

True or false: On average, the combined guess or estimate of a group is more accurate than that of the best individual of the group

**Riktig!**



Sant



Usant

**Spørsmål 3**

**1 / 1 poeng**

True or false: Agents in a swarm are always highly intelligent and use advanced sensors to coordinate and complete their task.



Sant

**Riktig!**



Usant

Agents in a swarm are usually very simple, and only has limited sensors and capabilities, but can solve complex tasks and form advanced structures when organized in large groups. Members of a swarm are in some cases referred to as "zero-intelligence" agents.

**Quiz 6 GENETIC ALGORITHM THEORY**

Resultat for dette forsøket: **6,75** av 7

**Spørsmål 1**

**1 / 1 poeng**

What is the underlying theory of genetic algorithms?



The theory of convolution

**Riktig!**



The theory of evolution

Correct. This method is inspired by the evolutionary processes found in nature, where creatures evolve and   
develop in order to survive and pass on their DNA to the next generation



The theory of planned obsolescence



The theory of relativety

**Spørsmål 2**

**1 / 1 poeng**

How do we represent potential solutions and their features in genetic algorithms?



Genetic polymorphism and nuclear connections



Edges and vertices



Private keys and public tokens

**Riktig!**



Chromosomes and genes

Correct. We model solutions as artificial chromosomes, with each feature of the solution encoded as genes.

**Spørsmål 3**

**0,75 / 1 poeng**

Which of the following are operators in genetic algorithms? (You may pick multiple options)



Crossunder



Transfiguration

**Riktig svar**



Inversion

**Riktig!**



Crossover

Correct. Crossover is the process of combining features of each parent in order to create offspring.

**Riktig!**



Selection

Correct. Selection is the process of choosing the most fit individuals.



Insubordination



Sublimation

**Riktig!**



Mutation

Correct. Mutations change random features of an individual.

**Spørsmål 4**

**1 / 1 poeng**

How do we assign an individual's fitness in genetic algorithms?



Based on their genetic diversity

**Riktig!**



Based on their ability to solve our problem



Based on their low mutation rate



Based on their number of features

**Spørsmål 5**

**1 / 1 poeng**

Why do we use mutations in genetic algorithms? (Select all the options you think are correct)



Eliminate bad solutions

**Riktig!**



Ensure genetic diversity



Solve the problem faster (convergence)

**Riktig!**



Introduce new feature values



Increase population fitness

**Riktig!**



Avoid getting stuck in local optimums

**Spørsmål 6**

**1 / 1 poeng**

Using roulette wheel selection, even individuals representing bad solutions may be selected for crossover. True or false?

**Riktig!**



Sant

This is not always bad in the long run. Roulette wheel selection keeps a number of less fit individuals around, which may in time   
prove to be the real answer to unforeseen challenges.



Usant

**Spørsmål 7**

**1 / 1 poeng**

Let's say that we increase the mutation chance to a very large value, i.e. that mutations happen on every feature on every crossover. Which of the following is most likely to happen?



The population will get stuck in a local optimum



The population will always converge faster to the optimal solution



The population will never converge to the optimal solution

**Riktig!**



The population will take a long time to converge to an optimal solution

Correct. Initially, the population may move towards the goal faster if the mutations happen to be beneficial. However, since mutations are random, the population may "overshoot" the goal, and jump back and forth between sub-optimal solutions. In short, we become more dependent on the random values than the actual fitness.

**QUIZ 7 PROBABILISTIC THEORY**

**Mangler :0**