

# Quiz: Basic introduction to AI

Forfall

Ingen forfallsdato

Poeng

4

Spørsmål

4

Tidsbegrensning

Ingen

Tillatte forsøk

Ubegrenset

## Instruksjoner

This is a voluntary quiz to test yourself about the material from Week 2

Ta quizen på nytt

## Forsøkshistorikk

	Forsøk	Tid	Resultat
GJELDENDE	<a href="#">Forsøk 3</a>	under 1 minutt	4 av 4
SISTE	<a href="#">Forsøk 3</a>	under 1 minutt	4 av 4
	<a href="#">Forsøk 2</a>	under 1 minutt	3 av 4
	<a href="#">Forsøk 1</a>	under 1 minutt	1,75 av 4

Resultat for dette forsøket: **4** av 4  
Innlevert 26. aug. i 11.40  
Dette forsøket tok under 1 minutt

Riktig!

Spørsmål 1

1 / 1 poeng

What is a linear combination?

☒ 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?

☒

Objective function

☐

Learning coefficients

☐

Loss function

**Riktig!****Spørsmål 4****1 / 1 poeng**

**Riktig!**

Why do we store intermediate results in dynamic programming?

- ☒ To speed up the runtime of the program
- ☐ To gain space in memory
- ☐ To increase the readability of the code

Quizresultat: **4** av 4

# Quiz: Gradient descent method

**Forfall** Ingen forfallsdato      **Poeng** 3      **Spørsmål** 3  
**Tilgjengelig** 22. aug. i 0:00 - 18. des. i 23:59      **Tidsbegrensning** Ingen  
**Tillatte forsøk** Ubegrenset

## Instruksjoner

Given an objective function  $Q = (x + 3)^2 (1 - x)$  defined on the interval  $[-4, 0]$

Ta quizen på nytt

## Forsøkshistorikk

	Forsøk	Tid	Resultat
GJELDENDE	<a href="#">Forsøk 2</a>	6 minutter	3 av 3
SISTE	<a href="#">Forsøk 2</a>	6 minutter	3 av 3
	<a href="#">Forsøk 1</a>	5 755 minutter	0 av 3 *

\* Noen spørsmål har ennå ikke fått vurdering

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

Innlevert 5. sep. i 16.46

Dette forsøket tok 6 minutter

### 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  $x_0 = -1$

.

Perform three steps of the gradient descent. Write down the result of each step  $(x_1, x_2, x_3)$

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.

**Quizresultat: 3 av 3**

# Quiz - genetic algorithm theory

**Forfall** Ingen forfallsdato**Poeng** 7**Spørsmål** 7**Tidsbegrensning** Ingen**Tillatte forsøk** Ubegrenset

## Instruksjoner

This short quiz will test your knowledge of some key topics of genetic algorithms covered in the lectures.

[Ta quizen på nytt](#)

## Forsøkshistorikk

	Forsøk	Tid	Resultat
GJELDENDE	<a href="#">Forsøk 2</a>	2 minutter	7 av 7
SISTE	<a href="#">Forsøk 2</a>	2 minutter	7 av 7
	<a href="#">Forsøk 1</a>	2 minutter	6,75 av 7

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

Innlevert 14. nov. i 10.36

Dette forsøket tok 2 minutter

### Spørsmål 1

**1 / 1 poeng**

What is the underlying theory of genetic algorithms?

- ☐ The theory of convolution
- ☐ The theory of planned obsolescence
- ☒ The theory of evolution

**Riktig!**

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 relativity

## Spørsmål 2

1 / 1 poeng

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

- ☒ Chromosomes and genes

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

- ☐ Genetic polymorphism and nuclear connections
- ☐ Edges and vertices
- ☐ Private keys and public tokens

Riktig!

## Spørsmål 3

1 / 1 poeng

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

- ☐ Transfiguration

**Riktig!**☒ Crossover

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

**Riktig!**☒ Inversion

Correct. This operator inverts random features of an individual.

**Riktig!**☒ Selection

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

☐ Sublimation☐ Crossunder**Riktig!**☒ Mutation

Correct. Mutations change random features of an individual.

☐ Insubordination**Spørsmål 4****1 / 1 poeng**

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

**Riktig!**☒ Based on their ability to solve our problem☐ Based on their low mutation rate☐ Based on their genetic diversity



- ☐ 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)

**Riktig!**

- ☒ Avoid getting stuck in local optimums

- ☐ Increase population fitness

**Riktig!**

- ☒ Introduce new feature values

- ☐ Eliminate bad solutions

**Riktig!**

- ☒ Ensure genetic diversity

- ☐ Solve the problem faster (convergence)

**Spørsmål 6****1 / 1 poeng**

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

- ☐ Usant

**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.

**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 never converge to the optimal solution
- ☒ 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.

- ☐ The population will always converge faster to the optimal solution

**Riktig!****Quizresultat: 7 av 7**

# Quiz: Naïve Bayes classifier

**Forfall** Ingen forfallsdato      **Poeng** 3      **Spørsmål** 3  
**Tilgjengelig** 22. aug. i 0:00 - 18. des. i 23.59      **Tidsbegrensning** Ingen  
**Tillatte forsøk** Ubegrenset

## 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

Ta quizen på nytt

## Forsøkshistorikk

	Forsøk	Tid	Resultat
GJELDENDE	<a href="#">Forsøk 2</a>	1 minutt	3 av 3
SISTE	<a href="#">Forsøk 2</a>	1 minutt	3 av 3
	<a href="#">Forsøk 1</a>	285 minutter	1 av 3 *

\* Noen spørsmål har ennå ikke fått vurdering

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

Innlevert 5. sep. i 21.49

Dette forsøket tok 1 minutt

Spørsmål 1

1 / 1 poeng

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

C0 -  , C1 -  , C2 -

X1 -  , X2 -  , X3 -

Svar 1:

Riktig!  
 Riktig svar  
 Riktig svar

banana  
 orange  
 other

Svar 2:

Riktig!  
 Riktig svar  
 Riktig svar

orange  
 banana  
 other

Svar 3:

Riktig!  
 Riktig svar  
 Riktig svar

other  
 banana  
 orange

Svar 4:

Riktig!  
 long

Riktig svar sweet

Riktig svar yellow

---

**Svar 5:**

Riktig! sweet

Riktig svar long

Riktig svar yellow

---

**Svar 6:**

Riktig! yellow

Riktig svar long

Riktig svar sweet

## 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:

$$P(\text{long}|\text{banana}) = 350/400 = 0.87$$

$$P(\text{sweet}|\text{banana}) = 350/400 = 0.87$$

$$P(\text{yellow}|\text{banana}) = 300/400 = 0.75$$

$$P(\text{long}|\text{orange}) = 0/300 = 0$$

$$P(\text{sweet}|\text{orange}) = 150/300 = 0.5$$

$$P(\text{yellow}|\text{orange}) = 200/300 = 0.6$$

$$P(\text{long}|\text{other}) = 100/300 = 0.33$$

$$P(\text{sweet}|\text{other}) = 200/300 = 0.6$$

$$P(\text{yellow}|\text{other}) = 50/300 = 0.17$$

### 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:

Yellow long and sweet. First of all it sounds like a banana, so an expert guess would be banana.

Using Naïve Bayes to inspect:

$$P(\text{other} | \text{long, sweet, yellow}) = 100/300 * 200/300 * 50/300 * 300/1000 = 0.011$$

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

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

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

Quizresultat: **3** av 3

# Quiz - Supervised and Unsupervised Learning

**Forfall** Ingen forfallsdato**Poeng** 7**Spørsmål** 7**Tidsbegrensning** Ingen**Tillatte forsøk** Ubegrenset[Ta quizen på nytt](#)

## Forsøkshistorikk

	Forsøk	Tid	Resultat
<b>GJELDENDE</b>	<a href="#">Forsøk 2</a>	1 minutt	7 av 7
<b>SISTE</b>	<a href="#">Forsøk 2</a>	1 minutt	7 av 7
	<a href="#">Forsøk 1</a>	4 minutter	5 av 7

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

Innlevert 7. sep. i 10.37

Dette forsøket tok 1 minutt

### 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
- ☒ All the above

**Riktig!****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
- ☒ The model is suffering from high bias problem
- ☐ The model is underfitting
- ☐ The model is suffering from high variance problem

**Riktig!****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

☒ Supervised learning, class, continuous

☐ Supervised learning, group, discrete

Riktig!

### Spørsmål 5

1 / 1 poeng

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

☐ The boundaries become rough

☒ The boundaries become smoother

☐ The algorithm classifies all data points in one class

☐ It will not affect the overall result

Riktig!

### Spørsmål 6

1 / 1 poeng

Which of the following statements are True?

A. In a dataset with multi features, each column is a feature vector

B. K-means is a lazy, non-parametric algorithm

C. The centroid in K-means algorithm remains same during the learning process

D. The K value in both KNN and K-means algorithms is the number of classes.

☐ A and C

☐ D

☐ B

☒ None the above

Riktig!

### Spørsmål 7

1 / 1 poeng

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

- A. Hamming distance
- B. Euclidean distance
- C. Manhattan distance

☐ A

☐ A and B

☐ C and B

☒ All the above

Riktig!

Quizresultat: 7 av 7

# Quiz - Swarm intelligence

**Forfall** Ingen forfallsdato**Poeng** 3**Spørsmål** 3**Tidsbegrensning** Ingen

## Forsøkshistorikk

	Forsøk	Tid	Resultat
SISTE	<a href="#">Forsøk 1</a>	under 1 minutt	2,5 av 3

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.

**Riktig!**☐ Sant☒ 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.

**Quizresultat: 2,5 av 3**