الجلسة 1: تعلم الآلة (الشعب 1)

Status	Finished
Started	Monday, 16 December 2024, 10:59 AM
Completed	Monday, 16 December 2024, 11:28 AM
Duration	28 mins 40 secs
Grade	**15.00** out of 16.00 (**93.75**%)

Question 1
Partially correct
Mark 5.00 out of 6.00
Flag question
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v2 (latest)

Assume you have a linear regression model with parameters m = 1 and b = 2. You process the data point (2, 5) using Stochastic Gradient Descent with a learning rate of 0.1. What are the updated values of m and b after one step of SGD?

In linear regression, the common loss function used is the Mean Squared Error (MSE), but for Stochastic Gradient Descent, we look at the contribution of one data point. The loss for one data point can be defined as:

Loss = $(Y - Y_{pred})^2$

Gradient with respect to (m) (slope):

The gradient (dL/dm) is calculated as follows:

dL/dm = -2 * Error * X

Where:

- Error = Y - Y_pred
- X is the input feature for which we are calculating the gradient.

Gradient with respect to (b) (intercept):

The gradient (dL/db) is simpler and is calculated as:

dL/db = -2 * Error

1- Calculate the predicted value: Y_pred = [4] ✓

2- Calculate the error: Error = [1] ✓

3- Calculate gradients:

Gradient with respect to (m) (slope): [-4] ✓

Gradient with respect to (b) (intercept): [-2] ✓

4- Update parameters:

the new m = [4.4] ✗

the new b = [2.2] ✓

| 1 | 2.2 | 16 | 4.4 | 1.4 | -2 | 4 | 20 | -4 |

Your answer is partially correct.

You have correctly selected 5.
The correct answer is:
Assume you have a linear regression model with parameters m = 1 and b = 2. You process the data point (2, 5) using Stochastic Gradient Descent with a learning rate of 0.1. What are the updated values of m and b after one step of SGD?

In linear regression, the common loss function used is the Mean Squared Error (MSE), but for Stochastic Gradient Descent, we look at the contribution of one data point. The loss for one data point can be defined as:

Loss = $(Y - Y_{pred})^2$

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Where:

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- X is the input feature for which we are calculating the gradient.

Gradient with respect to (b) (intercept):

The gradient (dL/db) is simpler and is calculated as:

dL/db = -2 * Error

1- Calculate the predicted value: Y_pred = [4]

2- Calculate the error: Error =[1]

3- Calculate gradients:

Gradient with respect to (m) (slope): [-4]

Gradient with respect to (b) (intercept): [-2]

4- Update parameters:

the new m = [1.4]

the new b = [2.2]

Make comment or override mark

Response history

Step	Time	Action	State	Marks
1	16/12/24, 10:59:23	Started	Not yet answered	
2	16/12/24, 11:25:47	Saved: {4} {1} {-4} {-2} {4.4} {2.2}	Answer saved	
3	**16/12/24, 11:28:03**	**Attempt finished**	**Partially correct**	**5.00**

Question 2
Correct
Mark 1.00 out of 1.00
Remove flag
Edit question
v1 (latest)

Which of the following classification metrics is also known as the harmonic mean of precision and recall?

a. F1 Score ✓
b. Specificity
c. Accuracy
d. AUC-ROC

Your answer is correct.

The correct answer is: F1 Score

Make comment or override mark

Response history

Step	Time	Action	State	Marks
1	16/12/24, 10:59:23	Started	Not yet answered	
2	16/12/24, 11:00:02	Saved: F1 Score	Answer saved	
3	**16/12/24, 11:28:03**	**Attempt finished**	**Correct**	**1.00**

Question 3
Correct
Mark 1.00 out of 1.00
Remove flag
Edit question
v1 (latest)

Mean Squared Error (MSE) is calculated as:

a. Average of squared errors
b. Sum of squared errors divided by sample size and Average of squared errors ✓
c. Sum of squared errors divided by sample size
d. Average of absolute errors

Your answer is correct.

The correct answer is: Sum of squared errors divided by sample size and Average of squared errors

Make comment or override mark

Response history

Step	Time	Action	State	Marks
1	16/12/24, 10:59:23	Started	Not yet answered	
2	16/12/24, 11:00:55	Saved: Average of squared errors	Answer saved	
3	16/12/24, 11:12:40	Saved: Sum of squared errors divided by sample size and Average of squared errors	Answer saved	
4	**16/12/24, 11:28:03**	**Attempt finished**	**Correct**	**1.00**

Question 4
Correct
Mark 1.00 out of 1.00
Flag question
Edit question
v1 (latest)

The main function of the gradient descent algorithm is to:

a. Calculate the variance
b. Maximize the loss function
c. Estimate the bias
d. Minimize the loss function ✓

Your answer is correct.

The correct answer is: Minimize the loss function

Make comment or override mark

Response history

Step	Time	Action	State	Marks
1	16/12/24, 10:59:23	Started	Not yet answered	
2	16/12/24, 11:01:04	Saved: Minimize the loss function	Answer saved	
3	**16/12/24, 11:28:03**	**Attempt finished**	**Correct**	**1.00**

Question 5
Correct
Mark 1.00 out of 1.00
Flag question
Edit question
v1 (latest)

If a confusion matrix shows: True Positives = 50, False Positives = 10, True Negatives = 30, and False Negatives = 5, what is the precision?

a. 0.90
b. 0.83 ✓
c. 0.87
d. 0.75

Your answer is correct.

The correct answer is: 0.83

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Response history

Step	Time	Action	State	Marks
1	16/12/24, 10:59:23	Started	Not yet answered	
2	16/12/24, 11:07:33	Saved: 0.83	Answer saved	
3	**16/12/24, 11:28:03**	**Attempt finished**	**Correct**	**1.00**

Question 6
Correct
Mark 1.00 out of 1.00
Remove flag
Edit question
v1 (latest)

In Naive Bayes classifiers, the term "naive" indicates that:

a. It can classify only binary data
b. It's easy to implement
c. Assumes independence among features ✓
d. The classifier is less accurate

Your answer is correct.

The correct answer is: Assumes independence among features

Make comment or override mark

Response history

Step	Time	Action	State	Marks
1	16/12/24, 10:59:23	Started	Not yet answered	
2	16/12/24, 11:08:03	Saved: Assumes independence among features	Answer saved	
3	**16/12/24, 11:28:03**	**Attempt finished**	**Correct**	**1.00**

Question 7
Correct
Mark 1.00 out of 1.00
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v1 (latest)

Gradient descent updates the weights in the direction of the [Negative] ✓ gradient of the loss function.

[Positive]

Your answer is correct.

The correct answer is:
Gradient descent updates the weights in the direction of the [Negative] gradient of the loss function.

Make comment or override mark

Response history

Step	Time	Action	State	Marks
1	16/12/24, 10:59:23	Started	Not yet answered	
2	16/12/24, 11:03:56	Saved: {Negative}	Answer saved	
3	**16/12/24, 11:28:03**	**Attempt finished**	**Correct**	**1.00**

Question 8
Correct
Mark 1.00 out of 1.00
Flag question
Edit question
v1 (latest)

In a confusion matrix, True Negatives (TN) are defined as:

a. Incorrectly predicted negative cases
b. Incorrectly predicted positive cases
c. Correctly predicted positive cases
d. Correctly predicted negative cases ✓

Your answer is correct.

The correct answer is: Correctly predicted negative cases

Make comment or override mark

Response history

Step	Time	Action	State	Marks
1	16/12/24, 10:59:23	Started	Not yet answered	
2	16/12/24, 11:04:10	Saved: Correctly predicted negative cases	Answer saved	
3	**16/12/24, 11:28:03**	**Attempt finished**	**Correct**	**1.00**

Question 9
Correct
Mark 1.00 out of 1.00
Remove flag
Edit question
v1 (latest)

Recall is also known as the [true positive] ✓ rate.

[true negative] [F1 score]

Your answer is correct.

The correct answer is:
Recall is also known as the [true positive] rate.

Make comment or override mark

Response history

Step	Time	Action	State	Marks
1	16/12/24, 10:59:23	Started	Not yet answered	
2	16/12/24, 11:04:56	Saved: {true positive}	Answer saved	
3	16/12/24, 11:09:16	Saved: {$a}	Not yet answered	
4	16/12/24, 11:16:06	Saved: {true positive}	Answer saved	
5	**16/12/24, 11:28:03**	**Attempt finished**	**Correct**	**1.00**

Question 10
Correct
Mark 1.00 out of 1.00
Flag question
Edit question
v1 (latest)

In the context of bias-variance tradeoff, high bias typically results in:

a. Overfitting
b. Increased variance
c. A balanced model
d. Underfitting ✓

Your answer is correct.

The correct answer is: Underfitting

Make comment or override mark

Response history

Step	Time	Action	State	Marks
1	16/12/24, 10:59:23	Started	Not yet answered	
2	16/12/24, 11:05:12	Saved: Underfitting	Answer saved	
3	**16/12/24, 11:28:03**	**Attempt finished**	**Correct**	**1.00**

Question 11
Correct
Mark 1.00 out of 1.00
Flag question
Edit question
v1 (latest)

The term [generalization error] ✓ refers to the error of the model when predicting new data that it has not seen before.

[Precision] [Recall]

Your answer is correct.

The correct answer is:
The term [generalization error] refers to the error of the model when predicting new data that it has not seen before.

Make comment or override mark

Response history

Step	Time	Action	State	Marks
1	16/12/24, 10:59:23	Started	Not yet answered	
2	16/12/24, 11:08:28	Saved: {generalization error}	Answer saved	
3	**16/12/24, 11:28:03**	**Attempt finished**	**Correct**	**1.00**