



Question 26

1 pts

Given a data frame `d` with 100 rows and 5 numeric columns, the following statements were executed in an R session:

```
a <- prcomp(d);
pc1 <- p$rotation[, 1];
pc2 <- p$rotation[, 2];
s <- cov(d);
```

Key facts about the functions used and objects generated here:

- The `prcomp` function performs a Principal Component Analysis (PCA).
- The `cov` function computes a covariance matrix.
- The `diag` function extracts the elements of the diagonal from a matrix.
- The columns of the rotation matrix in `a$rotation` contain the principal components.
- `a$sdev` contains the standard deviations for the principal components.

Check all statements that are mathematically correct after running the code above.



`sum(diag(a$rotation))` will evaluate to `0`.



`sum(diag(s))` will evaluate to `1`.



`sum(pc1 * pc2)` will evaluate to `0`.



`sum(diag(s)) - sum(a$sdev * a$sdev)` will evaluate to `0`.

such as calculators, Matlab or R.

- You have 90 minutes to complete the quiz.
- Clicking "Submit quiz" finishes the course tests and submits your answers for assessment. **Click this button only after completing all questions.**



Question 1

1 pts

A signal is sampled at 250 Hz during 4 seconds. The lowest and highest frequencies on the power spectrum will be, respectively,

0.4 and 250 Hz

0.5 and 500 Hz

0.25 and 125 Hz

4 and 250 Hz

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Question 27

Check all statements about generalisation that are correct.

- A test set for assessing generalisation should contain an equal number of samples for each class. 
- A classifier that quantitatively models the process generating the data will generalise well.
- Linear classifiers generalise better than nonlinear classifiers.
- Improving accuracy of classification for the training data is guaranteed to result in improved accuracy generally.

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```
x1 <- a - b;
x2 <- sqrt(sum(a * a));
x3 <- sum(b * b);
x4 <- sum(x1) / x2 / sqrt(x3);
```

Check all statements that are correct.

 x_4 contains the cosine of the angle between a and b . x_2 contains the mean of a . x_3 contains the distance of a from the origin of the coordinate system. x_1 has d components.[◀ Previous](#)[Next ▶](#)

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Question 14

Check all correct statements about regression.

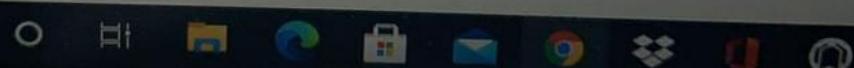
Vector quantisation can be used for regression.

Gaussian Processes can be used for regression.

Regression is a type of supervised learning.

The objective of regression is the prediction of class labels.

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all questions.

Question 15

1 pts

In independent component analysis (ICA)

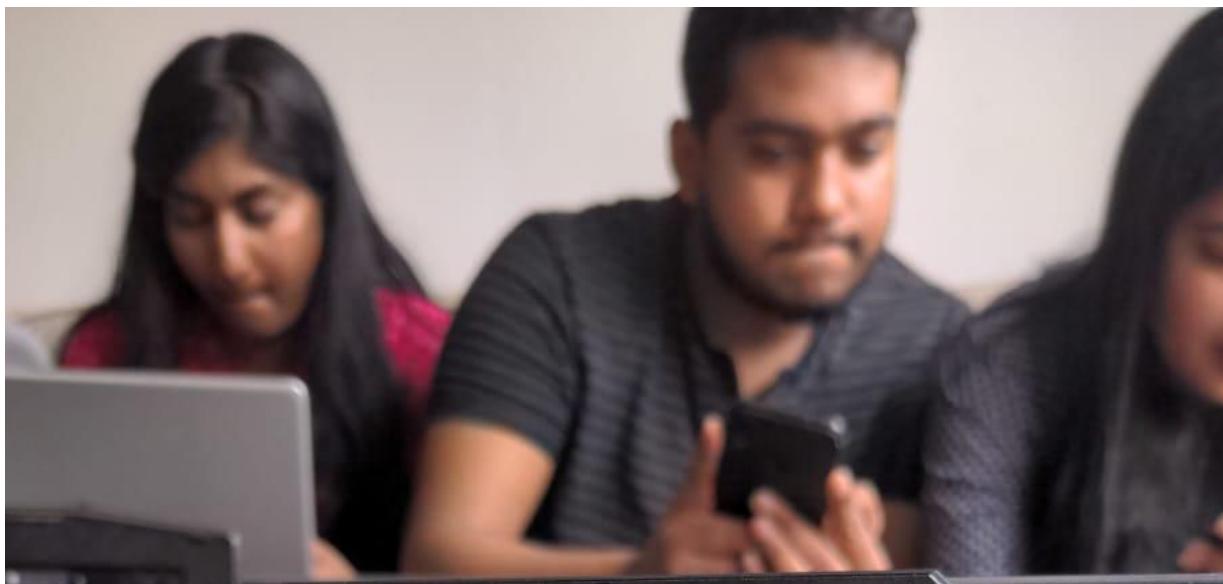
- the weight vectors are calculated so as to maximize the kurtosis of the distribution of the new coordinates.
- the independent components are calculated by projecting the data points onto the weight vectors (the columns of the demixing matrix).
- the independent components are calculated by the inner product of the data points with the weight vectors.
- the weight vectors are mutually orthogonal.

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Saved at 11:04

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A group of students are working on a laptop and a smartphone. The laptop screen shows a quiz interface for a linear models question.

Question 11 (1 pts)

Check all statements about linear models that are correct.

Linear models are used for binary classification by predicting the output label of an input \mathbf{x} based on which side of a hyperplane \mathbf{x} is on.

Increasing the variance in the training data set always improves the accuracy of the resulting linear model.

A linear model constructed using a data set that is not linearly separable will result in wrong predictions for all training inputs.

Adding samples to the training set will change the resulting linear model.

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Question 5

Check all statements about Principal Component Analysis (PCA) that are correct.

- Principal components are columns of the covariance matrix.
- The first principal component is orthogonal to all other principal components.
- The number of principal components is equal to the number of data points.
- The total variance in the data set is equal to the sum of eigenvalues of the covariance matrix.



« Previous

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1 pts

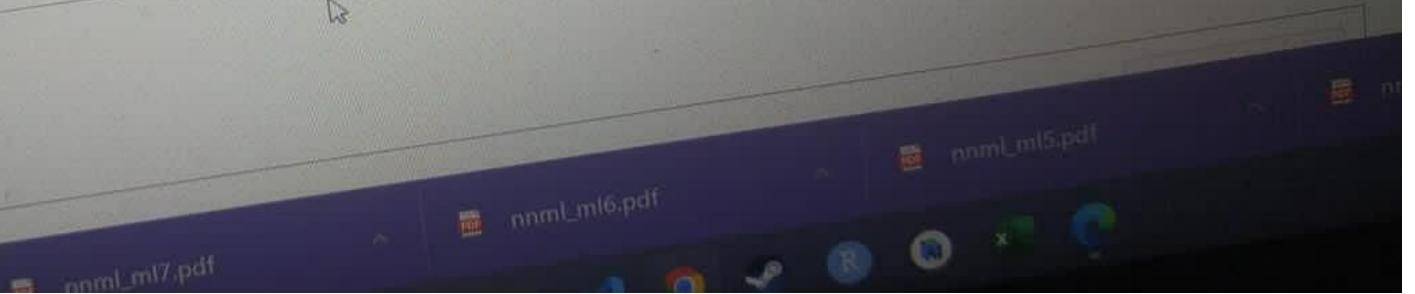
Question 20

Check all practices that should be followed when developing a Machine Learning analysis that is reproducible.

- Develop code, e.g. a script, that performs the entire analysis process non-interactively.
- Inspect results after each analysis, and manually select data points to be shown in figures and plots.
- Ensure that the original data is permanently available, e.g. by storing it on a read-only medium.
- Ensure that the latest version of all software (such as R, Matlab, or libraries such as [e1071](#)) is used.

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Quiz: In-Class Test 2: Multiple Ch X [Solved] Which of the following s X +

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You have 90 minutes to complete the quiz.
Clicking "Submit quiz" finishes the course tests and submits your answers for assessment.
Click this button only after completing all questions.

Attempt due: 29 Apr at 12:25
1 Hour, 15 minutes, 35 Seconds

Question 30 1 pts

Check all correct statements about regression.

K Means Clustering can be used for regression.

Linear Models can be used for regression.

Regression is a type of unsupervised learning.

The objective of regression is the prediction of continuous-valued outputs.

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Question 5

Which of the following statement about OPTICS is **correct**?



It does not require a predefined number of clusters in advance.



- It is a regression algorithm.
- it does not address one of DBSCAN's major weaknesses: the problem of detecting meaningful clusters in data of varying density.
- It cannot detect outliers.

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Quiz instructions

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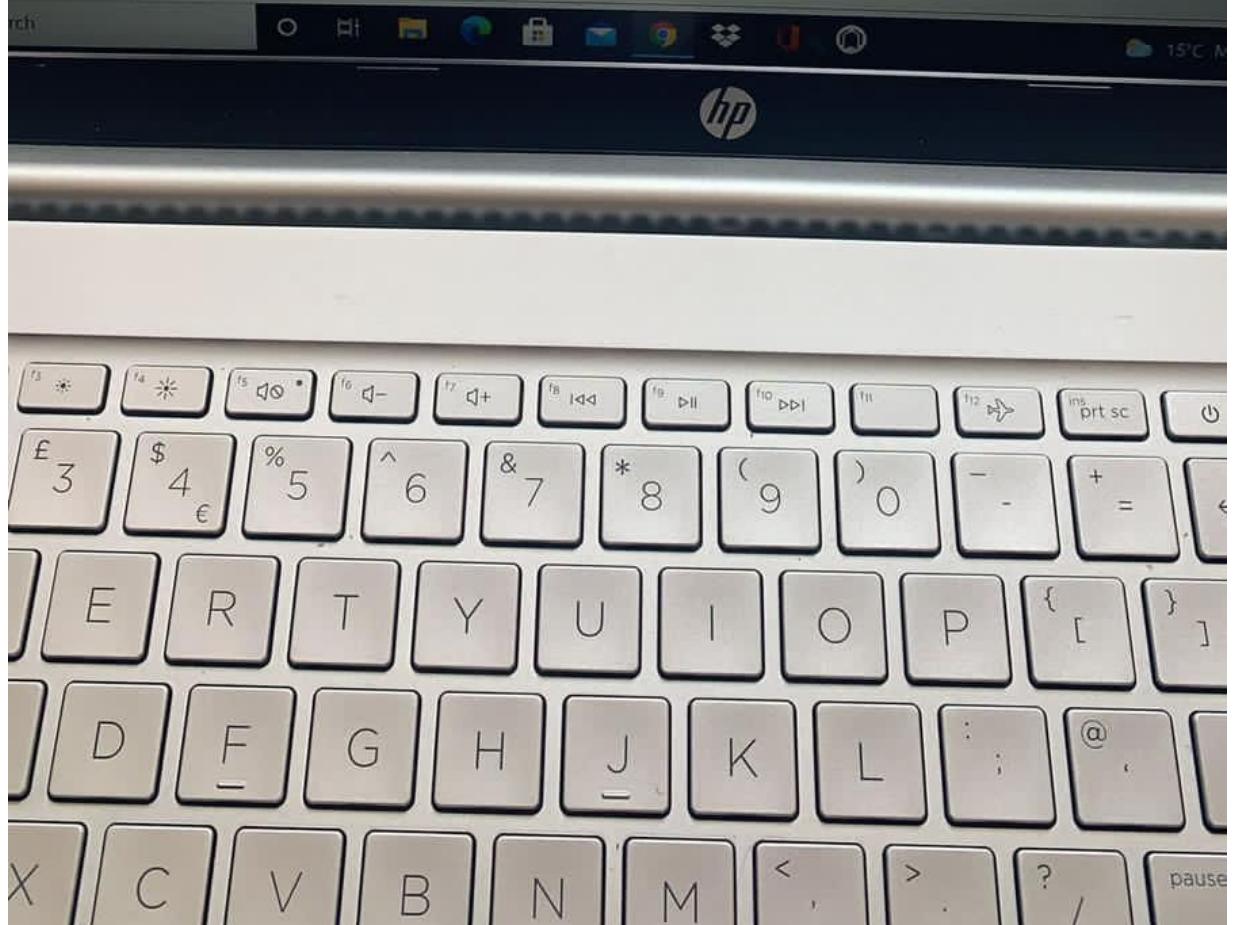
Question 9

Check all statements about Gaussian Processes (GPs) that are correct.

- Increasing the length scale (λ) results in a GP model that predicts smaller variances overall.
- Increasing the signal variance (σ_f^2) results in a GP model that predicts smaller variances overall.
- For an input \mathbf{x} , the variance σ^2 predicted by a GP model is smaller if \mathbf{x} is further away from the training inputs.
- GP models can predict a nonlinear relationship between inputs \mathbf{x} and corresponding outputs μ .

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Question 12

1 pts

In reinforcement learning,

- it is always best to choose the action that has yielded the greatest return so far.
- before the agent can start making decisions, every possible state and action must have been visited at least once.
- Q learning learns separate values for each possible action in each possible state.
- to choose the best action, the agent is always allowed to look ahead to the values associated with the neighbouring states.

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Question 29

1 pts

Which of these methods can be used for vector quantisation?

K Means Clustering.

Linear Models.

Gaussian Processes.

Self-Organising Maps.



Question 1

Which of the following statements about the kernel in SVM is **incorrect**?

- A kernel is essentially the similarly between two instances.
- The function of kernel is to take data as input and transform it into the *required form*.
- A kernel cannot be non-linear.
- Kernels can be combined to make new kernels, forming an *algebra of kernels*.

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Started: 29 Apr at 13:25

Quiz instructions

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Top tip: if you are not sure about a question, guess and move on, come back to the question at the end.

The access code for the test is: **cherry789pie**

Question 6 1 pts

Which of the following statement about Apriori algorithm is **incorrect**?

- Multiple scans are required to generate candidate sets.
- It is time-consuming because it scans the database multiple times to produce candidate sets.
- It is useful in mining frequent itemsets and relevant association rules.
- It must require labelled data.

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Question 12

In reinforcement learning,

- before the agent can start making decisions, every possible state and action must have been visited at least once.
- it is always best to choose the action that has yielded the greatest return so far.
- to choose the best action, the agent is always allowed to look ahead to the values associated with the neighbouring states.
- Q learning learns separate values for each possible action in each possible state.

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Top tip: if you are not sure about a question, guess and move on, come back to the question at the end.

The access code for the test is: **cherry789pie**

Question 5 1 pts

Which of the following statement about OPTICS is correct?

- It cannot detect outliers.
- it does not address one of DBSCAN's major weaknesses: the problem of detecting meaningful clusters in data of varying density.
- It is a regression algorithm.
- It does not require a predefined number of clusters in advance.

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Question 3

Question 4

Question 5

Question 6

Question 7

Question 8

Time running: Hide Time

Attempt due: 29 Apr at 16:00

19 minutes, 13 Seconds



Question 8

1 pts

Check all statements about K Nearest Neighbour (KNN) classification that are correct.

"curse of dimensionality" suggests that KNN performs better if there are more input dimensions.

Training samples may be classified incorrectly with $K > 1$.

KNN can be directly used for multi-class classification tasks.

The nearest neighbours of a point \mathbf{x} are all labelled points with a distance less than K from \mathbf{x} .

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In-Class Test 2: Multiple Choice Questions

Started: 29 Apr at 10:01

Quiz instructions

- This quiz is worth 40% of the marks for this module.
- This quiz consists of 30 questions.
- This is an individual assessment. You must not receive or send any communications pertaining to the assessment while taking it.
- This is an open book assessment. You may use notes, lecture materials, textbooks, software documentation, and software such as calculators, Matlab or R.
- You have 90 minutes to complete the quiz.
- Clicking "Submit quiz" finishes the course tests and submits your answers for assessment. **Click this button only after completing all questions.**



Question 25

1 pts

In this question, d denotes a data point, c^* the codevector closest to d ("winner"), and c^{**} the second closest codevector ("runner-up").

Check all statements about Neural Gas methods that are correct.

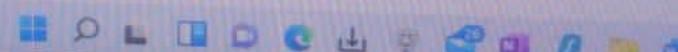
- The Neural Gas is a method for unsupervisedly learning topological structures from data.
- A connection between c^* and d is created, and any existing connection between c^{**} and d is removed.
- c^* has rank 0 in terms of proximity to d , and therefore c^* takes the largest learning step, in relative terms, of all codevectors.
- Connections are removed if the distance between the connected points exceeds a given threshold.

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- This is an open book assessment. You may use notes, lecture materials, textbooks, software documentation, and software such as calculators, Matlab or R.
- You have 90 minutes to complete the quiz.
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③ Que

⑦ Que

...

Time running

Attempt due: 29

1 Hour, 17 m



Question 3

1 pts

Check all statements about K Means Clustering that are correct.

- The sum of squared distances of data points from their cluster centres decreases in each iteration of the algorithm.
- Each data point belongs to multiple clusters that form a nested structure.
- The algorithm terminates when each cluster has at least K data points.
- The algorithm terminates when the cluster positions do not change during an iteration.

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24	The number of neighbours for K Nearest Neighbours.
25	<ul style="list-style-type: none"><input checked="" type="checkbox"/> Connections are removed if their age exceeds a given threshold.<input checked="" type="checkbox"/> The Neural Gas is a method for predicting outputs, such as class labels.
26	$\text{sum}(\text{pc1} * \text{pc2})$ will evaluate to 0.
27	<ul style="list-style-type: none"><input checked="" type="checkbox"/> If a test set is imbalanced this may result in over-estimating a classifier's generalisation.<input checked="" type="checkbox"/> Nonlinear classifiers generalise better than linear classifiers.
28	K Means Clustering minimises within-cluster error.
29	K Means Clustering. , Self-Organising Maps

- Clicking "Submit quiz" finishes the course tests and submits your answers for assessment. Click this button only after completing all questions.

Attempt due: 29 Apr at 12:25
39 minutes, 11 Seconds

Question 30

1 pts

Check all correct statements about regression.

- Gaussian Processes can be used for regression.
- Regression is a type of supervised learning.
- The objective of regression is the prediction of class labels.
- Vector quantisation can be used for regression.

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Quiz instructions

Carefully read and understand [MCQ 2 Information](#) before attempting this graded test.

Top tip: if you are not sure about a question, guess and move on, come back to the question at the end.

The access code for the test is: **cherry789pie**

Question 4 1 pts

Which of the following statement about K-means is **correct**?

It requires to specify K beforehand.

K-means cannot scale to large data sets.

K-means is relatively complicated to implement.

K-means can be used to solve regression problems.

Time running: [Hide Time](#)
Attempt due: 29 Apr at 16:00
19 minutes, 22 Seconds

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- You have 90 minutes to complete the quiz.
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Question 12

Check all statements about linear models that are correct.

- A linear model is always 1-dimensional.
- A linear model can be constructed for a dataset that is not linearly separable.
- Data points that are not exactly on the hyperplane of separation can be omitted without changing the model.
- A linear model can be specified by a Hessian normal form.

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Question 3

1 pts

Check all statements about K Means Clustering that are correct.

- The algorithm terminates when the cluster positions do not change during an iteration.
- The algorithm terminates when each cluster has at least K data points.
- Each data point belongs to multiple clusters that form a nested structure. 
- The sum of squared distances of data points from their cluster centres decreases in each iteration of the algorithm.

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le units: 7COM1018- X | Module units: 7COM1018- X | Clustering.pdf: 7COM1018 X | 2_Data_Warehousing.pdf: X | A signal is sampled at 250

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- You have 90 minutes to complete the quiz.
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Question 1

1 pts

A signal is sampled at 250 Hz during 4 seconds. The lowest and highest frequencies on the power spectrum will be, respectively,

- 0.25 and 125 Hz
- 0.5 and 500 Hz
- 0.4 and 250 Hz
- 4 and 250 Hz

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4 f5 f6 f7 f8 f9 f10 f11 f12 imprt sc



[Solved] Which of the following

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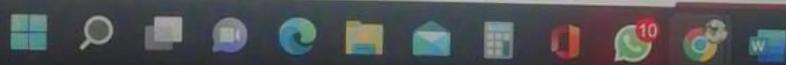
animal	class_mammal	class_reptile	class_fish
salmon		3	
zebra		1	

○

animal	class_mammal	class_reptile	class_fish
mouse	1	0	0
lizard	0	2	0
salmon	0	0	3
zebra	4	0	0

●

animal	class_mammal	class_reptile	class_fish
mouse	1	0	0
lizard	0	1	0
salmon	0	0	1
zebra	1	0	0



ASUS



You have 70 minutes to complete the quiz.

- Clicking "Submit quiz" finishes the course tests and submits your answers for assessment. **Click this button only after completing all questions.**



Question 17

1 pts

Suppose you wish to do blind-source separation. The signals \mathbf{S} (a matrix in which different columns contain the time-series of sounds produced by different voices) have been mixed to generate a matrix \mathbf{X} of signal mixtures. If the mixing matrix \mathbf{A} is known (such that $\mathbf{S}\mathbf{A} = \mathbf{X}$, then the original signals \mathbf{S} can easily be recovered from \mathbf{X} by matrix multiplication as

\mathbf{XA}

\mathbf{AX}

$\mathbf{A}^{-1}\mathbf{X}$

\mathbf{XA}^{-1}



Question 25

1 pts

In this question, \mathbf{d} denotes a data point, \mathbf{c}^* the codevector closest to \mathbf{d} ("winner"), and \mathbf{c}^{**} the second closest codevector ("runner-up").

Check all statements about Neural Gas methods that are correct.

-
- A connection between \mathbf{c}^* and \mathbf{d} is created, and any existing connection between \mathbf{c}^{**} and \mathbf{d} is removed.
 - \mathbf{c}^* has rank 0 in terms of proximity to \mathbf{d} , and therefore \mathbf{c}^* takes the largest learning step, in relative terms, of all codevectors.
 - The Neural Gas is a method for unsupervisedly learning topological structures from data.
 - Connections are removed if the distance between the connected points exceeds a given threshold.
-

ed] Which of the following X +

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- You have 90 minutes to complete the quiz.
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Click this button only after completing all questions.



Question 18

1 pts

What is the result of applying one-hot encoding on the `class` column in the table below?

animal	class
mouse	mammal
lizard	reptile
salmon	fish
zebra	mammal



ASUS





Question 7

1 pts

Check all statements about Hierarchical Clustering that are correct.

- The initial clusters in Hierarchical Clustering contain one single data point.
- The algorithm operates by iteratively merging the two largest clusters.
- Hierarchical Clustering results in a tree of nested clusters.
- A matrix of Pearson correlation coefficients between data points is suitable as a distance matrix for Hierarchical clustering.

Check all statements about Hierarchical Clustering that are correct.

- Hierarchical Clustering can be applied to the rows of a data table, as well as to its columns.
- The initial clusters in Hierarchical Clustering are designated randomly.
- The algorithm operates by iteratively merging the two smallest clusters.
- The L_1 norm (also known as "Manhattan distance") can be used to construct a distance matrix suitable for Hierarchical Clustering.

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18 minutes, 10 Seconds

Question 10

When clustering binary variables, the "simple matching coefficient" can be used as the distance metric.

Where:

a is the number of 1-1 matches,
b is the number of 1-0 matches,
c is the number of 0-1 matches,
d is the number of 0-0 matches.

$$d(i, j) = \frac{b+c}{a+b+c+d}$$

	Test 1	Test 2	Test 3	Test 4
Balbir	1	1	0	1
Berlinda	1	1	0	0

How dissimilar are Balbir and Berlinda, $d(\text{Balbir}, \text{Berlinda})$?

0.2
 0.5
 0.75
 0.25

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Question 11

1 pts

Check all statements about linear models that are correct.

- A linear model constructed using a data set that is not linearly separable will result in wrong predictions for all training inputs.
- Increasing the variance in the training data set always improves the accuracy of the resulting linear model.
- Adding samples to the training set will change the resulting linear model.
- Linear models are used for binary classification by predicting the output label of an input \mathbf{x} based on which side of a hyperplane \mathbf{x} is on.



Question 2

1 pts

Check all statements about Support Vector Machines (SVMs) that are correct.

- The surface of separation produced by an SVM classifier is always linear in the feature space.
- The radial basis function (RBF) kernel always gives the most accurate results.
- The SVM hyperparameters that give the best performance are the same for all classification problems.
- The best hyperparameter settings for training a SVM classifier can be identified using a grid search.



Question 21

1 pts

Check all statements about Gaussian Processes (GPs) that are correct.

- Increasing the length scale (λ) results in a GP model that predicts smaller variances overall.
- For an input \mathbf{x} , the variance σ^2 predicted by a GP model is smaller if \mathbf{x} is further away from the training inputs.
- GP models can predict a nonlinear relationship between inputs \mathbf{x} and corresponding outputs μ .
- Increasing the signal variance (σ_f^2) results in a GP model that predicts smaller variances overall.



Question 6

1 pts

A K Nearest Neighbours model has been built with 10 training samples, with labels taking values I, II, III, IV, as follows:

1	2	3	4	5	6	7	8	9	10
I	II	III	IV	I	II	III	IV	I	II

With K = 3, which label will this model predict for a new sample with the following distances to the training samples?

1	2	3	4	5	6	7	8	9	10
12	11	14	16	13	22	23	24	18	17

III

IV

I
 II

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MCQ 2

Started: 29 Apr at 13:25

Quiz instructions

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Top tip: if you are not sure about a question, guess and move on, come back to the question at the end.

The access code for the test is: **cherry789pie**

Question 8 1 pts

Which of the following statement describes the benefits of OLAP?

Query performance

All the options

Central repository of relations and calculations

Protects users from raw application database complexities

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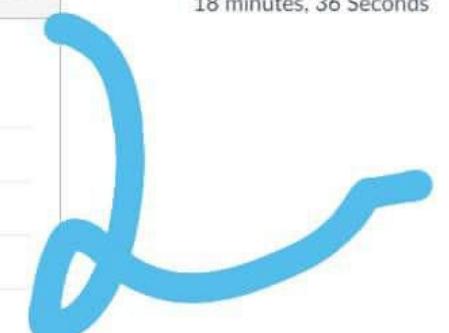
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Time running: Hide Time

Attempt due: 29 Apr at 16:00

18 minutes, 36 Seconds



- such as calculators, Matlab or R.
- You have 90 minutes to complete the quiz.
- Clicking "Submit quiz" finishes the course tests and submits your answers for assessment. Click "Next" to continue.

1 pts

Question 14

Which of the following functions could be used for Hierarchical Clustering?

$f(\mathbf{x}) = \cos(||\mathbf{x}||)$

$f(\mathbf{x}, \mathbf{y}) = 1 - \frac{\mathbf{x} \cdot \mathbf{y}}{||\mathbf{x}|| \cdot ||\mathbf{y}||}$

$f(\mathbf{x}, \mathbf{y}) = 1 - \mathbf{x} \cdot \mathbf{y}$

$f(\mathbf{x}, \mathbf{y}) = \sqrt{\sum_{i=1}^n (x_i - y_i)^2}$

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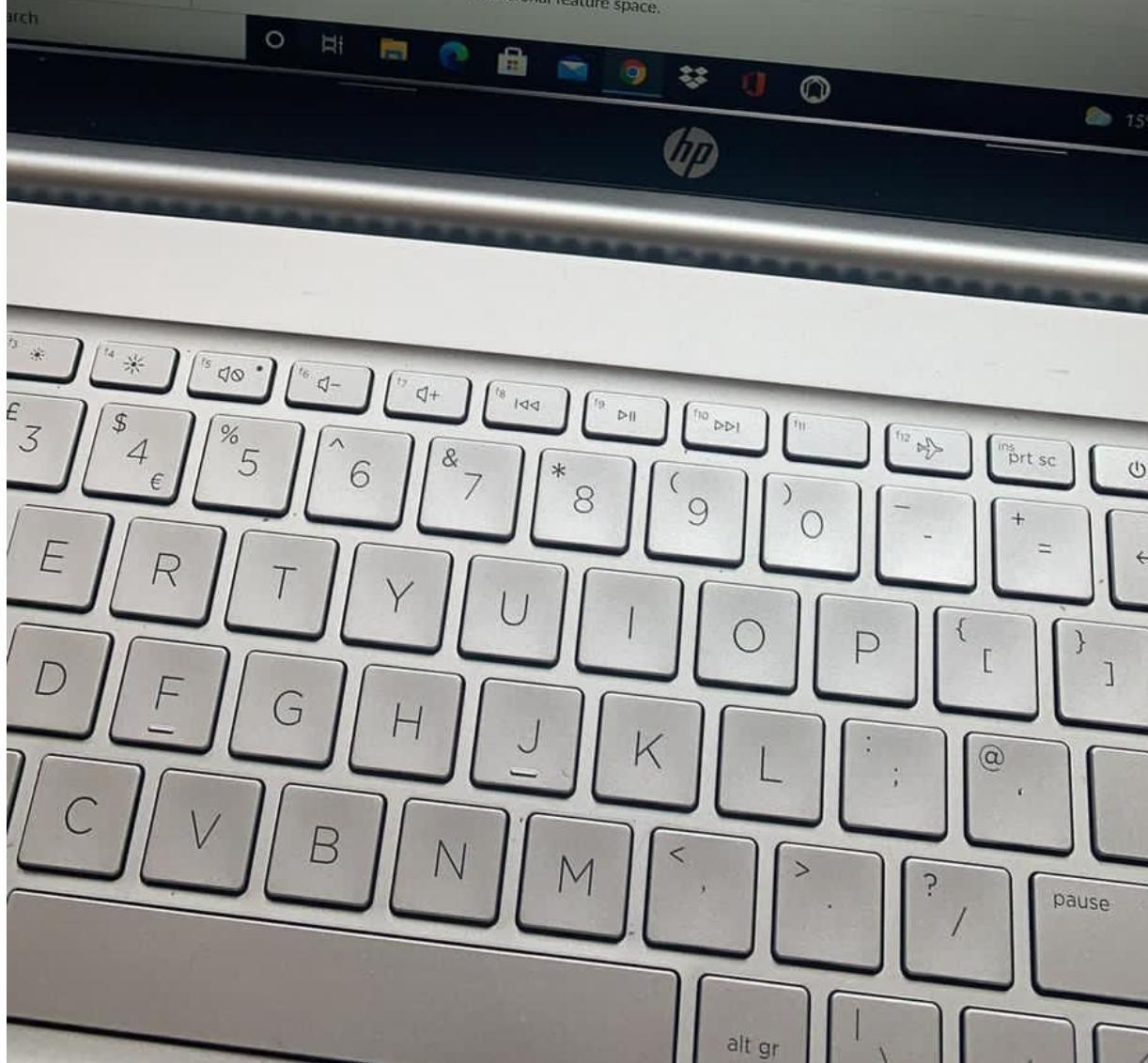
Quiz instructions

- This course test is worth 40% of the marks for this module.
- This course test consists of 30 questions.
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- This is an open book assessment. You may use notes, lecture materials, textbooks, software documents such as calculators, Matlab or R.
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Question 16

Consider two classes that are not linearly separable in their original d -dimensional input space. Which of the following operations can transform the data so that they are linearly separable?

- Transforming the data by rotating them around the coordinate origin.
- A nonlinear mapping to a $d - 1$ -dimensional feature space.
- A nonlinear mapping to a $d + 2$ -dimensional feature space.
- A linear mapping to a $d - 1$ -dimensional feature space.



13 x_1 has d components.

x_4 contains the cosine of the angle between a and b .

13

14
$$f(x, y) = 1 - \left(\frac{x \cdot y}{\|x\| \cdot \|y\|} \right)^2$$

14

the independent components are calculated by projecting the data points onto the weight vectors (the columns of the demixing matrix).

the weight vectors are calculated so as to maximize the kurtosis of the distribution of the new coordinates.

the weight vectors are mutually orthogonal.

the independent components are calculated by the inner product of the data points with the weight vectors.

15

Question 10

The objective function minimised by soft margin SVM is

$$\|w\|^2 + C \sum_{i=1}^n \xi_i$$

subject to the constraints

$$y_i(w^T x_i - b) \geq 1 - \xi_i$$

Check all statements about soft margin support vector machines.

- Increasing the value of C reduces a SVM's tolerance for margin violations.
- All components of w are non-negative: $w_i \geq 0$.
- A data point x_i is misclassified if $\xi_i > 1$.
- The bias b is a control parameter set by the user.



Question 10

1 pts

The objective function minimised by soft margin support vector machines is

$$\|\mathbf{w}\|^2 + C \sum_{i=1}^n \xi_i$$

subject to the constraints

$$y_i(\mathbf{w}^T \mathbf{x}_i - b) \geq 1 - \xi_i$$

Check all statements about soft margin support vector machines that are correct.

Increasing the value of C reduces a SVM's tolerance for margin violations and misclassifications.

The bias b is a control parameter set by the user.

All components of \mathbf{w} are non-negative: $w_i \geq 0$.

A data point \mathbf{x}_i is misclassified if $\xi_i > 1$.



Question 5

Check all statements about Principal Component Analysis (PCA) that are correct.

- The number of principal components is equal to the number of data points.
- Principal components are columns of the covariance matrix.
- The first principal component is orthogonal to all other principal components.
- The total variance in the data set is equal to the sum of eigenvalues of the covariance matrix.

In-Class Test 2: Multiple Choice Questions

Started: 29 Apr at 10:00

Quiz instructions

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- This quiz consists of 30 questions.
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- This is an open book assessment. You may use notes, lecture materials, textbooks, software documentation, and software such as calculators, Matlab or R.
- You have 90 minutes to complete the quiz.
- Clicking "Submit quiz" finishes the course tests and submits your answers for assessment. **Click this button only after completing all questions.**



Question 7

1 pts

Check all statements about Hierarchical Clustering that are correct.

- The initial clusters in Hierarchical Clustering contain one single data point.
- Hierarchical Clustering results in a tree of nested clusters.
- A matrix of Pearson correlation coefficients between data points is suitable as a distance matrix for Hierarchical Clustering.
- The algorithm operates by iteratively merging the two largest clusters.

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MacBook Air



- This is an open book assessment. You may use notes, books, and the internet.
- You have 90 minutes to complete the quiz.
- Clicking "Submit quiz" finishes the course tests and submits your answers for assessment. **Click this button only after completing all questions.**



Question 30



Check all correct statements about regression.

- K Means Clustering can be used for regression.
- Regression is a type of unsupervised learning.
- The objective of regression is the prediction of continuous-valued outputs.
- Linear Models can be used for regression.

◀ Previous

- If a test set is imbalanced this may result in over-estimating a classifier's generalisation.
- Nonlinear classifiers generalise better than linear classifiers.

Question 19

- An actor is exploring the environment during reinforcement learning. He/she must answer the following questions:
- has returned the greatest reward so far.
 - None of the other answers is correct.
 - has the greatest (state, action) value.
 - has most often been explored so far.

Previous

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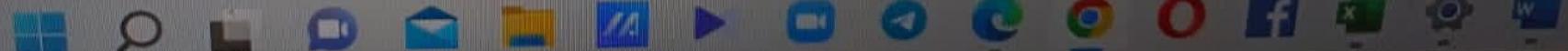
- You have 90 minutes to complete the quiz.
- Clicking "Submit quiz" finishes the course tests and submits your answers for assessment. *Click this button only after completing all questions.*



Question 21

Check all statements about Gaussian Processes (GPs) that are correct.

- Increasing the length scale (λ) results in a GP model that predicts smaller variances overall.
- For an input \mathbf{x} , the variance σ^2 predicted by a GP model is smaller if \mathbf{x} is further away from the training inputs.
- GP models can predict a nonlinear relationship between inputs \mathbf{x} and corresponding outputs μ .
- Increasing the signal variance (σ_f^2) results in a GP model that predicts smaller variances overall.



hyperparameters can you x | G Data points that are not exactly x | Discussions: 7COM1033-0206-20 x | G is regression supervised
/83263/quizzes/43121/take/questions/393617
THIS IS AN OPEN BOOK ASSESSMENT. YOU MAY USE NOTES, LECTURE MATERIALS, TEXTBOOKS, SOFTWARE DOCUMENTATION, AND SO ON, SUCH AS CALCULATORS, MATLAB OR R.
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Question 7

1 pts

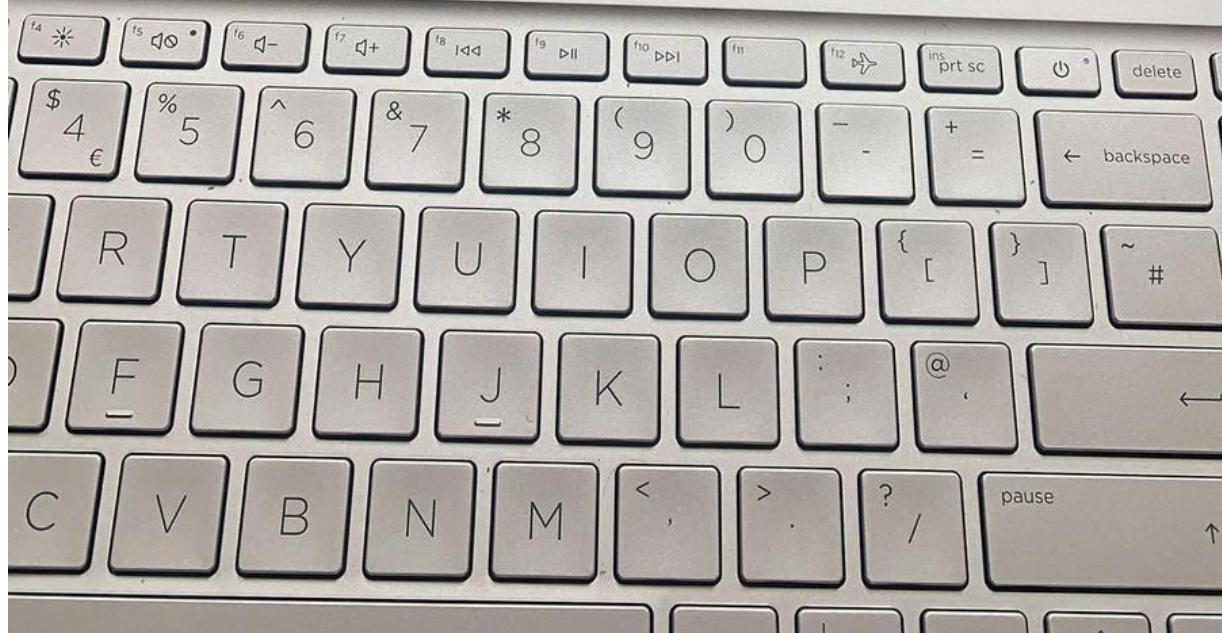
Which of the options to `svm-train` are suitable to train a support vector machine with a linear kernel? The documentation of the relevant command line options is shown below for reference.

```
-s svm_type : set type of SVM (default 0) 0 -- C-SVC 1 -- nu-SVC 2 -- one-class SVM 3 -- epsilon-SVR 4 -- nu-SVR  
-t kernel_type : set type of kernel function (default 2) 0 -- linear:  $u^T v + b$  1 -- polynomial:  $(gamma * u^T v + coef0)^degree$   
2 -- radial basis function:  $exp(-gamma * |u-v|^2)$  3 -- sigmoid:  $tanh(gamma * u^T v + coef0)$   
-d degree : set degree in kernel function (default 3)  
-g gamma : set gamma in kernel function (default 1/num_features)  
-r coef0 : set coef0 in kernel function (default 0)  
-c cost : set the parameter C of C-SVC, epsilon-SVR, and nu-SVR (default 1)
```

- s 0 -c 100 -g 1
- t 2 -c 10
- t 1 -d 1 -g 2
- t 0

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Question 29

Which of these methods can be used for vector quantisation?

Gaussian Processes.

Linear Models.

Self-Organising Maps.

K Means Clustering.

◀ Previous

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Question 28

1 pt

Check all statements about K Means Clustering that are correct.

- K Means minimises the sum of squared distances between data points and the centres of the clusters they are assigned to.
- The number of clusters is denoted by K. This parameter is set by the user.
- The clusters form a nested structure in which the first cluster contains all data points and all other clusters.
- The algorithm may run indefinitely because there is an infinite number of possible clusterings..

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Started: 29 Apr at 13:25

Quiz instructions

Carefully read and understand [MCQ 2 Information](#) before attempting this graded test.

Top tip: if you are not sure about a question, guess and move on, come back to the question at the end.

The access code for the test is: **cherry789pie**

Question 6 1 pts

Which of the following statement about Apriori algorithm is **incorrect**?

- Multiple scans are required to generate candidate sets.
- It is time-consuming because it scans the database multiple times to produce candidate sets.
- It is useful in mining frequent itemsets and relevant association rules.
- It must require labelled data.

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Question 1 Question 2 Question 3 Question 4 Question 5 Question 6 Question 7 Question 8

Time running: Hide Time
Attempt due: 29 Apr at 16:00
19 minutes, 2 Seconds

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Question 13

1 pts

The table below have the confusion matrix for a two-class classification problem with classes A and B.

	Predicted label A	Predicted label B
True label A	10	10
True label B	10	20

Choose the option which is closer to the **overall accuracy** for the classification.

60%

40%

100%

20%



Question 27

1 pts

Check all statements about generalisation that are correct.

- Generalisation describes the ability of a classifier to perform well on all inputs, not just those used in training.
- Nonlinear classifiers generalise better than linear classifiers.
- If a test set is imbalanced this may result in over-estimating a classifier's generalisation.
- Classifiers that generalise well within the range covered by training data will also perform well outside that range.

› Question 1

1 pts

A signal is sampled at 250 Hz during 4 seconds. The lowest and highest frequencies on the power spectrum will be, respectively,

- 0.4 and 250 Hz
- 0.5 and 500 Hz
- 0.25 and 125 Hz
- 4 and 250 Hz

points that are not exactly c x | Discussions: 7COM1033-0206-20 x | G is regression supervised or unsup x | +
s/83263/quizzes/43121/take/questions/393620

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- You have 90 minutes to complete the quiz.
- Clicking "Submit quiz" finishes the course test and submits your answers for assessment. **Click this button completing all questions.** Use the "Previous" and "Next" buttons, or the question panel (at the right) to navigate between questions.



Question 21

Check all statements about Principal Component Analysis (PCA) that are correct.

- The variance along the first principal component is always greater than 50% of the total variance in the data.
- If the original input features are normalised to unit variance, the variance of the first component is always equal to the number of features.
- The variance of the data is largest in the direction of the first principal component.
- The correlation between the first and the second principal components is 0.

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Saved at 11:02

Submit



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1 Hour, 17 minutes, 11 Sec



Question 4

1 pts

Which of the options to `svm-train` are suitable to train a support vector machine with a linear kernel? The documentation of the relevant command line options is shown below for reference.

```
-s svm_type : set type of SVM (default 0) 0 -- C-SVC 1 -- nu-SVC 2 -- one-class SVM 3 -- epsilon-SVR 4 -- nu-SVR
-t kernel_type : set type of kernel function (default 2) 0 -- linear: u'*v 1 -- polynomial: (gamma*u'*v + coef0)^d
               2 -- radial basis function: exp(-gamma*|u-v|^2) 3 -- sigmoid: tanh(gamma*u'*v + coef0)
-d degree : set degree in kernel function (default 3)
-g gamma : set gamma in kernel function (default 1/num_features)
-r coef0 : set coef0 in kernel function (default 0)
-c cost : set the parameter C of C-SVC, epsilon-SVR, and nu-SVR (default 1)
```

`-t 1 -d 1 -g 7 -r 5`

`-c 1 -g 2`

`-t 2 -c 10`

`-t 0 -c 3`

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Question 15

1 pts

In independent component analysis (ICA)

- the weight vectors are mutually orthogonal.
- the independent components are calculated by projecting the data points onto the weight vectors (the columns of the demixing matrix).
- the weight vectors are calculated so as to maximize the kurtosis of the distribution of the new coordinates.
- the independent components are calculated by the inner product of the data points with the weight vectors.

Activate

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MCQ 2

Started: 29 Apr at 13:25

Quiz instructions

Carefully read and understand [MCQ 2 Information](#) before attempting this graded test.

Top tip: if you are not sure about a question, guess and move on, come back to the question at the end.

The access code for the test is: **cherry789pie**

Question 2 1 pts

Which of the following statements about the kernel in SVM is **incorrect**?

Kernels can be combined to make new kernels, forming an algebra of kernels.

A kernel cannot be non-linear.

A kernel is essentially the similarly between two instances.

The function of kernel is to take data as input and transform it into the required form.

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Questions

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- [Question 2](#)
- [Question 3](#)
- [Question 4](#)
- [Question 5](#)
- [Question 6](#)
- [Question 7](#)
- [Question 8](#)

Time running: [Hide Time](#)
Attempt due: 29 Apr at 16:00
19 minutes, 42 Seconds

You have 75 minutes to complete the quiz.

- Clicking "Submit quiz" finishes the course tests and submits your answers for assessment. Click this button only after completing all questions.



Question 29

1 pts

Which of these methods can be used for vector quantisation?

K Means Clustering.

Self-Organising Maps.

Linear Models.

Gaussian Processes.

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Saved at 10:15

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Quiz: In-Class Test 2: Multiple Ch Topic: Preparation for test tomorrow (22) WhatsApp

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Question 2 1 pts

Check all statements about Support Vector Machines (SVMs) that are correct.

The best data points for training a SVM classifier can be identified using a grid search.

A SVM classifier may produce a surface of separation that is not linear in the input space.

The SVM hyperparameters that give a good performance are different for each classification problem.

SVM kernels with more hyperparameters always give more accurate results.

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Not saved Submit quiz

② Question 7

Time running: Hide Time

Attempt due: 29 Apr at 12:25

1 Hour, 28 minutes, 33 Seconds

- Clicking "Submit quiz" finishes the course tests and submits your answers for assessment.
- Click this button only after completing all questions.



Question 25

1 pts

In this question, \mathbf{d} denotes a data point, \mathbf{c}^* the codevector closest to \mathbf{d} ("winner"), and \mathbf{c}^{**} the second closest codevector ("runner-up").

Check all statements about Neural Gas methods that are correct.

- \mathbf{c}^* has rank 1 in terms of proximity to \mathbf{d} , and therefore \mathbf{c}^* takes the smallest learning step, in relative terms, of all codevectors.
- An edge of age 0 connecting \mathbf{c}^* and \mathbf{c}^{**} is created, or if they are already connected, the age of the existing edge is reset to 0.
- The Neural Gas is a method for predicting outputs, such as class labels.
- Connections are removed if their age exceeds a given threshold.

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LEGION



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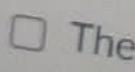
Question 3

1 pts

Check all statements about K Means Clustering that are correct.



K Means terminates when it reaches a local minimum of the sum of squared distances of data points from their respective cluster centres.



The K means algorithm terminates when all data points have a distance of at most K from their respective cluster centre.



The algorithm terminates when each cluster centre \mathbf{c}_k is exactly located at a data point \mathbf{x}_i , i.e. $\mathbf{c}_k = \mathbf{x}_i$



Each data point is placed in exactly one cluster.



Show all

This quiz is worth 40% of the marks for this module.

This quiz consists of 30 questions.

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Question 8

1 pts

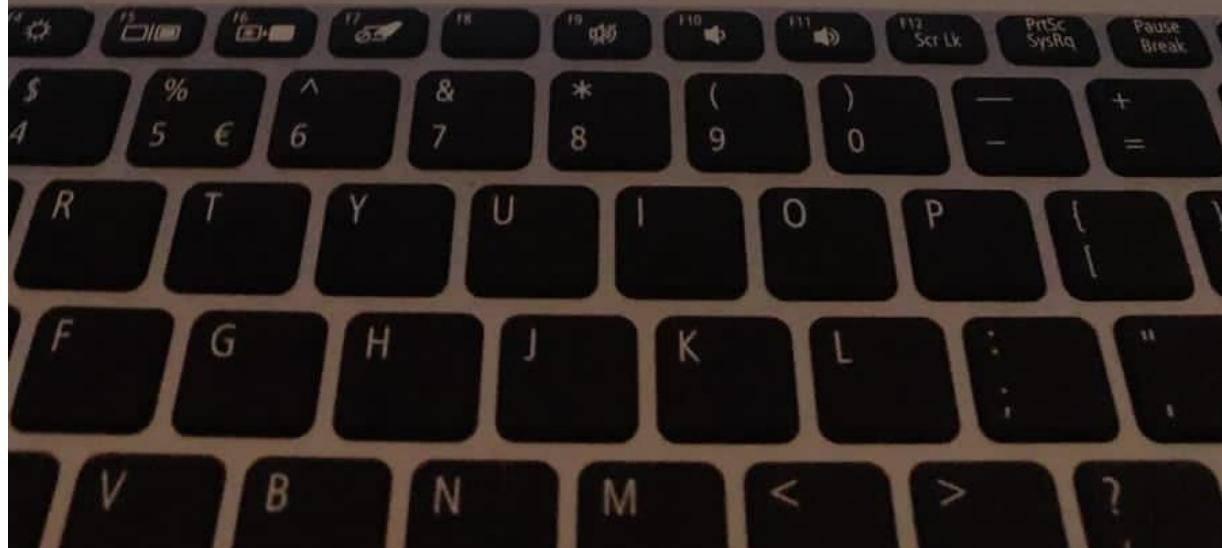
Check all statements about K Nearest Neighbour (KNN) classification that are correct.

- The nearest neighbours of a point \mathbf{x} are the K labelled points that are closest to \mathbf{x} .
- The "curse of dimensionality" suggests that KNN performance diminishes for a larger number of input dimensions.
- KNN is unsuitable if there are more than two classes.
- Training samples may be classified incorrectly if they have the same distance to multiple other training samples.

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19	has returned the greatest reward so far.
	<input type="checkbox"/> Build a virtual machine image in which all software used in the analysis is installed, use virtual machine running that image for all analyses, and safely store that image with the results. <input type="checkbox"/> Use scripts that produce plots and figures automatically, without any intervention by users.
20	
	<input type="checkbox"/> For an input \mathbf{x} , the variance σ^2 predicted by a GP model is smaller if \mathbf{x} is further away from the training inputs.
21	<input checked="" type="checkbox"/> Increasing the signal variance (σ_f^2) results in a GP model that predicts smaller variances overall.
	<input type="checkbox"/> Each data item that is not in the test set is used once for validation and $n - 1$ times for training a model. <input type="checkbox"/> The final training set consists of all data items that were correctly classified during validation. <input type="checkbox"/> Cross-validation aims to find a model that correctly predicts the class of n training samples.
22	
23	
24	

The access code for the test is: cherry789pie

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Question 4

Which of the following statement about K-means is **correct**?

- K-means can be used to solve regression problems.
- K-means is relatively complicated to implement.
- K-means cannot scale to large data sets.

✓ It requires to specify K beforehand.

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You have 90 minutes to complete the quiz.

Clicking "Submit quiz" finishes the course test and submits your answers for assessment. **Clicking "Submit quiz" will submit your answers. Make sure you have completed all questions.** Use the "Previous" and "Next" buttons, or the question panel (at the bottom) to move between questions.

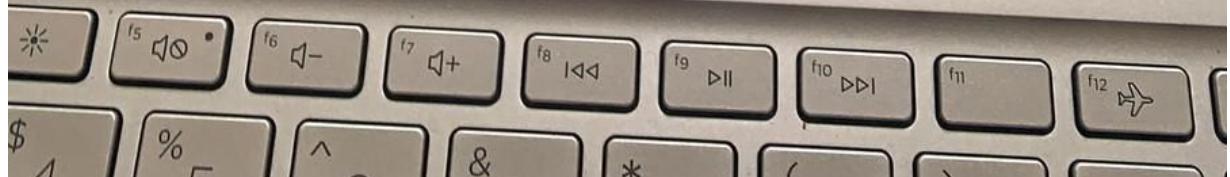
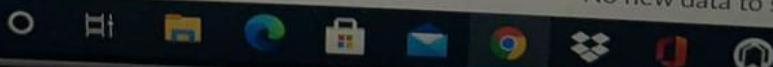
Question 30

Which of the following hyperparameters can you select using cross-validation?

- The regularisation parameter C for penalising slack variables in a support vector machine.
- The length scale λ of a Gaussian Process.
- The number of slack variables used by a support vector machine.
- The number of eigenvalues returned by Principal Component Analysis.

◀ Previous

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Data points that are not exactly c x | Discussions: 7COM1033-0206-20 x | is regression supervised or unsup x | +
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Question 15

You are given a data set with the features

- v_1 : numeric
- v_2 : numeric
- v_3 : categorical

and the task of predicting the numeric output y on this basis. Check all statements that are correct.

Principal Component Analysis could be applied to convert the categorical feature v_3 into a numerical feature.

 This is a regression problem.

 A Gaussian Process model could be constructed after using one-hot encoding for the categorical feature v_3 .

The categorical feature v_3 cannot be used because the output y is numeric.

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Question 4 Question 5 Question 6 Question 7 Question 8

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Top tip: if you are not sure about a question, guess and move on, come back to the question at the end.

The access code for the test is: **cherry789pie**

Question 3 1 pts

Which of the following statements about support vector machine (SVM) is **incorrect**?

It can be efficient because it only uses a subset of the training data

It performs well when the data set is large

It is suitable when classes are separable

It is tricky to select the appropriate kernel function

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- You have 90 minutes to complete the quiz.
- Clicking "Submit quiz" finishes the course tests and submits your answers for assessment. Click this button only after completing all questions.

Question 28

Check all statements about the use of error concepts by various Machine Learning methods that are correct.

- Hierarchical clustering maximises within-cluster error.
- The Neural Gas algorithm minimises the Bayes error rate.
- K-Means Clustering minimises within-cluster error.
- Self-organising maps minimise vector quantisation error.

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Attempt due: 29 Apr at 12:25
24 minutes, 25 Seconds

• You have 90 minutes to complete the quiz.
• Clicking "Submit quiz" finishes the course tests and submits your answers for assessment. Click this button only after completing all questions.

Question 22 1 pts

Check all statements about n -fold cross-validation that are correct.

The final training set consists of all data items that were correctly classified during validation.

Each data item that is not in the test set is used once for validation and $n - 1$ times for training a model.

The data in the test set is not used for training or validating models.

Cross-validation aims to find a model that correctly predicts the class of n training samples.

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Question 9

1 pts

Time can be introduced into a perceptron by

- tapped delay lines at the input nodes.
- recurrent connections.
- convolution of the inputs with temporal kernels.
- using the back-propagation algorithm.

button only after completing all questions.

Question 28

1 pts

Check all statements about the use of error concepts by various Machine Learning methods that are correct.

- Linear models can be derived from minimising the sum of squared errors.

K Means Clustering maximises within-cluster error.

The Neural Gas algorithms minimise vector quantisation error.

A Self-Organising Map minimises the Bayes error rate.

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- Click this button only after completing all questions.



Question 23

1 pts

In reinforcement learning, softmax action selection ensures that

- even the action that has yielded the least return so far can be selected.
- the selection probabilities of all possible actions add up to one.
- the action is taken that has yielded the greatest return so far
- there is NO randomness in the selection of the next action.

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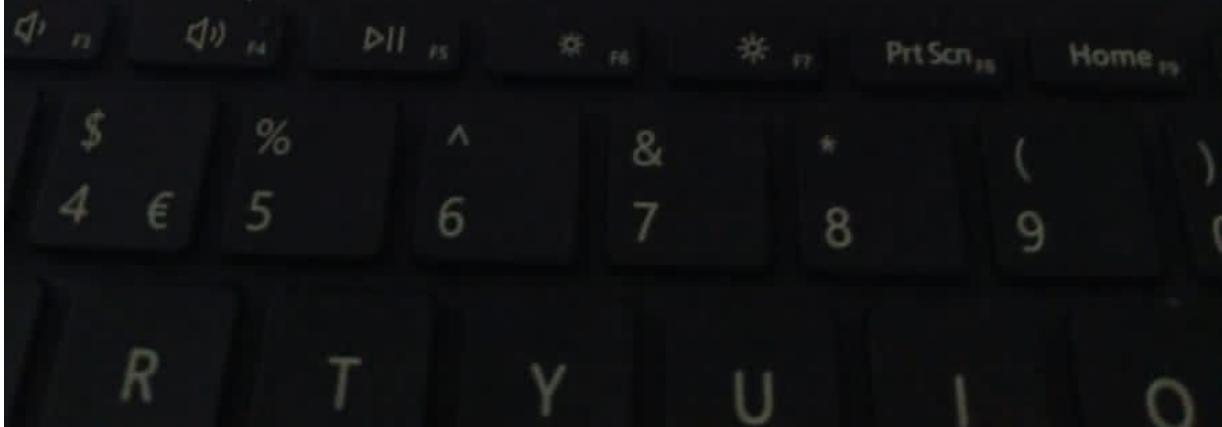
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Quiz instructions

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Top tip: if you are not sure about a question, guess and move on, come back to the question at the end.

The access code for the test is: **cherry789pie**

Question 1 1 pts

Which of the following statements about support vector machine (SVM) is **correct**?

- It cannot be efficient because it only uses a subset of the training data
- It performs well when the data set is large
- It is easy to select the appropriate kernel function
- It is suitable when classes are separable

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The access code for the test is: **cherry789pie**

Question 4 1 pts

Which of the following statement about K-means is **correct**?

It requires to specify K beforehand.

K-means cannot scale to large data sets.

K-means is relatively complicated to implement.

K-means can be used to solve regression problems.

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Time running: Hide Time
Attempt due: 29 Apr at 16:00
19 minutes, 22 Seconds

Question 1 Question 2 Question 3 Question 4 Question 5 Question 6 Question 7 Question 8

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Question 13

1 pts

Assume that a and b are of numeric type, that both have the same number of components $d > 1$, and the following code has been run:

```
x1 <- a * b;  
x2 <- sqrt(sum(a * a));  
x3 <- sum(b * b);  
x4 <- sum(x1) / x2 / sqrt(x3);
```

Check all statements that are correct.

x1 contains the cosine of the angle between a and b .

x4 has 1 component.

x2 contains the distance of a from the origin of the coordinate system.

x3 contains the mean of b .

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Top tip: if you are not sure about a question, guess and move on, come back to the question at the end.

The access code for the test is: **cherry789pie**

Question 7 1 pts

Which of the following statement about FP growth is **incorrect**?

- It represents the database in the form of a tree called a frequent pattern tree.
- It is faster than Apriori because it only needs to scan the database twice.
- It is similar to Apriori because it scans the database to generate candidate sets.
- Its runtime increases linearly with the increase of the number of itemsets.

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Time running: [Hide Time](#)
Attempt due: 29 Apr at 16:00
18 minutes, 48 Seconds

Question 5 Question 6 Question 7 Question 8

5	The total variance in the data set is equal to the sum of eigenvalues of the covariance matrix.
6	<input type="checkbox"/> N
7	Hierarchical Clustering results in a tree of nested clusters.
8	The "curse of dimensionality" suggests that KNN performance diminishes for a larger number of input dimensions, The nearest neighbours of a point are the labelled points that are closest to .
9	using the back-propagation algorithm.
10	<input type="checkbox"/> w is a normal vector of the hyperplane separating the classes. <input type="checkbox"/> Increasing the value of C increases a SVM's tolerance for margin violations and misclassifications.
11	<input type="checkbox"/> A linear model is a hyperplane in input space which is used for binary classification by predicting the output label of an input x based on which side of the hyperplane x is on. <input checked="" type="checkbox"/> Q learning learns separate values for each possible action in each possible state. <input checked="" type="checkbox"/> it is always best to choose the action that has yielded the greatest return so far.
12	

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Time running: Hide Time
Attempt due: 29 Apr at 12:25
24 minutes, 3 Seconds



Question 24

1 pts

Which of the following hyperparameters can you select using cross-validation?

- The number of eigenvalues returned by Principal Component Analysis.
- The number of slack variables used by a support vector machine.
- The regularisation parameter C for penalising slack variables in a support vector machine.
- The length scale λ of a Gaussian Process.

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16

7.8

17

 $A^{-1}X$

18

19

animal	class_mammal	class_reptile	class_fish
mouse	1	0	0
zebra	1	0	0
lizard	0	1	0
salmon	0	0	1

finishes the course to submit your answers for assessment. **Click this button** when you have completed all questions.



Question 3

Check all statements about K Means Clustering that are correct.

- K Means terminates when it reaches a local minimum of the sum of squared distances of data points from their respective cluster centres.
- The K means algorithm terminates when all data points have a distance of at most K from their respective cluster centre.
- The algorithm terminates when each cluster centre \mathbf{c}_k is exactly located at a data point \mathbf{x}_i , i.e. $\mathbf{c}_k = \mathbf{x}_i$
- Each data point is placed in exactly one cluster.

- You have 90 minutes to complete the quiz.
- Clicking "Submit quiz" finishes the course tests and submits your answers for assessment. Click this button only completing all questions.



Question 22

Check all statements about n -fold cross-validation that are correct.



- Each data item that is not in the test set is used once for validation and $n - 1$ times for training a model.
- The data in the test set is not used for training or validating models.
- Cross-validation aims to find a model that correctly predicts the class of n training samples.
- The final training set consists of all data items that were correctly classified during validation.

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MCQ 2

Started: 29 Apr at 13:25

Quiz instructions

Carefully read and understand [MCQ 2 Information](#) before attempting this graded test.

Top tip: if you are not sure about a question, guess and move on, come back to the question at the end.

The access code for the test is: **cherry789pie**

Question 8 1 pts

Which of the following statement describes the benefits of OLAP?

Query performance

All the options

Central repository of relations and calculations

Protects users from raw application database complexities

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Questions

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Time running: [Hide Time](#)
Attempt due: 29 Apr at 16:00
18 minutes, 36 Seconds

Question 4

1 pts

You are asked to explore printer sales based on data which include the following features:

- A: the weight of the printer, in kilograms.
- B: the printer's colour capability, either "b / w" (for black / white) or "colour",
- C: the number of pages that the printer can print per minute,
- D: the printing technology used by the printer,

A table with some example rows is:

model	A	B	C	D
QuickPrint	14.4	b/w	24	laser
BrilliantPix	8.5	colour	4	ink
PenWriter	4.6	b/w	2	other

Check all statements about input variable types that are correct.

A is a categorical variable.

C is a numerical variable.

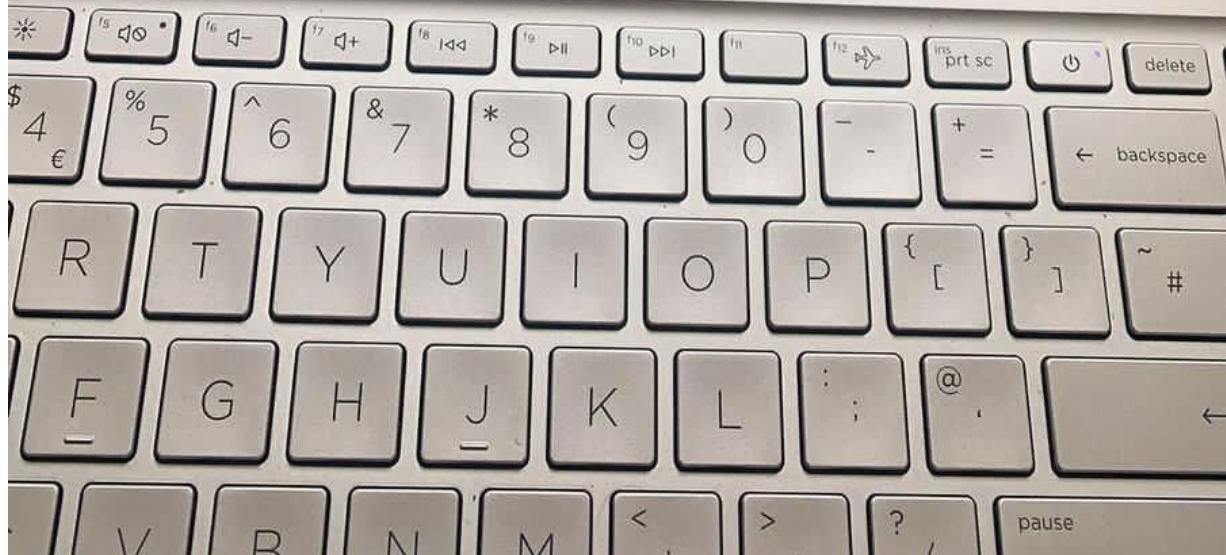
B is a numeric variable.

D is a categorical variable.

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- You have 90 minutes to complete the quiz.
- Clicking "Submit quiz" finishes the course tests and submits your answers for assessment. Click this button only after completing all questions.

Time running: [Hide Time](#)
Attempt due: 29 Apr at 12:25
46 minutes, 42 Seconds



Question 27

1 pts

Check all statements about generalisation that are correct.

- Generalisation describes the ability of a classifier to perform well on all inputs, not just those used in training.
- Classifiers that generalise well within the range covered by training data will also perform well outside that range.
- If a test set is imbalanced this may result in over-estimating a classifier's generalisation.
- Nonlinear classifiers generalise better than linear classifiers.

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Question 2

1 pts

Check all statements about Support Vector Machines (SVMs) that are correct.

- The surface of separation produced by an SVM classifier is always linear in the feature space.
- Using the radial basis function (RBF) kernel always gives the most accurate results.
- The SVM hyperparameters that give the best performance are the same for all classification problems.
- The best hyperparameter settings for training a SVM classifier can be identified using a grid search.

The access code for the test is: **cherry789pie**



Question 2

Which of the following statements about support vector machine (SVM) is **incorrect**?

- It performs well when the data set is large
- It is suitable when classes are separable
- It can be efficient because it only uses a subset of the training data
- It is tricky to select the appropriate kernel function

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hyperparameters can you | G Data points that are not exactly | Discussions: 7COM1033-0206-20 | G is regression supervised or un [s/83263/quizzes/43121/take/questions/393611](#)

- such as calculators, Matlab or R.
- You have 90 minutes to complete the quiz.
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Question 25

1 pts

The following table shows the accuracy values that have been found for models A, B and C, based on applying them to classify the samples in the training set and the test set, respectively.

model	training set	test set
A	0.91	0.62
B	0.89	0.88
C	0.62	0.61

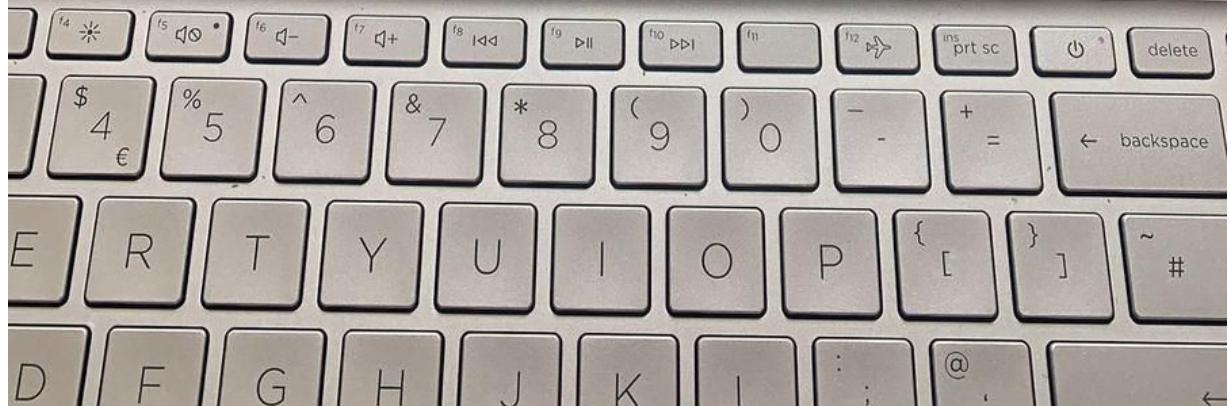
Check all correct statements about these models below.

- Model B may generalise best, as it consistently shows high accuracy with test data and with training data.
- Model C may be overfitting, as its accuracy is mediocre with both test and training data.
- Model A may be overfitting, as its accuracy is much higher with training data than with test data.
- Model A may be underfitting, as it achieves the highest accuracy.

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14°C Cloudy



Question 2

Check all statements about Support Vector Machines (SVMs) that are correct.

- The SVM hyperparameters that give a good performance are different for each *classification problem*.
- A SVM classifier may produce a surface of separation that is not linear in the input space.
- SVM kernels with more hyperparameters always give more accurate results.
- The best data points for training a SVM classifier can be identified using a grid search.





Question 11

1 pts

Check all statements about linear models that are correct.

A linear model constructed using a data set that is not linearly separable will result in wrong predictions for all training inputs.

Increasing the variance in the training data set always improves the accuracy of the resulting linear model.

Adding samples to the training set will change the resulting linear model.

Linear models are used for binary classification by predicting the output label of an input \mathbf{x} based on which side of a hyperplane \mathbf{x} is on.



Question 7

1 pts

Check all statements about Hierarchical Clustering that are correct.

- The initial clusters in Hierarchical Clustering contain one single data point.
- The algorithm operates by iteratively merging the two largest clusters.
- Hierarchical Clustering results in a tree of nested clusters.
- A matrix of Pearson correlation coefficients between data points is suitable as a distance matrix for Hierarchical Clustering.

- This course test is worth 40% of the marks for this module.
- This course test consists of 30 questions.
- This is an **individual** assessment. You must not receive or send any communications pertaining to the assessment with anyone else.
- This is an open book assessment. You may use notes, lecture materials, textbooks, software documentation, and software such as calculators, Matlab or R.
- You have 90 minutes to complete the quiz.
- Clicking "Submit quiz" finishes the course test and submits your answers for assessment. **Click this button only after completing all questions.** Use the "Previous" and "Next" buttons, or the question panel (at the right) to navigate between questions.

Question 20

1 pts

Assume that a Machine Learning model is found to achieve high accuracy when applied to a data set **X**. Check all conditions that could underpin this observation.

- X** was the training set used to build the model.
- The Bayes error rate in the range covered by **X** is low, and the model makes good use of the input for predicting the output.
- The true boundary surface between the classes maximally uncorrelated to the surface predicted by the model.
- The model achieves a low sensitivity in the range covered by **X**.

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Question 8

Time running: Hide Time
Attempt due: 29 Apr at 16:00
18 minutes, 26 Seconds

Question 9 1 pts

When comparing binary variables using the simple matching coefficient with a contingency table where:

a is the number of 1-1 matches,
b is the number of 1-0 matches,
c is the number of 0-1 matches,
d is the number of 0-0 matches.

Which letter does the Jaccard Coefficient NOT take into account.

a
 b
 c
 d

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