ML types: 1

Practice 1

There are three main types of machine learning: supervised, unsupervised, and reinforcement.

Which type of machine learning uses an **agent** that interacts with an **environment**?

- Unsupervised learning
- Reinforcement learning
- Supervised learning

ML models: error definition

Practice 2

Define the term 'error' in the context of developing a machine learning model.

- The mistakes made by the programmer while writing code for a machine learning model.
- The accuracy of a machine learning model in predicting outcomes.
- The difference between the predicted output of a machine learning model and the actual output.

Quiz:
STEM SMART Computer Science Week 31

ML engines: identify the technique

Practice 2

Machine learning models are based on mathematical and statistical techniques that are well understood by statisticians and data analysts.

Consider the graph in **Figure 1** below. The graph shows the relationship between the price of houses and their distance to a school.

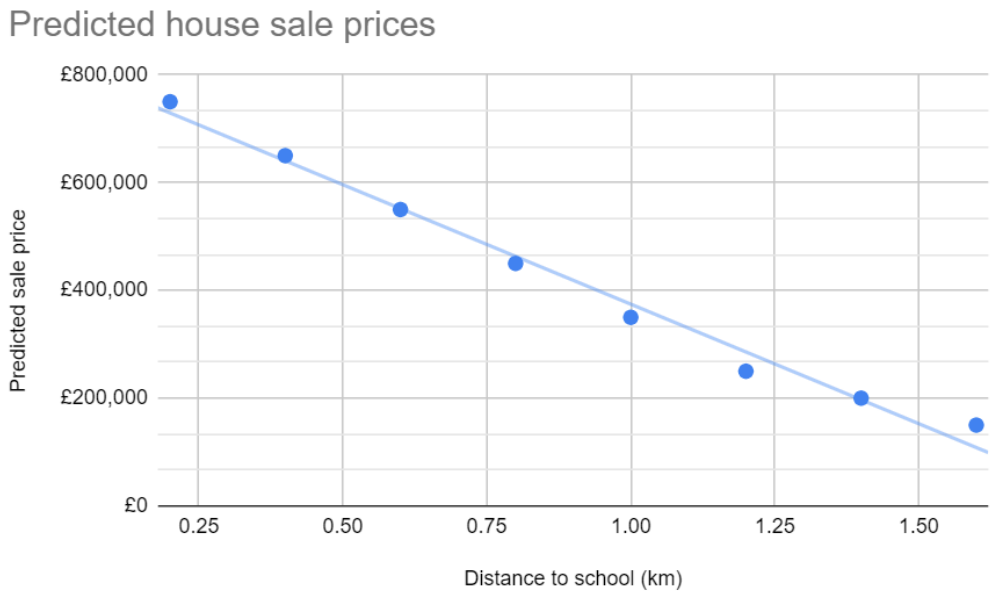

Figure 1: A graph that shows the relationship between the house prices and distance to school.

Part A

Which common statistical technique is being used?

Part B

What is the predicted cost of a house that is 0.5km from the school? Enter your answer as a whole number without a £ sign or any commas.

Quiz:
STEM SMART Computer Science Week 31

ML applications: 1

Practice 2

There are many, many different types of applications that use artificial intelligence. These applications often make use of machine learning models that are trained on vast quantities of historic data to allow them to make predictions about new data.

Which **one** of the following applications would most benefit from using artificial intelligence?

- A payroll system that calculates pay and produces payslips for employees.
- A spreadsheet application that allows you to model the costs of a weekly shop.
- An online shopping site that displays a list of items you may be interested in buying.

Quiz:
STEM SMART Computer Science Week 31

ML applications: 2

Practice 2

Many of us use online streaming services to listen to and organise our music.

Which of the following features of a music streaming service would benefit from using machine learning?

- Recommending a playlist based on the songs you commonly listen to.
- Adding a song to your favourites when you select the 'thumbs up' icon.
- Calculating how many minutes of music you listen to during the day.

Quiz:
STEM SMART Computer Science Week 31

ML models: testing and evaluating

Practice 2

A machine learning model has been developed to identify birds from their sound alone.

Part A

Whilst testing and evaluating the model, the developers found the following results. Which one of them is an indication of **bias** in the machine learning model?

- The average accuracy across all birds is 68%.
- The model is unable to identify human speech from sound.
- The app is 96% accurate for pigeons and 48% accurate for blackbirds.

Part B

Whilst testing and evaluating the model, it was found that it appeared to be biased against blackbirds. Which **two** of the following actions could the developers take to improve their model?

- [ ] Add audio samples of humans and other animals in a variety of environments.
- [ ] Add more audio samples of a wide variety of birds.
- [ ] Add audio samples of blackbirds in different conditions such as close up or far away.

Quiz:
STEM SMART Computer Science Week 31

ML engines: decision trees

Practice 2

Decision trees are engines that are a common component of many machine learning models.

A decision tree is made up of nodes that can be described as root, leaf, or decision nodes. Which **two** of the following types of node would contain a condition?

- [ ] Root node
- [ ] Decision node
- [ ] Leaf node

Quiz:
STEM SMART Computer Science Week 31

ML models: lifecycle

Practice 2

A project lifecycle refers to the series of phases or stages that a project progresses through, from initiation to completion.

Place the stages of developing a machine learning model into a logical order.

Available items

- Explaining the model
- Preparing the data
- Training the model
- Defining the problem
- Testing the model
- Evaluating the model

Quiz:
STEM SMART Computer Science Week 31

ML types: 2

Practice 1

There are three main types of machine learning: supervised, unsupervised, and reinforcement.

For each of the definitions shown below, drag and drop the most appropriate type to the space alongside the definition.

Example	Level
A form of machine learning where the model is trained using trial and error. The model can be said to "learn" from mistakes and will constantly improve.	
A form of machine learning where the model is trained using labelled data. The model is trained to find the patterns, relationships, and features that map each piece of training data to its associated label.	
A form of machine learning where the model is trained on an unlabelled data set. The model must identify patterns, hidden relationships, or structures within the data.	

Items:

Reinforcement learning | Supervised learning | Unsupervised learning

Quiz:
STEM SMART Computer Science Week 31

ML engines: 3

Practice 2

The engines of machine learning are the data structures and algorithms that are used to create a model. These algorithms use mathematical and statistical techniques that are well understood by statisticians and data analysts.

Different types of engine are suitable for different types of problem. For each of the following descriptions of a type of machine learning problem, match the name of the statistical approach to the description.

Type of problem	Statistical approach
Predicting the value of a continuous variable (such as house prices)	
Predicting a class or category (such as whether an email is spam or not)	
Dividing data into one or more groups according to its features (such as grouping people with similar taste in music to make recommendations)	
Predicting the next value in a sequence based on the previous values in that sequence (such as predictive text generated by large language models)	

Items:

Clustering Regression Classification Forecasting