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91898

NZQA | Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 2 Digital Technologies and Hangarau Matihiko 2025

91898 Demonstrate understanding of a computer science concept

Credits: Three

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of a computer science concept.	Demonstrate in-depth understanding of a computer science concept.	Demonstrate comprehensive understanding of a computer science concept.

There are two questions in this assessment. Choose ONLY ONE question to answer.

You should aim to write **800–1,500 words** in total.

Merit

TOTAL 05

INSTRUCTIONS

There are two questions in this assessment, on the topics of:

- artificial intelligence (AI) (page 3)
- computer encryption (page 8).

Choose ONLY ONE question to answer. Note that parts (b), (c), and (d) of each question include options for you to choose from.

Read all parts of your chosen question before you begin. Do not repeat your response in different parts of the question.

You are not permitted to access any resources (either in hard copy or online) other than those supplied in the assessment itself.

QUESTION ONE: Artificial intelligence (AI)

MOST COMMON TYPES OF IN-VEHICLE SENSORS

Source: https://www.apriorit.com/dev-blog/728-ai-applications-automotive-industry

(a) (i) How does AI use the inputs from various sensors in a car?
Give TWO ways in which the use of AI improves car safety.

Artificial intelligence (AI) uses the inputs of various sensors in cars in order to produce an output which aids in driving safely. And using the data that is known from these sensors, it can infer the current state of the vehicle. It achieves this because it can recognise patterns in certain datasets to its outcomes. The way how an AI knows these patterns is from its training with other data sets. And by applying this in vehicles, the onboard AI can detect issues and assist the driver in certain situations based on the state of the vehicle. Without the use of sensors, the AI wouldn't have any inputs to give an outcome, as that is what an neural network based AI does, it takes inputs to produce an output.

One way how an AI can improve car safety are emergency brakes. Using the sensors in the front, the car can detect when an object, whether it's another car, an object, or a person, is in front of the vehicle. And therefore, apply emergency brakes and disengage the car before it makes a collision and harms someone. Another way how AI can assist in car safety is through monitoring the car's parts to warn of potential failure or when a part is need of replacement or servicing. This is vital for car owners because many issues can be hidden or hard to spot without direct access to information. And keeping a car in good condition is important to ensure it doesn't suddenly fail and lead to unfavourable outcomes like brake failure and car crash or become stranded on the road due to an engine malfunction.

(ii) What are some of the key problems or issues in AI car safety systems?
In your response, ensure that you demonstrate clear links to computer science concepts.

There could be some potential issues when using AI in car safety systems. An AI is a computer program that doesn't know right or wrong, just what patterns it can follow from its machine learning. This means that the AI can malfunction, as a result, giving false positives, and therefore giving the wrong output which can endanger the driver and the people around. For example, a sensor might accidentally be misread or the AI may not act despite the conditions of the vehicle being in danger. Therefore, an AI is not fully reliable as the main safety system in a car.

Source (left image): https://www.geeksforgeeks.org/natural-language-processing-overview
Source (right image): https://www.sciencelearn.org.nz/images/5156-neural-network-diagram

(b) Provide details of how ONE of the following is used or implemented, or occurs.

- Natural language processing
- Neural networks.

Enter your selection here: Neural networks

Write your answer in the box below.

Neural networks are a structure/framework that an AI uses and is built off in order to be able to undergo machine learning. The main feature of a neural network are it's numerous layers of neurons. One input layer which takes a set of values. A hidden layer where multiple neurons are linked together in layers and in chains and perform maths operations on the values. And an output layer which outputs the result. In more detail, when a set of numbers are added, it could be colour and pixel data for an image or a string of characters as bytes, it travels to linked neurons in the hidden layer based on predefined weights. At the neurons, a bias is performed (a maths function) before it travels to the next neuron. It repeats this process of going through chains of neurons based on weights (a number the value is multiplied by as it travels from each neuron) before it's finished and reaches the output layer. Here, all the values are outputted and can be interpreted based on the context. This is the basis of a neural network and because of the neuron structure, it is also the basis for machine learning.

For computers to learn and get better at detecting patterns, for example, when an AI needs to perform a specific task like detecting what's in an image, it needs to be trained to output a correct and accurate result. An AI model with a neural network is trained using large portions of training data. This can either be supervised or unsupervised, where in supervised, the data is labelled. Here, the data is added to the neural network's input layer, it goes through the hidden layer and out into the output layer and the AI makes a prediction based on that result. Then it's told if it's correct or wrong using the actual answer from the label. After that, the AI uses back-propagation (similar to the process of giving an input into the AI to produce an output but instead, putting in the output and changing the weights in order to try to reach a similar input) to change the weights between neurons and retries again with more data. Over time, the accuracy of the AI will increase as it distinguishes more patterns between the input data and the actual answer. Unsupervised learning on the other hand, is different in that the data isn't labelled, and the AI instead, tries to find patterns in the dataset and changes it's weights to further become more accurate at distinguishing different patterns from which. Overtime, it gets better at separating data based on what is in it.

Neural networks are used everywhere, from large language models, image generators, to weak AI's like help bots or recommendation pages. What they do is they find patterns in the data and use it to predict what comes next. For example, in recommendation pages, the AI takes what type of content the user interacts with, and uses it to predict what else they like. Like a brain, it's constantly changing based on what data it's given. And as the weights continuously get fine tuned to a precise scale, the AI gets better at predicting and giving accurate outputs.

(c) Choose ONE of the following to answer:

- Explain how AI is needed in healthcare to deliver patient care.

OR

- Explain what opportunity machine learning has provided in healthcare.

Enter your selection in the box below:

Explain what opportunity machine learning has provided in healthcare

Write your answer in the box below.

Machine learning has provided the opportunity for the healthcare sector in that it can be used to make new discoveries. But also find patterns in patients to be able to accurately diagnose them for conditions. For example, learning to find patterns in cancer patients to be able to differentiate healthy cells and cancer cells. Therefore, being able to use AI and machine learning to diagnose those with cancer. This form of machine learning can be done via supervised or unsupervised learning. Meaning, as it's given data, it will iterate through each dataset and try to determine how each different value correlates to a pattern and output. In this case, it can be used to determine what cell is cancerous or not based on the vital signs of the patient, or the cell's activity or any other related dataset, as long as there is enough data and training. As well as this, the AI can be used to make new discoveries based on previous patterns. As healthcare is constantly changing, AI can be used to discover new treatment methods, diagnosing methods or new aspects of the human body. Because the AI is designed to detect patterns, it can also be used to differentiate data that don't follow this patterns, which as a result, can lead to new discoveries, or at least, new depth to the dataset.

(d) Choose ONE of the following to answer:

- Explain, giving examples, what can be done to future-proof the use of AI-generated content in social media.

OR

- Explain, giving examples, known ethical issues that have occurred from the use of AI-generated content in social media.

Enter your selection in the box below:

Explain, giving examples, known ethical issues that have occured from the use of AI-generated content on social media.

Write your answer in the box below.

Social media can contain AI-generated content, either through deepfakes, AI-generated videos/images, or just using AI to aid in the process of making content. This can lead to ethical problems though as, unlike humans, an AI is a program that does not intuitively understand morals and ethics on a scale that humans can. First, All AI's learn off training data and therefore, it follows the patterns found in that training data, this includes biases and unfair judgement. And as a result, the AI can become biased as well and give outputs that people may find to be polarising. AI-generated videos and images can also be an ethical issue when it reduces the need for other people's works. Particularly, in social media's case, those who create content, videos, images (like photography and art) and music. The use of AI can take people's careers and their way of life, which is an ethical issue as people are losing their jobs over an AI. As well as this, deepfakes are an ethical issue because it's an form of impersonation, which leads to false identities and potential for malicious acts. Whether it's to lower the public image of a figure, or manipulate others to do something. The problem here though, is that AI content is well ingrained into social media at this point and many have the ability to use AI. And with AI getting better at generating more accurate results, it's getting more difficult to differentiate what is real and what is fake and misleading.

Merit

Subject: Level 2 Digital Technologies

Standard: 91898

Overall grade: 05

Q	Part		Marker commentary
One	(a)	(i)	The candidate gave a detailed response that included how sensors are used by the AI to detect patterns and produce an outcome. Two examples were given. To produce a more robust answer, the candidate could have identified specific sensors and how they could be combined with other sensor input by the AI.
		(ii)	The candidate gave a limited response that does not meet the requirements for Excellence, but provided some evidence about machine learning and AI malfunctions for Merit.
	(b)		A detailed, well-written response on the concept of neural networks was given for this question.
	(c)		A satisfactory response for Merit. It could have been improved by giving further examples of where AI could be used.
	(d)		A detailed response was given for this question.