ACHIEVEMENT EXEMPLAR 2022

1

NZQA
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COMMON ASSESSMENT TASK

Level 1 Digital Technologies 2022

91887 Demonstrate understanding of compression coding for a chosen media type

Credits: Three

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of compression coding for a chosen media type.	Demonstrate in-depth understanding of compression coding for a chosen media type.	Demonstrate comprehensive understanding of compression coding for a chosen media type.

Type your School Code and 9-digit National Student Number (NSN) into the space below. (If your NSN has 10 digits, omit the leading zero.) It should look like "`123-123456789-91887`".

The task in this assessment is in FOUR parts.

Answer parts (a), (b), and (c), and then choose ONE of parts (d), (e), or (f).

You should aim to write **800–1500 words** in total.

Your answers should be presented in 12pt Times New Roman font, within the expanding text boxes, and may include only information you produce during this assessment session. Internet access is not permitted.

Save your finished work as a PDF file with the file name used in the header at the top of this page ("`SchoolCode-YourNSN-91887.pdf`").

By saving your work at the end of the assessment, you are declaring that this work is your own. NZQA may sample your work to ensure this is the case.

INSTRUCTIONS

The assessment task requires you to discuss compression methods for one or more media types (image, video, or audio).

You must answer parts (a), (b), and (c).

Choose only ONE of parts (d), (e), or (f) on lossless compression:

- (d) Huffman coding
- (e) Run-length encoding
- (f) LZW.

You may copy and paste (snip and / or screengrab) relevant information from the following resources to support your answers.

Read all parts of the assessment task before you begin.

RESOURCE A: Images

Fig. 1

RESOURCE B: Audio

Fig. 2

RESOURCE C: Video

Fig. 3

Fig. 4

Acknowledgements
Material from the following sources has been adapted for use in this assessment:
https://helpx.adobe.com/photoshop/key-concepts/compression.html
https://boomspeaker.com/320kbps-vs-flac/
https://aws.amazon.com/blogs/media/part-1-back-to-basics-gops-explained/

ASSESSMENT TASK

(a) Referring to ONE media type (image, video, or audio), explain the reasons why files of this media type might be compressed.

Media type: Image

Image files may be compressed for multiple reasons. One of these reasons is to store more images in the same amount of space. If you have a lot of images being stored in an uncompressed format, you can quickly run out of space to store more images, so if you compress them, you can store many more images. Another reason is to reduce download times. If you have a website with a lot of images, the time is takes for all those images to download can make users frustrated with your website as it will feel slow. Compressing your images will allow your website to load faster than if the images were not compressed.

(b) Give examples of times when you have used either lossy or lossless compression. Why was it appropriate to use this compression method in these cases?

One time that I used lossy compression is sending a video over discord. It was appropriate to use lossy compression as otherwise the file would have exceeded the file size limit and I wouldn't have been able to send it. One time that I used lossless compression was when send a mod file for a game to a friend. It was appropriate to use lossless compression because it was important because the file need to be able to be restored to the exact same as it was before compression but I could not leave it uncompressed as it would have been too large of a file.

SCENARIO: Sharing school photos

You are the head of your school's digital media team and have taken photos, video, and audio of the kapa haka group's latest performance. Because your school is small and in a rural area, internet access can be patchy. The principal would like to share the recordings with whānau and the community.

There are two options available to the principal:

- Emailing the files as attachments and / or
- Storing them on the school's server and emailing a link to download them.

(c) Consider the scenario above. You may also include snips from Resources A, B, and C on pages 2 and 3.

Select ONE of the media types (photos, video, or audio) and recommend an option to the principal. Refer to the scenario in your recommendation. You may select the same media type as you discussed in part (a).

Media type: photos

I would recommend emailing them as attachments

(i) What would be the most appropriate compression method for the scenario?

The most appropriate compression method would be lossless

(ii) Explain why this method would be more suitable than another compression method. Justify your choice by comparing and contrasting it with another compression method.

In this scenario lossless compression would be more suitable than lossy compression because it doesn't lose quality if it is sent to someone. Lossless compression does result in a larger file, but since people are directly being sent the files, rather than a link to download them, they are more likely to send them to someone else. If they had been sent a link to download them, they would probably send that to someone to download the files, in which case lossy compression would be more appropriate. But since they are more likely to send them on it is important that image quality is not impacted

(iii) Explain how this method would affect the output from the end user's perspective.

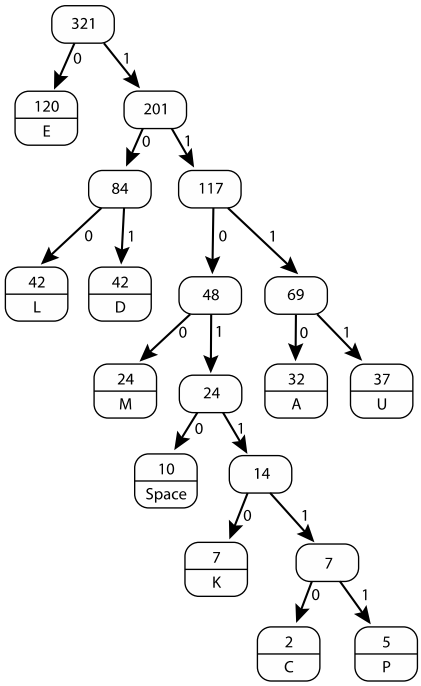
This would mean that it would take longer to download the files from the email, but it also means that they won't lose quality and possibly experience artifacts.

Lossless compression

Answer EITHER part (d) Huffman coding OR part (e) Run-length encoding OR part (f) LZW

(d) **Huffman coding**

Note: If you are answering this part, don't answer parts (e) or (f).



(i) Using the Huffman tree above, decode the code `1100 1111 1101110 110110`

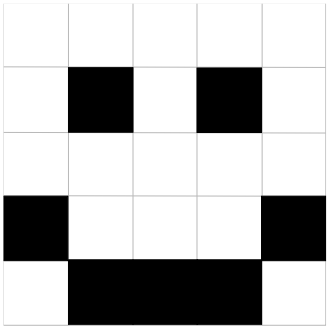
(ii) Using the Huffman tree above, encode the word `DAME`

(iii) If the phrases `A MUDDLED MEAL` and `PACK UP A CUP` are encoded with the Huffman tree above, which phrase will be compressed by more? Justify your answer.

(e) **Run-length encoding**

Note: If you are answering this part, don't answer parts (d) or (f).

(i) Encode this image using run-length encoding.



5 1,1,1,1,1 5 0,1,3,1 1,3,1

(ii) Decode the code below by filling in any 'black' boxes with a cross (X).

```
0, 5
1, 3, 1
2, 1, 2
2, 1, 2
5
```

x	**x**	**x**	**x**	**x**
	x	**x**	**x**	
x	**x**		**x**	**x**
x	**x**		**x**	**x**

(iii) Consider the two 13×13 images below. Which of these will result in a larger file size than the original when compressed using run-length encoding? Justify your answer.

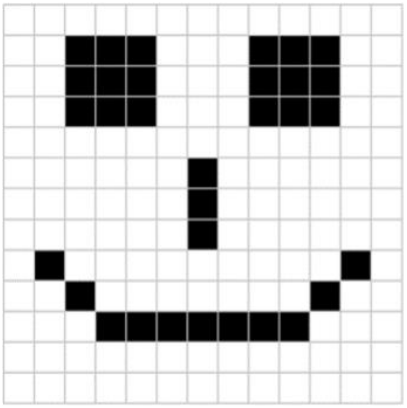


Image A

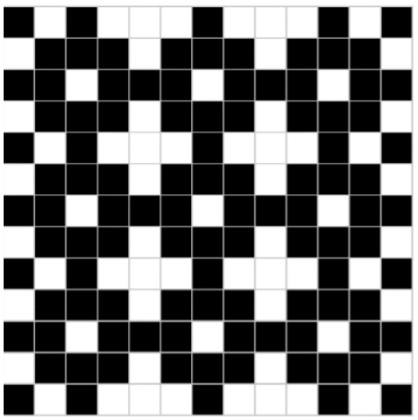


Image B

Image B will result in a large file size than Image A. This is because Image A contains longer runs than Image B. The longer runs in Image A mean that more data will go into a single run than in Image B compressing the image more.

(f) **LZW**

Note: If you are answering this part, don't answer parts (d) or (e).

Code	Character string	Code	Character string
0	`Just drift away`	5	`day`
1	`,`	6	`Day`
2	`yeah`	7	`dreaming`
3	`(`	8	`so sweet`
4	`)`	9	`.`

(i) Use the dictionary above to encode the following song lyrics.

```
Just drift away, yeah
Just drift away (day dreaming, so sweet, yeah)
Just drift away (day dreaming, so sweet, yeah)
Day dreaming, so sweet, yeah
Just drift away
```

(ii) Use the dictionary above to decode the following code.

```
0 9 6 7 1 8 1 2 9
```

(iii) How could the dictionary above be changed to improve the compression of the message in (i)? Justify your answer.

Achievement Exemplar 2022

Subject	Digital Technologies Level 1	Standard	91887	Total score	04

Q	Grade score	Annotation
1	A4	The candidate has identified two reasons why compression might be used and has explained the benefits of using compression in both cases. The candidate has given examples of when they have used both lossy and lossless compression. Their explanations give the benefits of their choice of compression method, but do not contrast their choice with the advantages/disadvantages of an alternative method. They have applied their understanding to the scenario, selecting the lossless compression method. Their justification is short and unclear, although they do demonstrate that they understand that lossless files will be larger and take longer to download than lossy files, and that lossy files will be of poorer quality. They have correctly encoded an image using Run Length Encoding but have made an error decoding an image. They correctly identify image B as the image that will result in a larger file size because image A has longer runs. To demonstrate greater understanding, their explanation would require more depth and detail.