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COMMON ASSESSMENT TASK

Level 1 Digital Technologies 2021

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 “123-123456789-91886”.

Make sure that you have the scenario page.

Answer ALL parts of the assessment task in this document.

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 as instructed by your teacher.

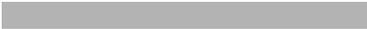
By saving your work at the end of the examination, you are declaring that this work is your own. NZQA may sample your work to ensure this is the case.

Merit

TOTAL

05

ASSESSOR'S USE ONLY



INSTRUCTIONS

The task in this assessment requires you to discuss compression methods for ONE media type (image, video, or audio) with reference to the scenario provided.

Read the scenario and all parts of the task before you begin.

All your answers must be based on the same media type.

Scenario (specify “A” or “B”):

A

Chosen media type (specify “image”, “video”, or “audio”):

Image Compression

ASSESSMENT TASK

- (a) Explain the reasons why files of your chosen media type might be compressed.

An image may be compressed to increase transmission speed between devices connected to the internet, or to decrease the storage needed to store the image. While you may think that the compression of a photograph may ruin the quality it doesn't, as when a camera takes a picture it captures a very large amount of detail that we as humans can't see a lot of as sometimes, we can have such a high-quality photograph that we can compress by around 50% without really noticing any clear differences in quality unless taking a very close look at the image.

- (b) (i) Explain how files of your chosen media type can be represented using bits in an **uncompressed** form.

In an uncompressed form an image is made up of tiny squares called pixels, these pixels are stored in bits and depending on the number of colours the number of bits will be increased by a square with each increase as with 1 byte of data it will require 2(0, 1) bits, 2 bytes will require 4(2²) bits, 4 bytes will require 16(4²) bits, and finally an 8-byte image will have 256(16²) bits. The 8-byte image is what we are used to seeing as most images are stored in the sRGB (Standard Red Green and Blue) format. This is because each pixel made up of three colours, this includes red, green, and blue with each of these bytes having a brightness range of 256(0-255) which for each pixel will lead to 16,777,216(256³) different colour combinations this would mean that on a regular 1920x1080p image containing a total of 2073600 pixels we would have a total of 16,777,216²⁰⁷³⁶⁰⁰ different colour combinations, this means that the number of these different colour combinations would be almost infinite if we were to calculate it.

Examples of colour combinations include

Red + Green + Blue = Black

Red + Green = Yellow

And if they were all off, we would have White

But if we wanted to go simpler to an image with only 2 colours or 1 byte meaning that each colour can only be 0 or 1 the image in an uncompressed form may look something like this

1111111

0111110

0011100

0001000

0011100

0111110

1111111

(As you maybe be able to tell from the highlighted bits 0s are white pixels and the 1s are black pixels)

This would give us a total of 49 bits as each 1 or 0 represents 1 bit this means that the total would be 6.13(2dp) bytes when stored on a computer as 8 bits is equal to 1 byte.

- (ii) Explain how a method of **lossless compression** works for files of your chosen media type.

Lossless compression is when we compress something such as an image so we can transmit the image faster over the internet and that when it is uncompressed it still looks the same image and has no loss in quality to the original image an example of this compression that can be found quite often is the zip file as we are able to compress the file to make it faster to send to someone else where once it is sent and uncompressed it still looks the same.

If we look back to the previous image seen in the last part that looked a bit like an hourglass, we can be easily compress this image into a lossless compression format. We might begin this process by first making an algorithm that tells the computer that the first number entered is always white and that from there the colours will be alternating between black and white to make things easier. The next step which is the compression in this case may look something like this.

0,7

1,5,1

2,3,2

3,1,3

2,3,2

1,5,1

0,7

If we were to break the first line of the compression down, we can see that the first line contains a 0 and a 7 this is because the line contains 0 white pixel and 7 black pixel to carry on this we can see that the second line has 1 white pixel, 5 black pixels and lastly another white pixel.

As we can see from the compression above it is already much smaller containing only 19 bits now instead of the original 49, this gives us a compression of 30 bits or 3.75 bytes which may not seem like much but overall it was a compression of 61.17% (2dp) and if we had an enormous photo taking up around 10gb of space this compression would compress it down to 3.88gb which would make the transmission of the image to someone else much faster than if it was the original 10gb in size.

- (c) (i) Referring to the scenario, select ONE of the required outputs for your chosen media type where a **lossy compression method** would be appropriate, and:
- explain why this method would be more suitable for the output than another compression method
 - explain how this method would affect the output from the end user's perspective.

As a member of the schools media team my job was to take some pictures of our schools production from last night, that I will edit before putting them up on the schools website and Facebook page although now that I have made it to the editing stage I have realized that the total file size for the images is quite large, as they were all shot with the schools brand new photography equipment which takes extremely high quality pictures. So, I have made the decision use a lossy compression to compress the photos by around 50%, as while this may seem like a large percentage of the image, but the computer is mainly getting rid of the parts of the image that we can not notice and even if we can notice some minor changes the photos will look no different upon a glance to the users. I have also decided that lossy was a good decision as it would allow for a faster upload and download speed of the photos on our school webpage which would mean that when the user scrolls down to them that they will already be most if not fully downloaded and ready for the user to look at in allowing for a more fluid clean experience.

- (ii) Referring to the scenario, select ONE of the required outputs for your chosen media type where a **lossless compression method** would be appropriate, and explain why it would be more suitable than another method.

As I have been going through these photos, I have found a place where a lossless compression method may be useful that being the schools archive if for any reason someone wants to access the original photos, they will easily be able to find a high-quality picture in the schools' archive. What makes the lossless compression method perfect for this scenario is that in this form the file will easily be able to be uploaded and download quite fast as it will be taking up very minimal space due to the files small space another bonus of the file being in this form is that since it doesn't take up very much space allowing for many more pictures to be stored without too much harm.

- (iii) Referring to the scenario, select ONE of the required outputs for your chosen media type where an **uncompressed storage method** would be appropriate, and explain why it would be more suitable than another method.

I have now finished compressing some of the photos for the school's website and Facebook page, but, I have also noticed that the school requested a link on the pages to a full-size image. I think this would be a great place to use an uncompressed storage method, as anyone who is wanting to see a full-size image will most likely be the family and friends of someone who performed in the production. So, I believe that they will be looking for a high-quality image that can show the true beauty of the production, a draw back to doing this is that the image will take a while to upload and download. But I don't think that anyone will be driven away by this as those who are looking for a high-quality image of their family and/or friends won't mind the extra wait.

Merit Exemplar 2021

Subject	Level 1 Digital Technologies	Standard	91887	Total score	05
Q	Grade score	Annotation			
1	M5	<p>The candidate has demonstrated a good understanding of the differences between lossy and lossless compression. Their explanation of how files can be represented using bits shows confusion as to how bits are used but they are able to explain how different colour channels are used to create colour.</p> <p>The explanation of how a lossless compression method worked is thorough, and although it ignored the inclusion of commas in the calculation, it was helpful to show how file size was saved and the impact on a larger file.</p> <p>In the final three parts of the task, the candidate has clearly explained why the chosen outcomes suit each compression type. However, greater understanding could have been demonstrated by contrasting the effectiveness of each with other compression types.</p>			