

## Report

### Questions

- 1) Is there a tradeoff between image quality and degree of compression?
- 2) What would be a good value of K for each of the two images?

### Answers

1. There is definitely a tradeoff between image quality and degree of compression. The relationship between the two follows an inverse relationship. As the degree of compression increases then the image quality decreases and when the degree of compression decreases the image quality increases. For example, in the Koala picture with a K equal to 2, the size of the picture becomes 64.4 KB compared to the original 762 KB as least for my computer and program. However, the image quality is low, you cannot tell what color the Koala is, you cannot tell what the background is, and you cannot tell what the koala is holding on to. All you can tell is that the picture is a koala with no detail. However, if you take a look at the biggest K, being 20, the size becomes 466 KB compared to the original 762 KB. In this picture more details are visible. In the Koala picture, you can see the whiskers of the Koala, the nostrils of the Koala, you can see some reflection in the eyes of the koala, you can see the different colors on the Koala itself, the details of the fur of the koala, and you can tell the Koala is holding onto a branch that looks to be brown. This tends to be true for every picture like the penguin picture provided. As K increases so does the quality but it decreases the compression. In the end, there is definitely a tradeoff between the image quality and degree of compression. This relationship follows an inverse relationship where if compression increases then image quality decreases and vice versa. In order to find the optimal tradeoff then the user must understand which attribute is more important.
2. A K value would depend on what the user wants more. Is the user more concerned with image compression or is the user more concerned with the image quality? I will be looking at the Koala picture and Penguin with K values equal to 2, 5, 10, 15, and 20, and try to balance both attributes. Starting with the Koala picture, the image quality is not good for K equal to 2 and 5. The main subject of the photo is the koala and the picture with those K values tend to miss a lot of detail of the Koala. Now looking at the pictures of the koala with K values equal to 10, 15, and 20, there is not much difference between the photos. The koala itself is very detailed and you can see the koala clearly. The only major difference between photos is the background. As K increases the background becomes clearer and you can tell the color of the branch. However, the size of K = 10 is 296 KB while 15 and 20 are 398 KB and 466 KB, respectively. The picture is about the Koala so the background would not be enough to justify the increase of memory. So, for this picture I would say a K value of 10 would be ideal. However, in the Penguin photo, I would say 15 would be the ideal K value. This is because K = 2, 5 reduces the image

quality too much and although  $K = 10$  is good it does miss some details about the penguin. At least for my program it did not show fully the yellow on the penguins and because the penguins are the main subject of the photo, this is important.  $K = 15$  shows more detail about the penguins and  $K = 20$  does not really make much of a difference. In my computer the penguin photo for  $K = 15$  takes up 187 KB while  $K = 20$  takes up 251 KB. So in the end, I think the ideal  $K$  value depends on what the user wants more, but for me, if I had to choose with the photos outputted by my program, I would choose  $K = 10$  for the Koala and  $K = 15$  for the Penguin. Of course, the bigger the  $K$  the better the image looks but the more memory it takes up. In the end, I choose  $K = 10$  and  $K = 15$  not just based on image quality but also degree of compression. I choose these values because they were the lowest  $K$  value that represented the main subjects of the image well.

Note: The memory specifications given in the report is based on my computer, my operating system, and my program. These numbers may vary with computer, operating system, and program.