Exercises on MMDB
SS 2023

University of Passau
Prof. Dr. Mario Döller, Prof. Dr. Harald Kosch, Kanishka Ghosh Dastidar, Alaa Alhamzeh

---

Exercise 3

Topic: Images: Part 1

Aufgabe 1: Image Formats

1. Describe the differences between vectorial and raster (bitmap) image formats.
2. Outline the main properties of the following image formats: GIF, PNG and JPEG with respect to the following dimensions: color model, color depth, compression, file size.

Aufgabe 2: Image Processing and Resolution

Let I be an 12 x 12 RGB image.

a) Consider an RGB image implementation in **Java** that stores pixels in a 3D array (of integers), where each dimension corresponds to a color channel. How much memory is required to store I?

b) One way to reduce memory consumption is to transform the 3D array representation into a 2D array representation. A pixel is packed into a single integer (32 bit), where each channel is coded in 8 bits. The desired result is depicted in Figure 1. How much memory is saved compared to the 3D array representation?

c) Describe how we can retrieve the individual R, G, B samples from the packed pixel.

d) For an iPhone 11, given a screen size of 6.1 inches, aspect ratio of 19.5: 9, and resolution of 828 x 1792 pixels, calculate it's pixel density (Show the steps).

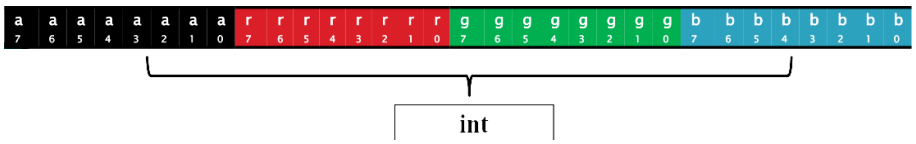

Abbildung 1: A pixel as single integer

Aufgabe 3: Quantization and Dithering

1. Write down the uniform and median cut color quantization algorithms (In simple steps, not code/pseudocode).
2. Give a brief explanation of noise dithering.