1. Exercise – Part I : Theory

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1. What is a digital image?

Digital Image Function $f : \mathbb{I}^2 \rightarrow \mathbb{I}^c$

A digital image is an image composed of picture elements, also known as pixels, each with finite, discrete quantities of numeric representation for its intensity or gray level that is an output from its two-dimensional functions fed as input by its spatial coordinates denoted with x, y on the x-axis and y-axis, respectively. Depending on whether the image resolution is fixed, it may be of vector or raster type. And normally the image formation contains Interior Orientation and Exterior Orientation.

2. What does the paradigm "top-down processing" mean?

The perception is constructive. When we perceive something, we must rely on the context and our high-level knowledge to correctly interpret the perception. It relies on higher-level information such as prior knowledge and experience.
Perceive the whole and then individual parts as needed.
Experience-driven as opposed to stimulus or input-data driven.
Quick and highly inferential but also a source of misperception.

3. What is quantization and digitization?

In order to become suitable for digital processing, an image function f(x,y) must be digitized both spatially and in amplitude. The sampling rate(digitization) determines the spatial resolution of the digitized image, while the quantization level determines the number of grey levels in the digitized image. A magnitude of the sampled image is expressed as a digital value in image processing. The transition between continuous values of the image function and its digital equivalent is called quantization.