Readings

- Szeliski 1.1 What is computer vision
- Szeliski 1.2 A brief history
- Szeliski 2.3 The digital camera
- Szeliski 2.3.2 Colour
- Moeslund Chapter 3 Colour Images

Summary

Goals of Computer Vision

- Computer vision aims to automatically interpret images (and video)
- Goals of computer vision are to
    - Measure properties of the world from visual data
    - Recognize objects, people, scene, activities, etc.
    - Organize visual data for indexing, search and retrieval
    - Enhance, manipulate, and generate visual data

Relevance & Applications of Computer Vision

- Relevance resides primarily in the many different applications based on computer vision
- Safety, health, security, comfort, entertainment, access, etc.
- Many, many applications, e.g. face recognition, biometrics, film special effects, deep fakes, surveillance, sports and gaming, autonomous driving, robotics, VR/AR, etc.
- Modern applications are powered by the advances made in deep learning

Difficulties of Computer Vision

- Generalizing to the real world is hard! So many variations in viewpoint, illumination, scale, appearance, occlusions, etc.
- Perception is an inherently ambiguous problem that needs prior knowledge about the world

Digital Images

- energy transfer from source (sun, light bulb) to scene to sensor (eye, camera)
- CCD sensor converts energy to a proportional digital signal, i.e. the image
- Parameters of image capture affects output, e.g. exposure time, gain
- “digital” means quantization
    - space: spatial resolution, number of pixels in image
    - intensity: number of grey-scale levels (usually 8 bits, 256 grey-scale levels)

Colour Representations

- 3 colours captured on a single sensor: R, G, B elements are intermixed via Bayer filter; de-mosaicking recovers 3 colour channels
- RGB is an additive model used to represent colour based on human perception
- Normalized RGB separates colour from intensity (carries more information about the image)
- HSV colour model: hue and saturation represents colour, value represents the intensity