

Disclaimer

This summary is part of the lecture “ETH Image Analysis & Computer Vision” by Prof. Van Gool, Prof. Konukoglu and Prof. Goksel (HS19). It is based on the lecture.

Please report errors to doberm@student.ethz.ch such that others can benefit as well.

The upstream repository can be found at <https://github.com/mrrebot/Summaries>

Image Analysis & Computer Vision

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1 Introduction

Vision is important:

- Half our brain is devoted to it
- Developed many times during evolution
- It is non-contact
- It can be implemented with high-resolution
- Works with ambient EM-waves
- yields color, texture, depth, motion, shape

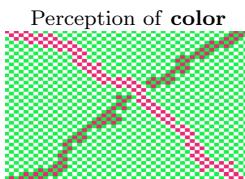
Take home message:

For people vision is their most crucial sense, for good reason

1.1 Perception of vision

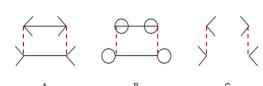


The gray fields have the same intensity (same gray tone).



The red squares have equal color (gray tone).

Perception of length



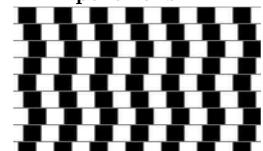
the horizontal lines are equally long.

Lines being straight



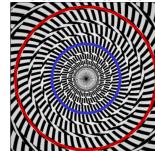
The lines do not have any curvature

Perception of parallelism



All lines are parallel.

Perception of curvatures



There is no spiral.

Perception of motion



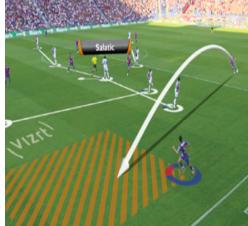
The pole rotates about the vertical, it does not translate vertically.

The role of context



All encircled patterns are identical!

Augmented Reality, e.g. sports



Computer-assisted surgery



Take home message:
It is feasible now to let most things see and interpret their environment.

1.3 The nature of light

1.3.1 Light as an EM wave...

1.3.2 Interactions with matter

Light as an EM wave...
interaction with matter...

1.2 Applications

Most early applications were found in **production environments**, as these allow for **controlled conditions** and have **little uncertainty**. But some areas do not allow for much control: medical IP, remote sensing, surveillance, etc.

Currently Computer Vision (CV) is conquering the less controllable areas by storm:

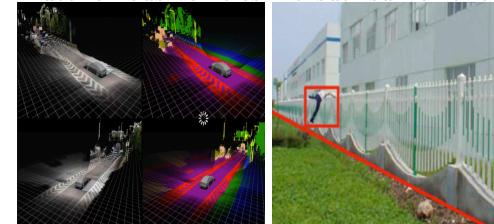
Image enhancement: mobile → DSLR



Image retrieval, captioning



Autonomous vehicles



Visual surveillance

