Stereo vision

Dröppelmann,
Hueting,
Latour,
Van der Veen

Recap

Demonstration

Applications

Vragen

Stereo Vision using the OpenCV library
A glance

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Goal

Goal

Generating a disparity depth map of the environment using stereo vision.

Intended end-result

Figure: Stereo images with disparity depth map

Calibration
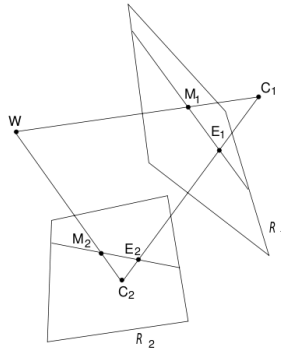
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- Retrieve distortion
- Retrieve spatial relation between cameras
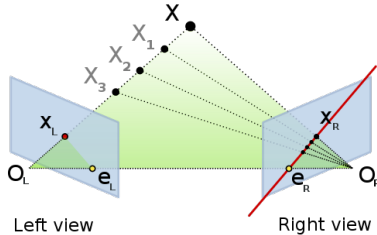
Calibration

Demo

Epipolar Geometry

Figure: Epipolar geometry. Point X_L in the left image has to lie on the epipolar line in the right image

Rectification
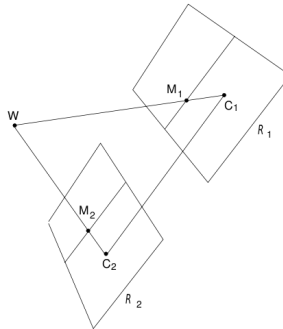
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- Calculate rectification parameters
- Reusable

Rectification

Demo

Stereo Matching - A general overview

A	B	C
D	E	F
G	H	I

$\Rightarrow$

	A'	B'
		D'
		H'
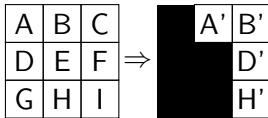
- Mapping of pixels
- Disparity $\rightarrow$ Depth
- Occlusion

Stereo Matching - Depthmap

Closest
Nearby
Far
Very Far
Invalid
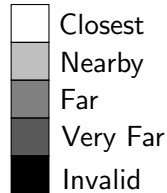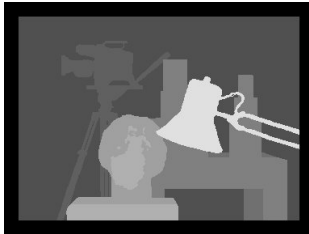
Stereo Algorithms - Graph Cut

- popular
- slow
- smooth
- interlinear consistency

Stereo Algorithms - Block Matching

- fast
- lots of noise
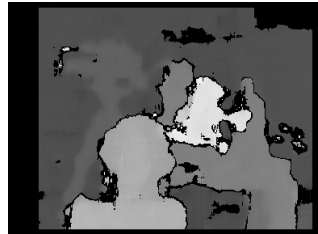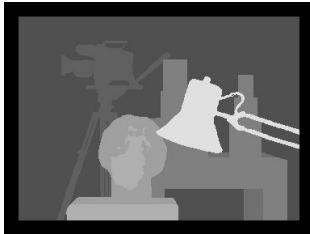
Stereo Algorithms - Semi Global Block Matching

- not in Python
- good in speed/quality
- good depthmap
- noise
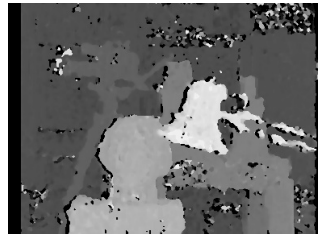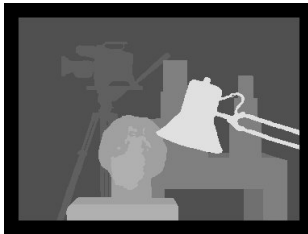
DEMO

Now follows a demonstration of

- SGBM
- GC

Demo

- 3D mapping of a 2D image
- Live Depthmap
- Background Removal

Vragen?