

# Digital Sytems

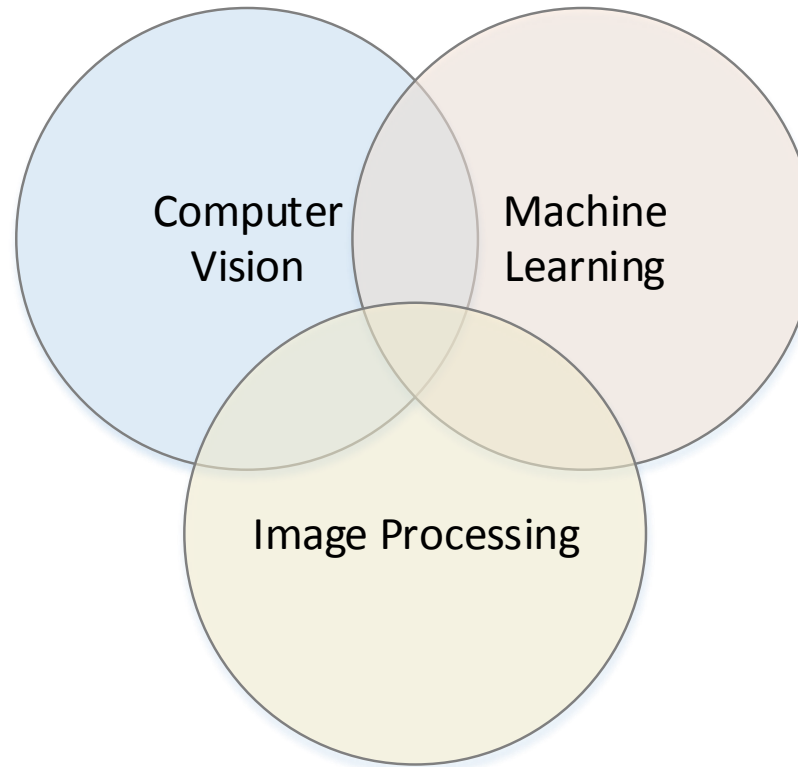
## Overview and Motivation

Organisation Digital Systems			
Date Lecture	Lecture Content	Date Exercise	Exercise Content
2015-10-16	Introduction, Organisation	2015-10-20	no exercise
2015-10-23	Sampling, Fourier	2015-10-27	no exercise
2015-10-30	Sampling, Fourier	2015-11-03	Sampling, Fourier (Group 1)
2015-11-06	Histogram, Point Operations	2015-11-10	Sampling, Fourier (Group 2)
2015-11-13	Histogram, Point Operations	2015-11-19	Histogram, Point Operations (Group 1)
2015-11-20	Histogram, Point Operations	2015-11-24	Histogram, Point Operations (Group 2)
2015-11-27	Spatial Filtering	2015-12-01	Spatial Filtering I (Group 1)
2015-12-04	Spatial Filtering	2015-12-08	Spatial Filtering I (Group 2)
2015-12-11	Spatial Filtering	2015-12-15	Spatial Filtering II (Group 1)
2015-12-18	Evaluation	2015-12-22	no exercise
Holidays			
		2016-01-05	Spatial Filtering II (Group 2)
2016-01-08	Segmentation	2016-01-12	Segmentation (Group 1)
2016-01-15	Segmentation	2016-01-19	Segmentation (Group 2)
2016-01-22	Morphology	2016-01-26	Morphology (Group 1)
2016-01-29	Morphology	2016-02-02	Morphology (Group 2)
2016-02-05	Consultation		

Lecture: Friday 11:30-13:00 C104  
 Exercise: Tuesday 11:30-13:00 N111

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- **Image data processing**
- **Human vision emulation**
- **Generation of symbolic data**
- **Scene understanding**
- Camera calibration
- Multi-view vision
- Structure from Motion
- Object detection/recognition
- Object tracking
- Background subtraction

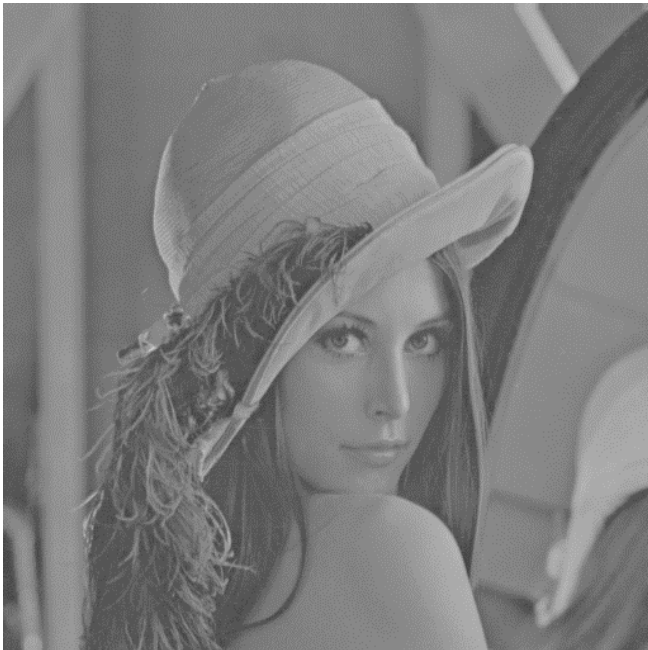


- **Artificial Intelligence**
- Training
- Regression, Classification
- Pattern Recognition
- Feature detection
- Clustering

- **Image data manipulation**
- Image enhancement
- Two dimensional signal processing
- Basics of image processing:
  - Brighten image
  - Blur image
  - Sharpen image
  - Remove noise
  - Enhance image contrast

# Applications for Image Processing and Computer Vision

## Image Enhancement

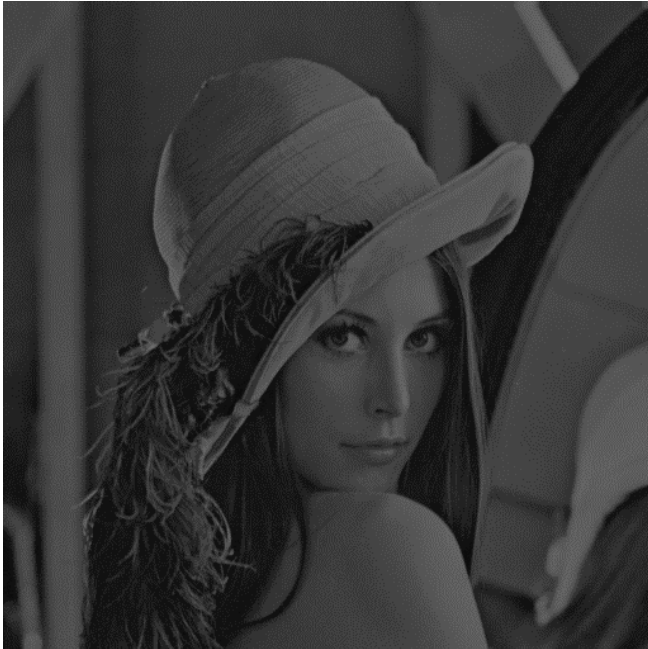


Low contrast

Contrast  
enhancement



## Image Enhancement



Brighten the  
image



Underexposure



## Public Security



<http://www.spiegel.de/fotostrecke/london-ende-des-video-booms-fotostrecke-56650.html>



<http://www.stern.de/digital/homeentertainment/ueberwachung-neue-kameras-loesen-diebstahlalarm-aus-700555.html>



[http://www.youtube.com/watch?v=FC9B\\_5ffXco](http://www.youtube.com/watch?v=FC9B_5ffXco)

## Public Security





## Burglaries, robberies

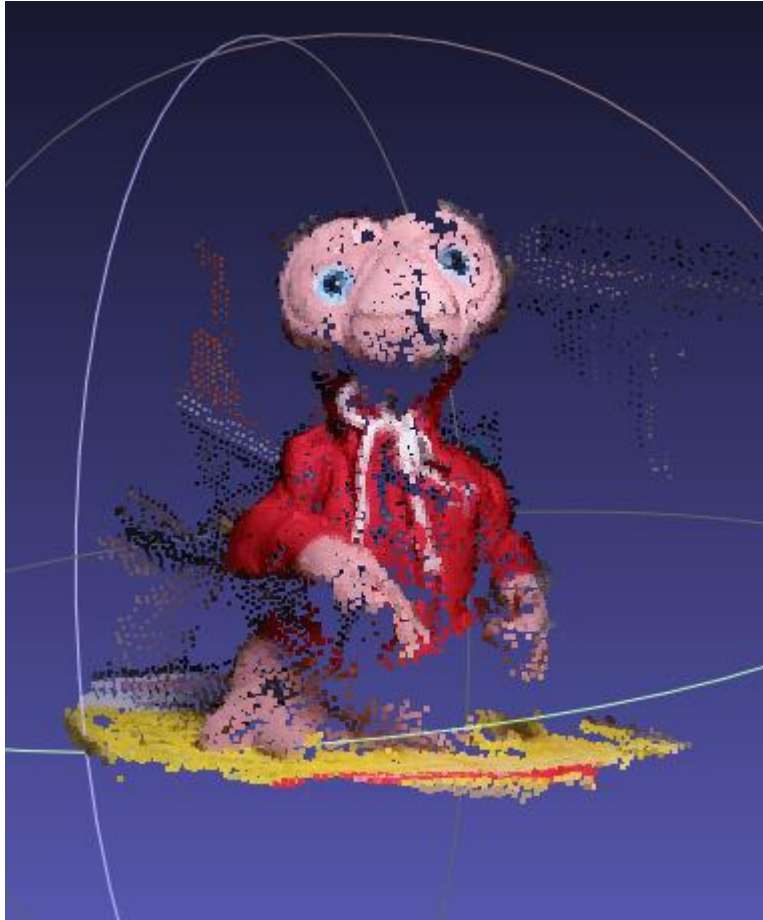


<http://www.ips-analytics.com/produkte/ips-videoanalytics-new/server-based/ips-intrusion-detection.html>



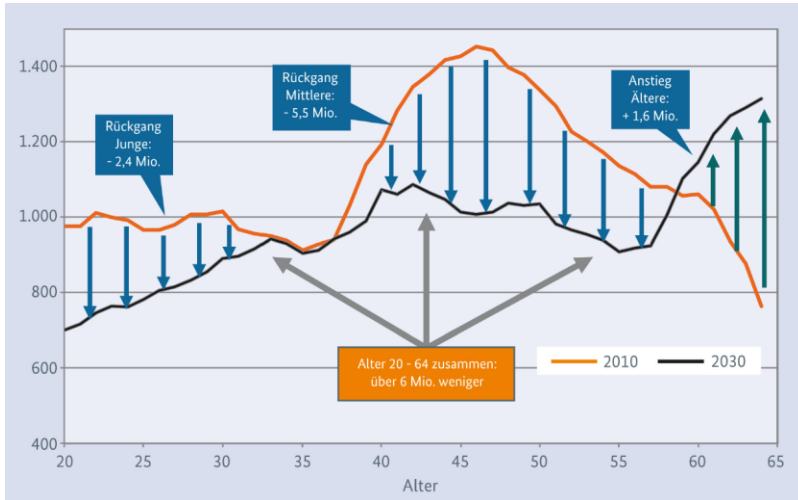
<http://antoanvn.wordpress.com/tag/camera-thong-minh/>

## Structure from Motion

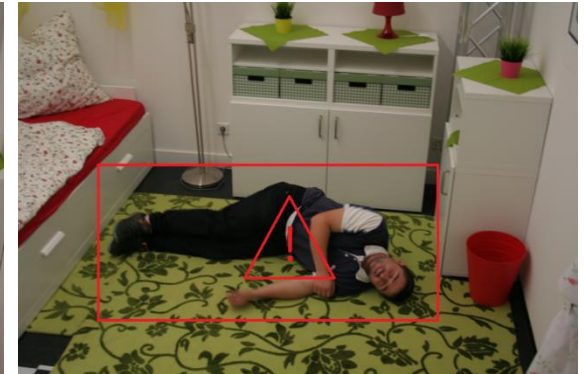


3-D model generation from images

## Elderly Care



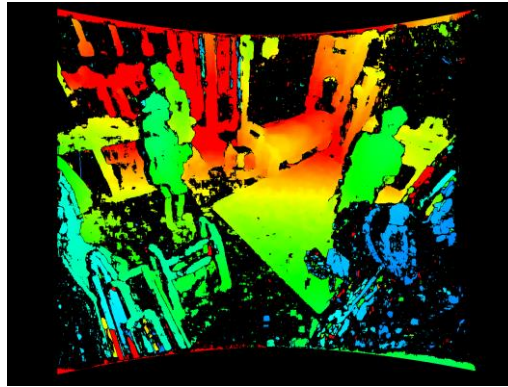
Statistisches Bundesamt, 12. Koordinierte Bevölkerungsvorausberechnung





## Elderly Care

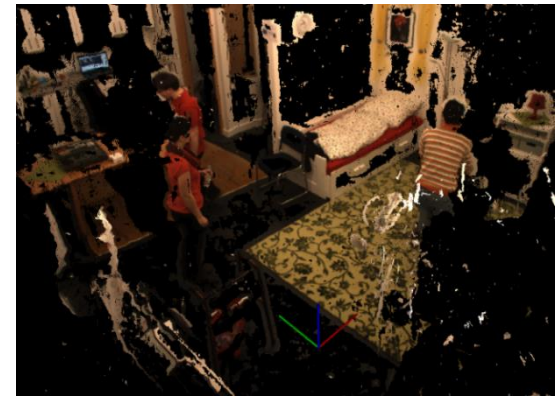
Depth data



RGB data

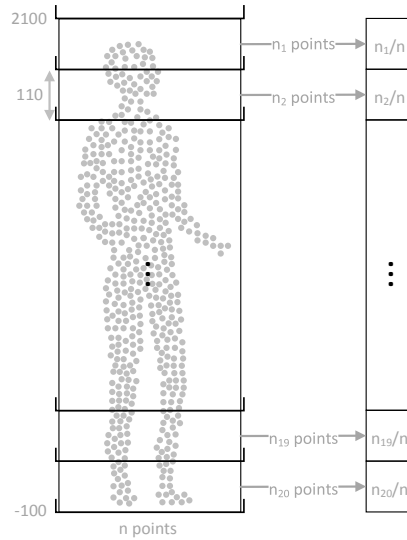
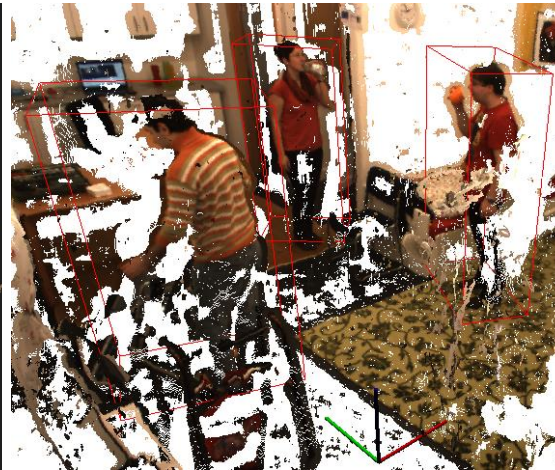
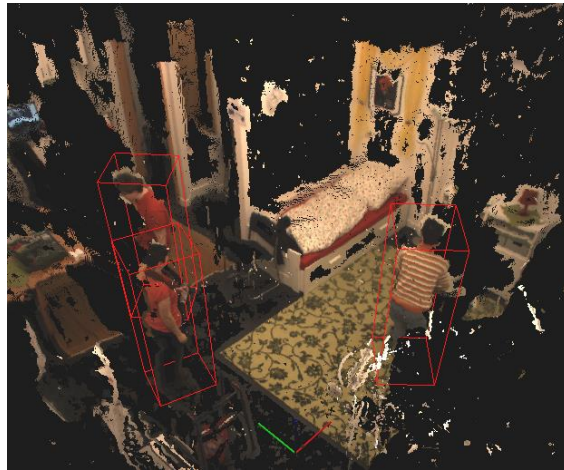


Point Cloud



Person  
Localisation, Pose  
Estimation,  
Movement  
Detection

## Elderly Care



→ Is person standing, sitting or lying?

Demo: OPDEMIVA, Action Recognition using Kinect, Person Detection



## Therapy

