

Hauptseminar/Master Seminar:

Machine Learning Methods for Computer Vision Applications

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Goals of the Seminar

Seminar Topic

Machine Learning and Computer Vision

Learn how to:

- **Read** scientific papers.
- Research the **state of the art** on a specific topic.
- Write a scientific **report**.
- Do a scientific **presentation**.

Scientific Communication

- **During your studies:** Understand and discuss existing literature related to your own thesis (Bachelor's, Master's, Diploma).
- **Scientific publications (Conference / Journals / Workshops):**
 - Hundreds of conferences and journals on different topics
 - Present your own research and contribution to other researchers
 - Exchange of knowledge, make contacts
 - Confirmation and validation of contributions

Related Conferences / Journals

Conferences

- (CVPR) IEEE Computer Society Conference on Computer Vision and Pattern Recognition
- (ICCV) International Conference on Computer Vision
- (ECCV) European Conference on Computer Vision
- (NIPS) Neural Information Processing Systems
- (MICCAI) Medical Image Computing and Computer Assisted Interventions

Journals

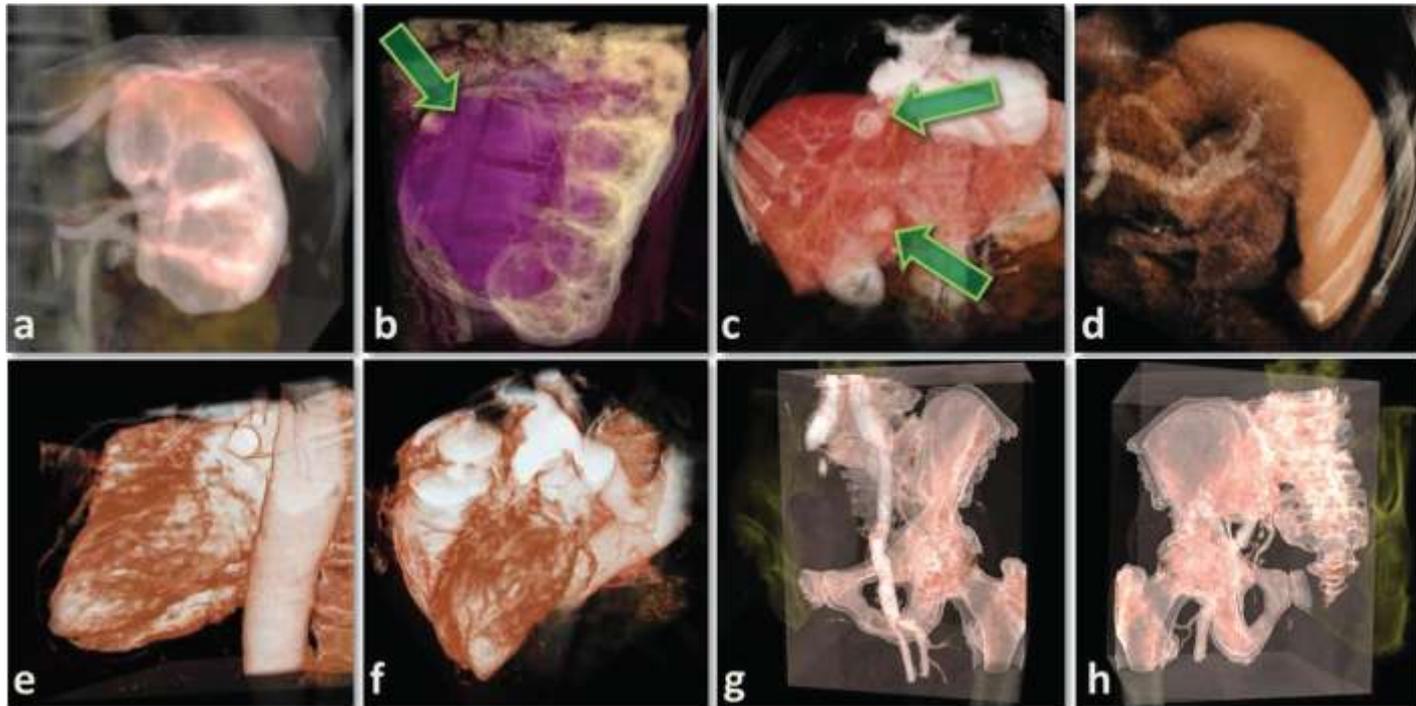
- (PAMI) IEEE Transactions on Pattern Analysis & Machine Intelligence
- (IJCV) Springer International Journal on Computer Vision
- (CVIU) Elsevier Computer Vision and Image Understanding
- (TMI) IEEE Transactions on Medical Imaging
- (MIA) Medical Image Analysis

Previous Years' Papers

Medical Image Analysis
Object Detection and Tracking
Image Analysis
Human Motion Analysis

Medical Image Analysis

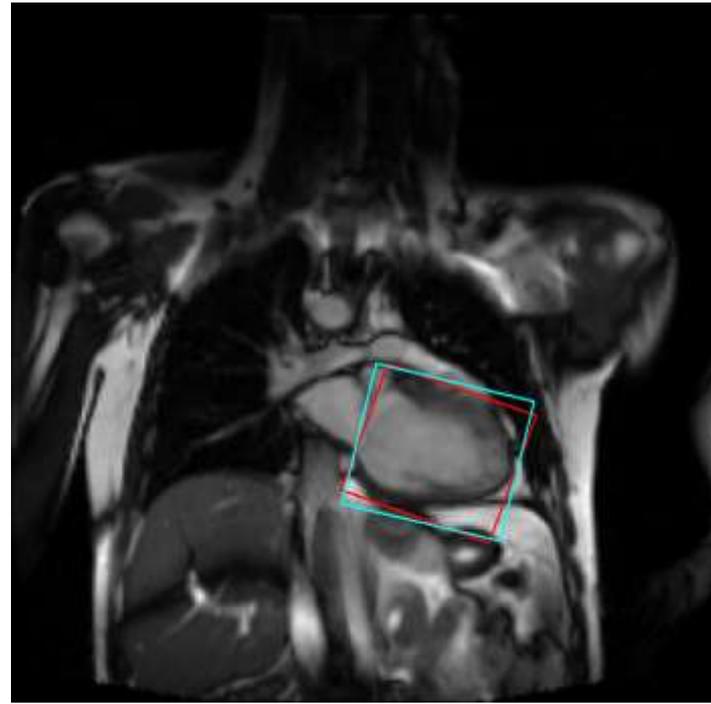
Organ Localization in CT scans using regression forests



Criminisi, Shotton et al.: **Regression Forests for Efficient Anatomy Detection and Localization in CT Studies**, MICCAI (2010)

Medical Image Analysis

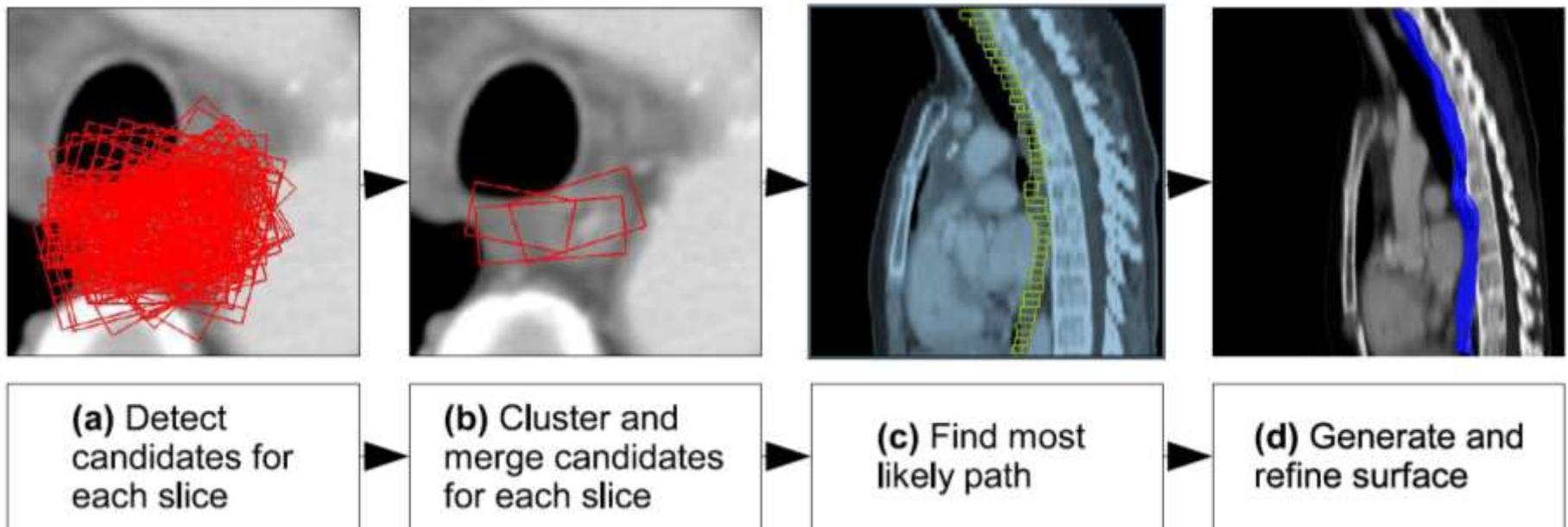
Organ Localization in CT/MR scans using Marginal Space Learning



Zheng, Georgescu et al.: **Marginal Space Learning for Efficient Detection of 2D/3D Anatomical Structures in Medical Images**, IPMI (2009)

Medical Image Analysis

Segmentation in CTscans using Marginal Space Learning



Feulner, Zhou et al.: **Fast Automatic Segmentation of the Esophagus from 3D CT Data Using a Probabilistic Model**, MICCAI (2009)

Object Detection and Tracking

Hough Forests

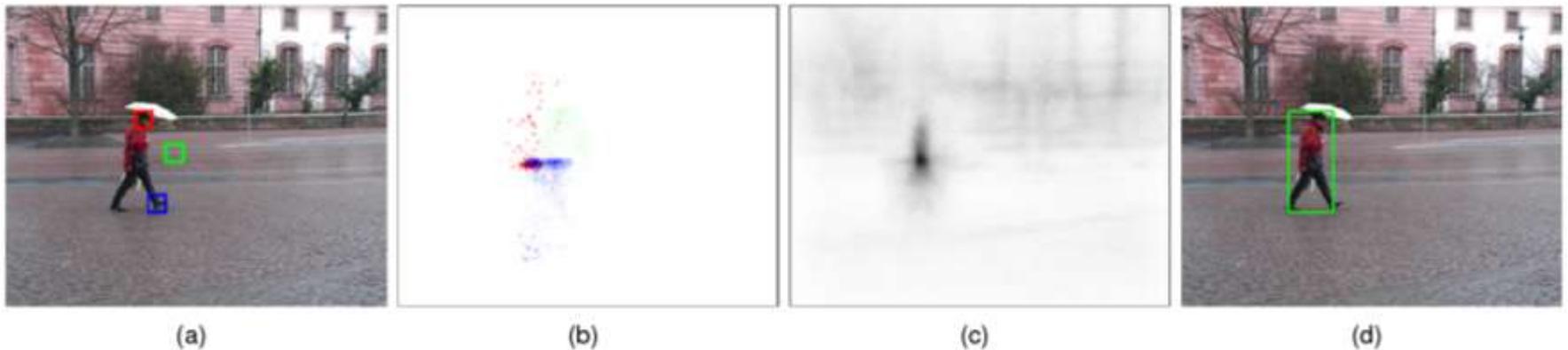
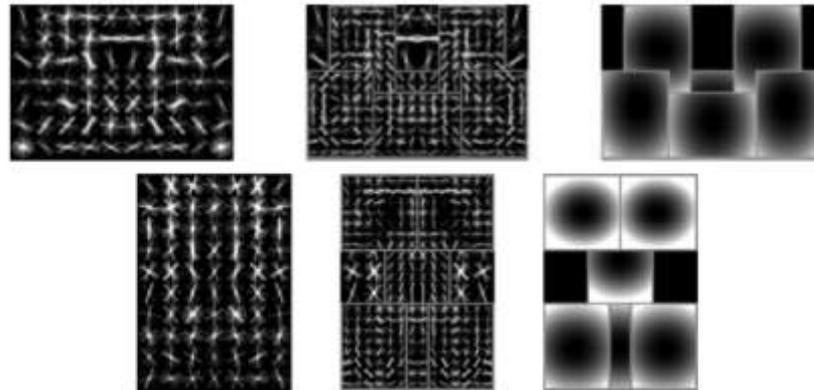
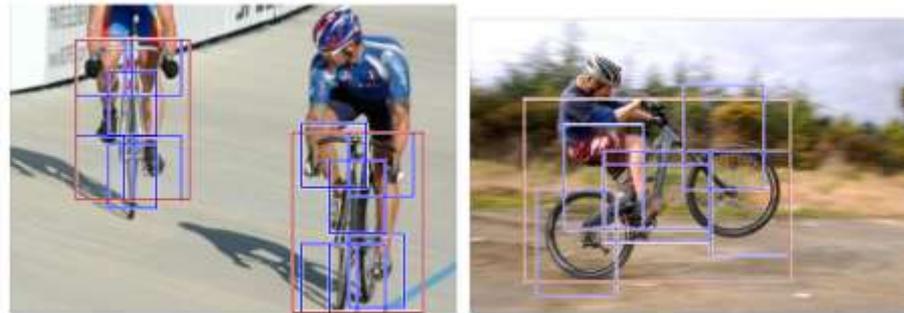


Fig. 1: For each of the three patches emphasized in (a), the pedestrian class-specific Hough forest casts weighted votes about the possible location of a pedestrian (b) (each color channel corresponds to the vote of a sample patch). Note the weakness of the vote from the background patch (green). After the votes from all patches are aggregated into a Hough space (c), the pedestrian can be detected (d) as a peak in this image.

Gall, Yao et al.: **Hough Forests for Object Detection, Tracking, and Action Recognition**, PAMI 2011

Object Detection and Tracking

Part-based Object detection



Felzenszwalb, Girshick et al: **Object Detection with Discriminatively Trained Part Based Models**. PAMI (2010)

Image Analysis

Texture segmentation

Constraints	TVSeg	GrabCut	Our approach
	 90.0%	 73.8%	 94.6%
	 59.9%	 86.3%	 96.3%
	 99.4%	 89.4%	 99.6%

Santner, Unger et al.: **Interactive Texture Segmentation using Random Forests and Total Variation**, BMVC (2009)

Image Analysis

Super-resolution



(a) Bicubic

(b) Yang et al. [10]

(c) Proposed

Yang, Huang and Yang: **Exploiting Self-Similarities for Single Frame Super-Resolution**, ACCV (2010)

Human Motion Analysis

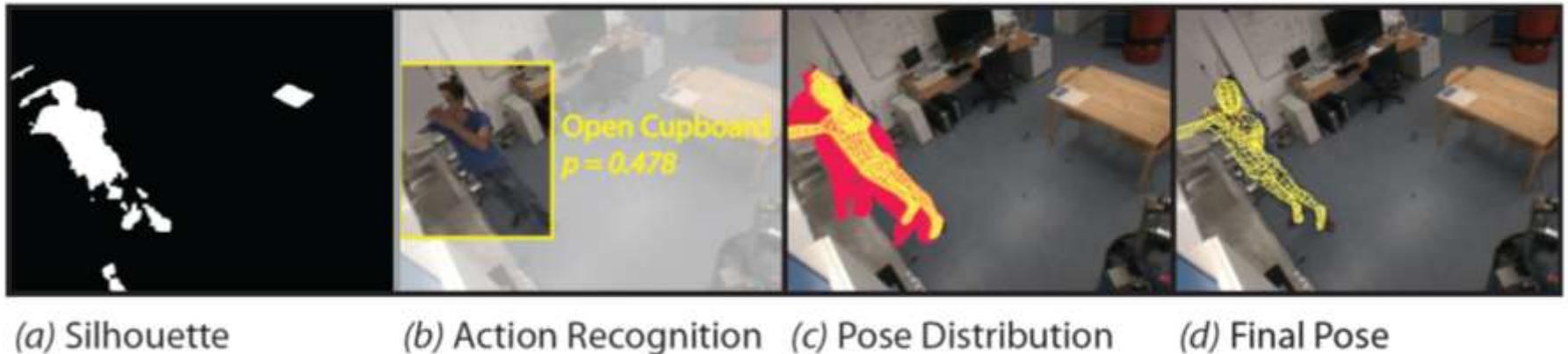
Human Pose Estimation using KINECT



Shotton, Fitzgibbon et al.: **Real-Time Human Pose Recognition in Parts from Single Depth Images**, CVPR (2011)

Human Motion Analysis

Human Pose Estimation / Action Recognition



Gall, Yao and van Gool: **2D Action Recognition Serves 3D Human Pose Estimation**, ECCV (2010)

In Practice...

Reading the paper
Presentation
Report

Papers & Dates

- Paper list will be online soon
<http://campar.in.tum.de/Chair/TeachingSoSe2012MLCVSeminar>
- Introduction Meeting **Thursday 10 th May at 11.00**
send a mail with your paper of choice (and maybe an alternative choice) to pauly@cs.tum.edu (first come first served)
- Presentation dates will be in
 - end of June till end of July
 - Schedule will be announced soon