

Daniel Kondermann

Heidelberg Collaboratory for Image Processing (HCI)
University of Heidelberg

Wolfgang Niehsen

Robert Bosch GmbH, Corporate Research
Computer Vision Research Lab Hildesheim



Heidelberg Collaboratory for Image Processing



UNIVERSITÄT
HEIDELBERG

We make it visible. Zukunft. Seit 1386.

IWR

Interdisciplinary Center
for Scientific Computing



pco.



BOSCH

Invented for life

SONY

make.believe



BOSCH

Motivation

→ Problem 1

Difficult real-world scenarios

→ Problem 2

No ground-truth data

→ Our Approach

Challenge to create awareness

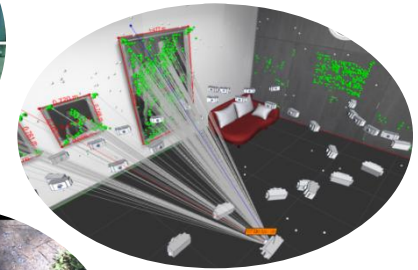
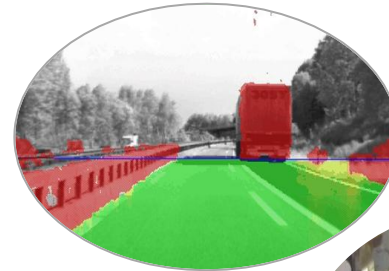


Challenging Scenes ...



Applications and Core Methods

- Driver Assistance and Robotics
 - Ego-Motion Estimation
 - Object Detection and Tracking
 - 3D Reconstruction
- Surveillance
 - Object Detection and Tracking
 - Action Recognition
- Video Editing
 - Denoising
 - Super-Resolution
 - Re-Timing and Frame Interpolation



Task

Obtain any results with any
published method on our data !

Download Statistics

As of August 9th:

- 2200 unique visitors on challenge page
- 1700 unique visitors on dataset download page
- 100 different registrations for download

Submissions

- *“Iterative Semi-Global Matching for Robust Driver Assistance Systems” and “Hierarchical Scan Line Dynamic Programming for Optical Flow using Semi-Global Matching”*

Simon Hermann and Reinhard Klette

- *“Motion Detail Preserving Optical Flow Estimation”*

Li Xu, Jiaya Jia, and Yasuyuki Matsushita

- *“An Improved Stereo Matching Algorithm with Ground Plane and Temporal Smoothness Constraints“*

Cevahir Cigla and A.Aydin Alatan

- *“A Segmentation Based Variational Model for Accurate Optical Flow Estimation”*

Li Xu, Jianing Chen, and Jiaya Jia

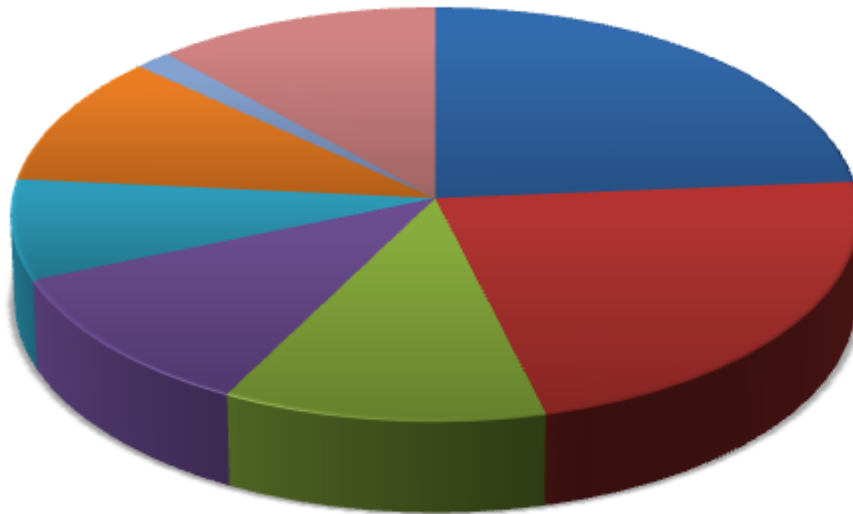


The Jury

- **Simon Baker,**
Principal Researcher, Microsoft Research
- **Goksel Dedeoglu,**
Vision R&D Manager, Texas Instruments
- **Jan Effertz,**
Head of Sensors&Fusion, Volkswagen Research Driver Assistance and Integrated Safety
- **Oliver Erdler,**
Senior Manager of Video Signal Processing Group, Sony
- **Phil Parsonage,**
Lead Engineer, The Foundry
- **Christian Unger,**
Camera-based Driver Assistance, BMW Group
- **Stephan Simon,**
Senior Expert, Computer Vision, Corporate Research, Robert Bosch GmbH
- **Wolfgang Niehsen,**
Chief Expert Computer Vision Systems, Corporate Research, Robert Bosch GmbH



Evaluation Criteria & Weights

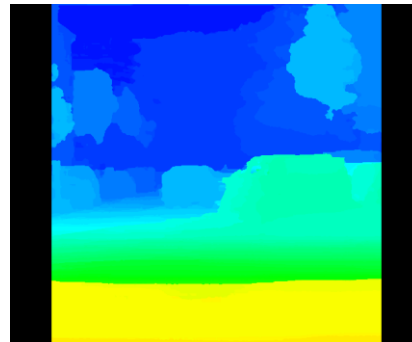
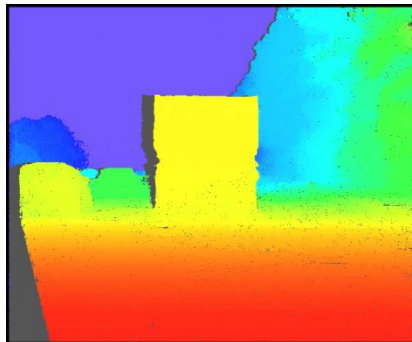
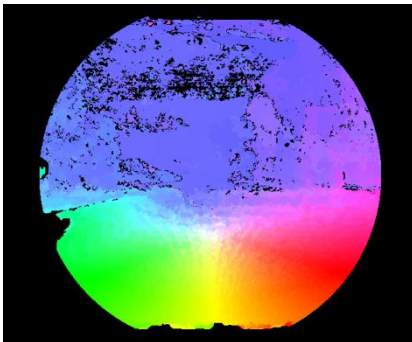


- Occurrence and commonness of wrong correspondences
- Presence of correspondences
- Range of correspondence estimation
- Implementation
- Changing Illumination
- Imaging system induced disturbances
- Transparency
- Reflecting and Glossy Surfaces

Challenging Sequences ...



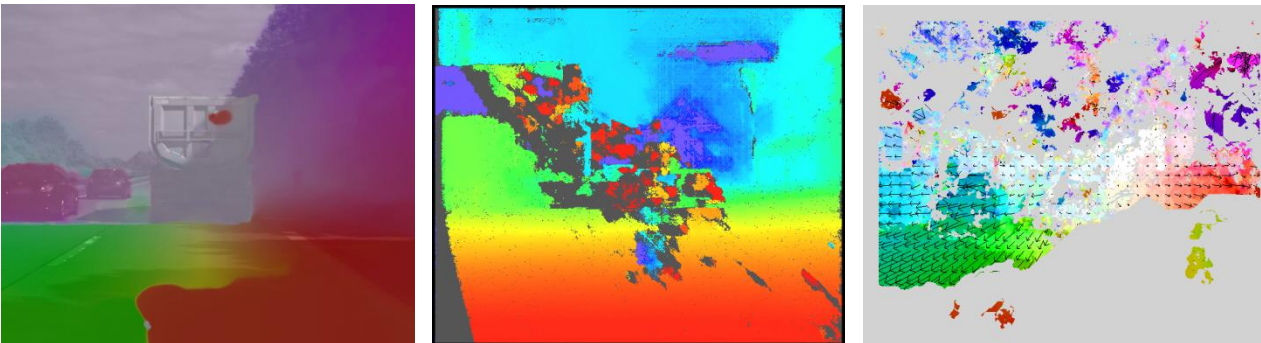
... and appealing results !



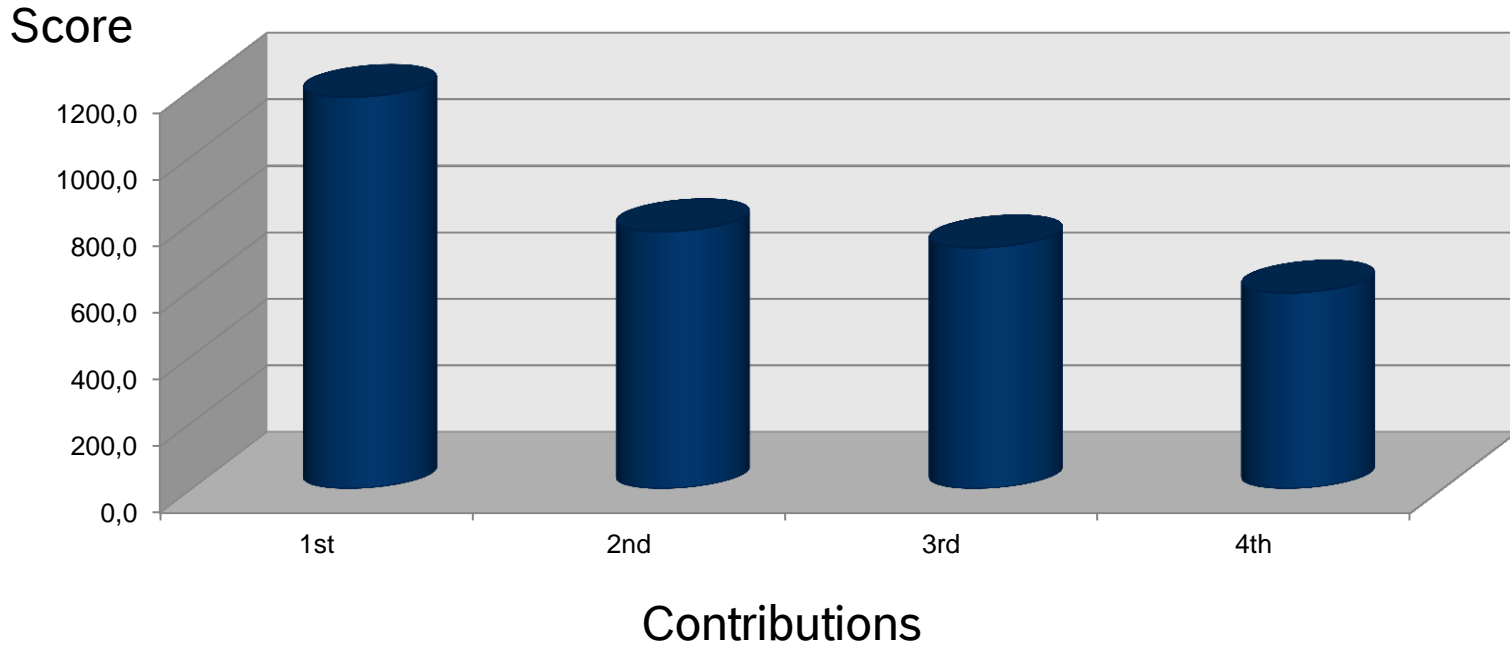
Even more challenging sequences ...



... and some open issues ;-)



Results



Reviewer comments on the winning contribution

Stereo:

- PRO: object boundaries, overall solid/robust, confidences, stable at reflections/shadows
- CONTRA: streaking/noise and similar to original SGM, bad in sunflare, temporal consistency

Flow:

- PRO: robust (filtering out implausible matches)
- CONTRA: low accuracy, bad boundaries, no fine structures, high quantization, bad in sunflare, most noisy reflecting car, not completely dense flow



The People who made it happen ...

- Daniel Kondermann,
Heidelberg Collaboratory for Image Processing (HCI),
University of Heidelberg
- Sebastian Lauer,
Robert Bosch GmbH, Corporate Research,
CV Research Lab, Hildesheim
- Anita Sellent,
Institute of Computer Science and Applied Mathematics,
University of Bern



The Winner is ...

iSGM & fSGM
by
Simon Hermann
and
Reinhard Klette



BOSCH