POSTER SESSION BOOKLET

http://www.dmi.unict.it/icvss

University of Catania - University of Cambridge

International Computer Vision Summer School 2014

From Fundamentals to Applications

Sicily, 13-19 July 2014

International Computer Vision Summer School

Computer vision is the science and technology of making machines that see. It is concerned with the theory, design and implementation of algorithms that can automatically process visual data to recognize objects, track and recover their shape and spatial layout.

The International Computer Vision Summer School - ICVSS was established in 2007 to provide both an objective and clear overview and an in-depth analysis of the state-of-the-art research in Computer Vision. The courses are delivered by world renowned experts in the field, from both academia and industry, and cover both theoretical and practical aspects of real Computer Vision problems.

The school is organized every year by University of Cambridge (Computer Vision and Robotics Group) and University of Catania (Image Processing Lab). The general entry point for past and future ICVSS editions is:

http://www.dmi.unict.it/icvss

ICVSS Poster Session

The International Computer Vision Summer School is especially aimed to provide a stimulating space for young researchers and Ph.D. Students. Participants have the possibility to present the results of their research, and to interact with their scientific peers, in a friendly and constructive environment.

This booklet contains the abstract of the posters accepted to ICVSS 2014.

Best Presentation Prize

A subset of the submitted posters is selected by the school committee for short oral presentation. A best presentation prize is given to the best presentation selected by the school committee.

Scholarship

A scholarship is awarded to the best PhD student attending the school. The decision is made by the School Committee at the time of the School, taking into account candidates'cv, poster and oral presentation.

Sicily, May 2014

Roberto Cipolla
Sebastiano Battiato
Giovanni Maria Farinella

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SOCIALLY ASSISTIVE TECHNOLOGIES FOR ASD CHILDREN

Adamo F., Cazzato D., Palestra G.C.

Abstract: The lack of social interaction is one of the most debilitating deficit associated with autism spectrum disorder (ASD) [1]. Children affected by ASD have problems in paying attention, turn-taking, games and communication activities. We propose a set of solutions in order to improve quality of social interaction in ASD children. Our methods will be implemented on board of a socially assistive robot or installed in an ambient assisted living (AAL) and sessions will be subjected to the evaluation of a team composed by therapists and neuroscientists.

Contact: dario.cazzato@ino.it

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

3D FACE DYNAMIC SEQUENCES ANALYSIS FOR UNCONSTRAINED FACE RECOGNITION

Alashkar T., Ben Amor B., Daoudi M., Berretti S.

Abstract: Automatic face recognition has been an important research topic over the past few years. Although a significant progress has been made, the task of automated, robust face recognition is still a distant goal. An emerging solution is to use laser scanners for capturing 3D observations of human faces, and use this data in performing face recognition. Such observations are relatively invariant to illumination and pose, although they do vary with facial expressions. However, the 3D models that have been used are all static. The most recent technological advances in 3D imaging allow for real-time 3D facial shape acquisition and analysis. Such 3D sequential data captures the dynamics of time-varying facial surfaces, thus allowing us to use 3D dynamic surface. In this thesis we address the facial geometry analysis for recognition and facial expression recognition from 3D sequences (3D plus time, or 4D). A more challenging problem in this thesis is to study the shape explicitly using the geometry of surface deformations evolving in time where the subjects that are acquired in the sequence can move during acquisition, changing their pose, facial expression or speaking thus opening and closing the mouth. In this thesis, we will define new facial descriptors for 3D face frames of the sequence and for the temporal dynamics of the 3D video

Contact: taleb.alashkar@telecom-lille.fr

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

VISUO-HAPTIC MODELING FOR MANIPULATION

Alt N., Steinbach E.

Abstract: Cognitive robotic systems require multilayered models of objects in their environment. For detection and manipulation tasks, appearance, geometry, material roughness, stiffness and weight are of relevance. Appropriate models build on established visual reconstruction techniques, yet they must also integrate haptic properties, which can only be learned by exploration. We propose two approaches of visuo-haptic modeling for grasping and navigation, which are adapted for object-level or room-level representations, respectively. Visual reconstruction, transparency detection and haptic exploration are combined to create a model suitable for stable manipulation tasks. Visually similar objects such as paper/plastic/glass cups are successfully distinguished. Furthermore, a camera-based sensor is presented, which visually obtains haptic/tactile data during manipulation.

Contact: n.alt@tum.de

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

THE BOUNCE IMAGING EXPLORER

Alvarado-Moya P., Cabrera-Quiros L.

Abstract: The Bounce Imaging Explorer is an assistive device for rescue or hazard situations where a "first look" of a space can sometimes make the difference between life and death. Using six fisheye cameras it records its surroundings, generates a panoramic view of the space and sends it to a mobile device or tablet (running Android OS) via wireless communication. Due to its final use, the device had to be capable of working with noisy images and be fast enough for real-time image acquisition. These requirements were fulfilled with the final prototype.

Contact: L.C.CabreraQuiros@tudelft.nl

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

H.264 VIDEO CODING FOR UAV APPLICATIONS IMPROVED BY SENSOR FUSION

Angelino C.V., Baraniello V.R., Cicala L., De Mizio M., Leoncini P., Baccaglini E., Gavelli M., Raimondo N., Scopigno R.

Abstract: This work presents a new low-complexity H.264 encoder for Unmanned Aerial Vehicles (UAV) applications. Standard video coding systems currently employed in UAV applications do not rely on some peculiarities in terms of scene 3D model and correlation among successive frames. In particular, the observed scene is static, i.e. the camera movement is dominant, and it can often be well approximated with a plane. Moreover, camera position and orientation can be obtained from the navigation system. Therefore, correspondent points on two video frames are linked by a simple homography. The encoder employs a new motion estimation scheme which make use of the global motion information provided by the onboard navigation system. For the aim position and orientation data accuracy is further improved analyzing the optical flow and adopting a sensor fusion strategy. The homography is used in order to initialize the block matching algorithm allowing a more robust motion estimation and a smaller search window, and hence reducing the complexity. The results are relevant in low frame rate video coding, which is a typical scenario in UAV behind line-of-sight (BLOS) missions, in which a satellite data link must be used in upload. Experiments open new directions in developing new sensor aided video coding standards.

Contact: l.cicala@cira.it

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

SEAM CARVING FOR TEXT LINE EXTRACTION ON GRAYSCALE HISTORICAL MANUSCRIPTS

Arvanitopoulos N., Ssstrunk S.

Abstract: We propose a novel algorithm for automatic text line extraction on grayscale manuscripts without prior binarization. Our method is based on constrained seam carving to compute separating seams between consecutive text lines. Extensive experimental evaluations on diverse manuscripts show that we improve upon the state-of-the-art for grayscale text line extraction.

Contact: nick.arvanitopoulos@epfl.ch

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

MULTI-TARGET VISUAL TRACKING USING RANGOM FINITE SET-BASED FILTRES

Baisa N. L., Wallace A., Clark D.

Abstract: A Multi-target visual tracking (MTVT) algorithm is developed using the recently popular Random finite set (RFS)-based filters. RFS is used to naturally represent the varying number of non-ordered multi-target states and observations which is analogous to random vector for single target tracking. Finite set statistics (FISST), the study of statistical properties of RFS, is the first systematic treatment of multi-sensor multi-target filtering as a unified Bayesian framework using random set theory.

Contact: nb30@hw.ac.uk

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

REAL-TIME COLLISION AVOIDANCE FOR COMPLEX DYNAMIC SCENES

Bakken M., Risholm P., Schumann-Olsen H.

Abstract: In robotics, there is an increasing need for dynamic collision avoidance to enable collaboration with humans. We propose a system for real-time path planning for a mobile manipulator, with 3D vision integrated in the control loop. To achieve a short planning time, we rely on extensive preprocessing and GPU parallelization. On a 5 DOF KUKA youBot we achieve an online planning time of 10-15 ms. Collision avoidance with human obstacles has been successfully demonstrated.

Contact: marianne.bakken@sintef.no

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

UNCERTAINTY VISUALIZATION FOR NON-EXPERT USERS

Beauxis-Aussalet E., Hardman L.,

Abstract: Computer vision uncertainty is not easily understood by end-users. It can yield trust issues impeding technology transfers, or misinterpretations of data, which can be critical. We propose visualization designs for end-user assessment of uncertainty. We investigate the requirements of non-experts, and the corresponding visualizations. Our study primarily concerns an application for scientific research. Our insights are generalizable to other domains.

Contact: emma@cwi.nl

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

SHAPE COULOMBIZATION

Boscaini D., Girdziusas R. and Bronstein M. M.

Abstract: Canonical shape analysis is a popular method in deformable shape matching, trying to bring the shape into a canonical form that undoes its non-rigid deformations, thus reducing the problem of non-rigid matching into a rigid one. As a result, the shape canonization process replaces the original shape by its stretched-the-most variant. Inspired by natural phenomena, we propose to perform such a stretching by the simulation of electrostatic repulsion among the vertices of the shape

Contact: davide.boscaini@usi.ch

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

FLEXIBLE VISUAL SLAM

Breuer T.

Abstract: Visual trajectory estimation and 3D reconstruction is an important task in robotics and has interesting applications like autonomous driving. Current research concentrates on scalability and precision on large environments and real time performance. Here I present you my approach, offering precise real time trajectory estimation while supporting arbitrary camera configurations and efficient loop detection.

Contact: timo.breuer@iosb.fraunhofer.de

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

IMPROVING DEPTH ESTIMATION USING SUPERPIXELS

Cambra A.B., Muoz A., Murillo A.C., Guerrero J.J., Gutierrez D.

Abstract: The depth information obtained from multiple view algorithms or RGB-d sensors is frequently incomplete. We study how to improve the scene depth estimation combining any kind of rough initial estimation with a pipeline for pixel-wise labeling optimization. Our preliminary pipeline makes use of superpixel image segmentation and Markov-Random-Field solvers, both of them very powerful tools frequently used to obtain a robust and consistent labeling in an image. We propose and analyze how to modify the MRF cost functions and superpixel description to improve the performance.

Contact: acambra@unizar.es

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

3DV-E - AN EMBEDDED, DENSE STEREO-VISION-BASED SYSTEM

Camellini G.

Abstract: This poster describes an embedded, low-cost and low-power dense stereo reconstruction system, running at 27fps at VGA resolution. The processing pipeline includes an image rectification stage, a cost generation unit based on the census transform, a Semi-Global cost optimization stage, and a final minimization step. The hardware is based on a Xilinx Zynq System-on-Chip, which provides a FPGA and a physical dual-core ARM CPU for control and streaming.

Contact: cgabri@ce.unipr.it

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

LOCALIZATION AND MAPPING ON A QUADRUPED ROBOT

Camurri M., Bazeille S.

Abstract: Legged robots are expected to have superior mobility on rough terrain than wheeled robots. The main reason is that legged locomotion is more adaptable to a wide range of terrain types as the robot can decompose its path into a sequence of footholds and can use different locomotion strategies. In order to accomplish most of the locomotion tasks the robot requires high level control (i.e., to adjust the locomotion parameters and to choose optimal footholds) which depends on real-time localization and accurate terrain mapping [1].

Contact: marco.camurri@iit.it

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

PATH ANALYSIS USING GEODESIC ACTIVE CONTOURS.

Cancela B., Ortega M., Penedo M.G.

Abstract: Path analysis is an important field of study in security environments. It is a powerful tool in behavioral systems, such as detecting abnormal behavior in targets with erratic movements, road analysis detecting traffic jams and possible escape routes. We present a new strategy for path analysis based in the idea of that a target tends to choose the path that takes less time to reach its goal, avoiding unnecessary huge deviations. Thus, the system can be modeled as a minimal path approach.

Contact: brais.cancela@udc.es

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

AUTONOMOUS VEHICLE. LOCALISATION AND CONTROL

Chirca M., Chapuis, Debain C., Lenain R., Martin G.

Abstract: Autonomous driving, although demonstrations showed that it is possible, still remains a major challenge due to reliability, costs and legislation. The objective of the thesis is to in-depth research and to develop an intelligent vehicle system for safe and fully automated driving in private designated areas. In order to do that, the driver must drive the car to and from the garage. In this way, the car learns a map and it will be able to drive itself on a optimized path to and from the private garage, once its at home.

Contact: mihai.chirca@gmail.com

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

EXPLOITING SHADING CUES IN KINECT IR IMAGES FOR GEOMETRY REFINEMENT

Choe G., Park J., Tai Y.-W., Kweon I. S.

Abstract: We propose a method to refine geometry of 3D meshes from the Kinect fusion by exploiting shading cues captured from the infrared (IR) camera of Kinect. A major benefit of using the Kinect IR camera is that the IR images captured by Kinect are narrow band images which filtered out most undesired ambient light that makes our system robust to natural indoor illumination. We define a near light IR shading model. To resolve ambiguity in our model between normals and distance, we utilize an initial 3D mesh from the Kinect fusion and multi-view information to reliably estimate surface details.

Contact: gmchoe@rcv.kaist.ac.kr

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

A JOINTS ESTIMATION ALGORITHM FOR GUGT

Cippitelli E., Gasparrini S., Spinsante S., Gambi E.

Abstract: The "Get Up and Go Test" (GUGT) represents an assessment tool to evaluate elderly people gait and balance. This test is used in hospital environment, and consists in standing from an armless chair and starting to walk. It might be useful to design an automatic system which gives an objective (i.e. repeatable) score of the test, using the Microsoft Kinect sensor, which integrates depth and color cameras. We propose an innovative markerless solution, to estimate the trajectories of six side skeleton joints, for objective gait analysis. Anthropometric models, used to extract joints coordinates, avoid unnecessary resource-consuming computations and allow real time implementation.

Contact: e.cippitelli@univpm.it

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

MULTI SCALE CAMERA NETWORK FOR ACCURATE STRUCTURE FROM MOTION

Daftry S., Hoppe C., Bischof H.

Abstract: To obtain high-resolution reconstructions from a large-scale object using SfM, there are many constraints on the quality of image data. In traditional SfM methods, images are acquired at a constant distance to the object which introduces significant drift that cannot be reduced by even bundle adjustment. In this work, we propose to adjust the image acquisition strategy to a multi-scale network and take images at different distances to obtain dense reconstructions while being more accurate.

Contact: daftry@icg.tugraz.at

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

DATA COMPOUNDING FOR EXTENDED FIELD OF VIEW

Danudibroto A., Samset E., D'hooge J.

Abstract: Echocardiography with its high frame rate capability has the potential to become a useful tool for intra-operative guidance [1] during procedures such as EP ablation and CRT placement. However, the field of view for intra-operative probes such as TEE and ICE is limited, and echocardiography may suffer from regional signal dropouts. Data compounding is intended to overcome these challenges by utilising the data from several images to form an extended field of view.

Contact: adanudibroto@gmail.com

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

MAPPING AGRICULTURAL FIELDS IN SUB-SAHARAN AFRICA

Debats S., Fuchs, T., Estes, L., Caylor, K.

Abstract: Agriculture is a main driver of land-use change, especially as population increases. 25% of the world's undernourished live in Sub-Saharan Africa, which is dominated by smallholder agriculture with field sizes less than 2 hectares (141 m x 141 m). Gridded land cover data sets provide overall extents of agriculture, but no information on smallholders' fields. Our ongoing research focuses on mapping boundaries of individual agricultural fields across Sub-Saharan Africa, using a joint framework of a random forest and graph cuts. The random forest classifies remote sensing image pixels, based on labeled training data. Graph cuts enforce labeling consistency by obtaining a maximum a posteriori estimate of a Markov random field by solving a multiway minimum cut problem, thereby smoothing classifications into coherent regions corresponding to agricultural fields.

Contact: sdebats@princeton.edu

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

MULTI-REGION ACTIVE CONTOURS WITH A SINGLE LEVEL SET FUNCTION

Dubrovina A., Rosman G. and Kimmel R.

Abstract: Segmenting an image into an arbitrary number of parts is at the core of image understanding. We propose a novel approach to tackle the problem of multiple-region segmentation, which can be applied for an arbitrary number of regions, and generic region and edge appearance models. Object boundaries are modelled by active contours, minimizing the chosen energy functional, while the segmentation update is done by level set evolution. Unlike most existing methods, in our framework, the evolution is executed using a single non-negative level set function, through the Voronoi Implicit Interface Method (VIIM) for multi-phase interface evolution. Our method is shown to obtain accurate segmentation results for various natural 2D and 3D images.

Contact: nastyad@cs.technion.ac.il

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

ACTIVITY RECOGNITION USING RELATIONAL GRAPH LEARNING

Duckworth P., Cohn A. G., Hogg D. C.

Abstract: This research aims to develop a largely unsupervised learning system from visual data, to recognise new event classes and detect events occurring during long-term observation. The learning system will use qualitative spatio-temporal relationships (QSRs) between observed objects to represent a video sequence in a graph structure [4]. We apply our learning system within a robotics framework. The robot will observe and learn from a variety of human populated environments over a long period of time. This is the main goal of the EU funded robotics project STRANDS [5].

Contact: scpd@leeds.ac.uk

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

ON-ROUTE SEGMENTATION OF COMPLEX INDOOR ENVIRONMENT FROM DRIVE-THROUGH IMAGE SEQUENCES

Ecke G. A., Mallot H. A.

Abstract: Visual navigation can be based on discrete, recognizable anchorpoints extracted from continuous motion sequences. We use the Laptev space-time interest point detector to define points where the agent passes an aperture or occluding object. Results indicate that points of passage provide a suitable skeleton for the representation of indoor spaces.

Contact: gerrit.ecke@uni-tuebingen.de

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

HIGH AND LOW FREQUENCY IMAGE PROCESSING WITH RBF-SOM

Efremova N., Inui T.

Abstract: Recent neurophysiological studies suggest, that primate brain utilises two pathways for object recognition: ventral visual stream for precise object recognition and magnocellular pathways for top-down facilitation of object recognition. In our study, we propose hierarchical architecture for 3D object recognition, which consists of the number of modules, resembling the ventral visual stream of the primate brain (V1, V2, V4, inferior temporal cortex) and orbitofrontal cortex. This architecture provides robust and accurate recognition of real-world objects, presented from various points of view, including non-canonical views. In the previous studies, we have presented a general framework for development of the cortex-like visual object recognition systems. The proposed architecture incorporated the information processing principles, which are recognized to be intrinsic for the primate brain. However, earlier architecture was only capable of processing high-quality input data by processing it with the hierarchy of modules, resembling the VVS: V1-V4 and IT. The main module of the proposed network is the model of a primate IT cortex. The architecture of this module represents a modification of the conventional SOM, where each vector unit of the conventional SOM is replaced by a functional module. The functional modules are arrayed in a lattice that represents the coordinates of the feature map. Layers V1-V4 were presented with layers of simple cell-like receptive fields, modelled by Gabor filters. Responses of the simple cells are pooled together into the next layer of the complex-like cells, performing maximum operation, next level is the layer of simple cells, each complex unit combines adjacent simple afferents. The final complex-cell layer provided an input to the IT module. This study left several open questions for further work, such as the existence of the confusion region for the objects, presented from non-canonical views. Therefore, our objective in this work was is to extend the existing framework in order to provide faster low-frequency data processing and top-down prediction mechanisms. We intend to introduce additional processing modules, which will simulate the behaviour of M-and P-pathways and provide the top-down prediction mechanisms. The basis for improvement of the existing framework stems from the recent results of neurophysiological studies on IT and OFC . At the present study, we enhanced the results of our previous work by addition of the modules, responsible for LF-processing of the input image and simulated the top-down facilitation of object recognition. We obtained the following results: (1) The simulation results provide exact "recognition" regions for each of 18 input objects on the resulting 2D similarity map; (2) all the views for one object were grouped together at the resulting similarity map according to the degree of their similarity. These results show, that a) our model is neurophysiologicaly plausible, and b) the properties of IT neurons, which are widely accepted to be intrinsic to the primate brain, can be modelled with the proposed architecture.

Contact: natalia.efremova@gmail.com

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

MULTIMODAL MANIFOLD ANALYSIS BY SIMULTANEOUS DIAGONALIZATION OF LAPLACIANS

Eynard D., Kovnatsky A., Bronstein M., Glashoff K., and Bronstein A.

Abstract: We construct an extension of spectral and diffusion geometry to multiple modalities through simultaneous diagonalization of Laplacian matrices. This naturally extends classical data analysis tools based on spectral geometry, such as diffusion maps and spectral clustering. We provide several synthetic and real examples of manifold learning, object classification, and clustering, showing that the joint spectral geometry better captures the inherent structure of multi-modal data.

Contact: davide.eynard@usi.ch

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

ENVIRONMENTAL MONITORING BY ONLINE SOCIAL MEDIA

Fedorov R., Fraternali P., Tagliasacchi M.

Abstract: We present a system for environmental monitoring based on online social media. In particular we address the problem of snow cover and snow level estimation through the analysis of publicly available mountain photographs and webcams. The pipeline includes the geo-tagged photo crawling and classification, photo orientation estimation, mountain peak identification and snow mask estimation.

Contact: roman.fedorov@polimi.it

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

THE DISCRIMINATIVE GENERALIZED HOUGH TRANSFORM FOR FULLY AUTOMATIC OBJECT DETECTION AND LOCALIZATION

Gabriel E., Hahmann F., Meyer C., Schramm H., Koch R.

Abstract: The Discriminative Generalized Hough Transform (DGHT) is a general and robust automatic object detection and localization technique. We outline the basic algorithm and demonstrate its performance in an eye localization task on the FERET database, nearly achieving state-of-the-art results without any task-specific optimizations. In the next project phase, we aim to extend the DGHT framework towards multi-object detection in a real-life scenario, and illustrate a basic concept.

Contact: eric.gabriel@fh-kiel.de

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

VIDEO UNDERSTANDING FOR GROUP BEHAVIOR ANALYSIS

Garate C., Bremond F.

Abstract: The automatic video interpretation in the cognitive vision field has become an important research topic for real life application during the last years. One clear example is Video Surveillance. The main goal is to recognize the behaviors of a group of people (2-5 persons) involved in a scene depicted by a video sequence. This problem could be solved with the implementation of an automatic system to recognize in real time. So far, there are different research topics related to crowd or isolated individuals, but only a few works have addressed the recognition of group behavior. The current approach uses recent advances in group tracking and behavior recognition to process large amounts of video surveillance data from an underground railway station and perform a statistical analysis. The most important advantages of our approach are the robustness to process long videos and the capacity to recognize several and different events at once.

Contact: carolina.garate@inria.fr

Presentation Type: Poster

Date: Monday 14 July 2014

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Poster Session: 1

DRINK INTAKE MONITORING USING A DEPTH CAMERA

Gasparrini S., Cippitelli E., Spinsante S., Gambi E.

Abstract: Health of elderly people is directly influenced by food and drink intake behaviors. This monitoring is usually done by the patient himself or by the healthcare staff but unfortunately their judgment is subjective and this aspect represents a limitation to the assessment. The information provided by the Microsoft Kinect can be exploited to automatize the process. This sensor provides RGB and Depth (D) streams to realize a data fusion algorithm that recognizes the patient gestures typically performed when he is drinking. In this work, the device is placed in ceil configuration and a skeleton, characterized by eleven joints, is automatically fitted to the person shape. At each frame, the system monitors the distances between head and hands to identify a drink intake action.

Contact: s.gasparrini@univpm.it

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

FINDING THE LARGEST HYPERCAVITY IN A LINEAR DATA SPACE

Gubareva A., Sulimova V., Seredin O., Larin A., Mottl V.

Abstract: This poster proposes the definition and the solution of the problem of finding a hypercavity as a data-free hypersphere with a maximal radius. This problem is formulated here as multiextremal problem with constraints in a linear feature space and in a linear space produced by a kernel function. In accordance with the proposed approach, which succeeds to the one-class SVM, a center of a hypersphere is found as a linear combination of some small quantity of so called "support" objects.

Contact: a.a.gubareva@yandex.ru

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

APPEARANCE-BASED STEREO MATCHING

Guney F., Geiger A.

Abstract: Stereo matching methods tend to fail on planar or specular surfaces where little or ambiguous texture information is available. With the increasing availability of large annotated datasets like KITTI[1] or SINTEL[2], we ask a natural question: Can we condition the potentials in traditional stereo CRFs on contextual appearance information to improve binocular depth estimation? While current methods focus either on depth estimation from single images or on classical stereo matching, the combination of these two tasks has been little explored so far. In our work, we focus on combining binocular and monocular cues in an efficient framework and investigate the utility of various appearance features by regressing depth and surface normals using random forests.

Contact: guneyftm@gmail.com

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

HUMAN-CENTERED VISUAL SUMMARIZATION

Gygli M., Grabner H., Riemenschneider H., Van Gool L.

Abstract: In order to handle the increasing amount of collected image and video data, we propose to summarize this data based on human interest. First, we analyze what humans find interesting. Then, we propose summarization algorithms for various applications.

Contact: gygli@vision.ee.ethz.ch

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

SLAMRT: A REAL-TIME SLAM SYSTEM TO DEAL WITH ROTATIONS AND TRANSLATIONS

Herrera C. D., Kim K., Kannala J., Pulli K., Heikkilä J.

Abstract: We demonstrate a slam system that deals with both pure rotations and generic camera motion seamlessly in real-time. Inspired by PTAM, it improves performance by also adding non-triangulated features to the map. Characteristics: -Free of restrictions on camera motion -Takes advantage of triangulated points to speed up matching and pose estimation -Reduces drift by matching to map features -Performs bundle adjustment in the background -Real-time and open source

Contact: dherrera@ee.oulu.fi

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

INTERACTION-FREE CALIBRATION FOR OPTICAL SEE-THROUGH HEAD-MOUNTED DISPLAYS BASED ON 3D EYE LOCALIZATION

Itoh Y. and Klinker G.

Abstract: A correct spatial registration of Optical See-Through Head-Mounted Displays (OST-HMD) w.r.t. a users eye(s) is an essential problem for any AR application using the such HMDs. Maintaining the correct registration demands frequent (re)calibrations for the end-users whenever they move the HMD on their head (Touching, rubbing eyes etc.). Our method utilizes dynamic 3D eye position from an eye tracker in combination with pre-computed, static display parameters. The result shows that our calibration with eye tracking is more stable than repeated SPAAM calibrations.

Contact: yuta.itoh@in.tum.de

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

LOCAL BINARY PATTERNS CALCULATED OVER GAUSSIAN DERIVATIVE IMAGES

Jain V., Crowley J.L., Lux A.

Abstract: In this work we present a new static descriptor for facial image analysis. We combine Gaussian derivatives with Local Binary Patterns to provide a robust and powerful descriptor especially suited to extracting texture from facial images. Gaussian features in the form of image derivatives form the input to the Linear Binary Pattern(LBP) operator instead of the original image. The proposed descriptor is tested for face recognition and smile detection. For face recognition we use the CMU-PIE and the YaleB+extended YaleB database. Smile detection is performed on the benchmark GENKI 4k database. Even with minimal machine learning our descriptor outperforms the state of the art at smile detection and compares favourably with the state of the art at face recognition.

Contact: varun.jain@inria.fr

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

MODELING FACE IMPORTANCE FOR SALIENCY DETECTION

Jin B., Yildirim G., Lau C., Shaji A., Ortiz-Segovia M., Ssstrunk S.

Abstract: We present an algorithm to model the importance of human faces in visual saliency tasks. The perceived importance of faces is determined as a function of the face size and the number of faces through crowd sourcing experiments. Wecreate a new visual saliency database that includes face and non-face images, and collect ground truth also through crowd sourcing. Evaluation on this database shows that our face and object saliency method outperforms eight state-of-the-art saliency algorithms.

Contact: bin.jin@epfl.ch

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

A VISUAL SERVOING APPROACH FOR AUTONOMOUS DOORWAY PASSING

K.Narayanan V., Pasteau F., Babel M., Chaumette F.

Abstract: Doorways make wheelchair navigation difficult and hazardous for users. A low-cost monocular vision based autonomous framework for the task is introduced. A Lyapunov-based control scheme is employed to generate a trajectory based on line features representing doorposts. A constraint taken into account that that the robot able to position regardless of its initial position. First step in semi-autonomous navigation systems with human in the loop.

Contact: vishnu.karakkat-narayanan@inria.fr

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

TEMPORALLY CONSISTENT 3D POSE ESTIMATION IN THE INTERVENTIONAL ROOM USING MRF OPTIMIZATION OVER RGB-D SEQUENCES

Kadkhodamohammadi A., Gangi A., de Mathelin M., and Padoy N.

Abstract: Tracking and estimating the pose of clinicians benefit many applications. However the special requirements of the operating room make the vision based tracking very challenging. In this paper, we propose an MRF energy formulation that leverages both kinematic and temporal constraints to estimate poses over RGB-D sequences. The quantitative evaluation of the approach on seven sequences from two different interventional rooms shows robust results in presence of multiple persons and occlusions.

Contact: kadkhodamohammad@unistra.fr

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

AUTOMATIC MODELING AND RECOGNITION OF HETEROGENEOUS LOGICAL STRUCTURES FROM DIGITIZED BUSINESS DOCUMENTS

Kessi L., Lebourgeois F., Garcia C.

Abstract: Abstract and Motivation The main objective: the automatic recognition of document structure by image analysis of highly heterogeneous business documents without any predefined model. Two main complementary directions are provided: First direction, is to develop an automatic structure recognition system to generate specific model of business documents from the fusion of existing knowledge databases, complemented by exogenous information. Second direction and most ambitious, is to automatically generalize all existing knowledge databases about business document structures, to derive a sufficiently generic model to recognize all new unknown document whatever its structure.

Contact: louisa.kessi@insa-lyon.fr

Presentation Type: Poster

Date: Monday 14 July 2014

Time: 21:30

Poster Session: 1

VISUAL SLAM WITH AN EVENT CAMERA

Kim H., Davison A.

Abstract: An event camera is a silicon retina which outputs not video frames, but a stream of events indicating when individual pixels observe a log intensity change. We aim to develop a visual SLAM system with a single event-driven sensor which is to be no longer restricted by the same limitations imposed to standard cameras and inherently more efficient as it exploits compressed visual data, high temporal resolution, low latency and wide dynamic range provided by this type of sensor.

Contact: hanme.kim@imperial.ac.uk

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

BENEFITS OF A PARTS HIERARCHY LEARNED WITH AN AUTOENCODER

Koeberl S., Pugeault N.

Abstract: The following work intends to demonstrate the advantages of using a parts hierarchy as a representation to store visual features. Algorithms showing how a parts hierarchy can be learned are described. These algorithms entailing part extraction and selection, make up the key antagonistic functions of an auto-encoder used here. Then finally using the MNIST data set the results suggesting how compact a parts hierarchy can be are shown along with detection times.

Contact: s.koeberl@surrey.ac.uk

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

BROWNIAN DESCRIPTOR FOR ACTION RECOGNITION

Koperski M., Bremond F.

Abstract: HOG is the most popular appearance descriptor in Action Recognition. We propose a novel appearance descriptor, which models relationships between different pixel-level features such as intensity or gradient, using Brownian Covariance (BC). BC is a natural extension of classical covariance measure that models any kind of relationship. We show that BC carries complementary information to HOG, because fusion of those two gives significant performance improvement. We test our method on 3 datasets.

Contact: michal.koperski@inria.fr

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

UNDERSTANDING BLIND DECONVOLUTION VIA VARIATIONAL BAYES

Kotera J., Sroubek F.

Abstract: Blind deconvolution is a problem of removing blur from a single degraded image without knowledge of the blur process. Two corner stones of effective deconvolution are proper estimator and correct image prior. Many successful methods rely on ad-hoc parameter adjustment or other tricks. We attempt to provide rigorous explanation of these tricks in the context of variational Bayesian estimation with the automatic relevance determination distribution as image prior, where such steps arise naturally.

Contact: kotera@utia.cas.cz

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

CAN AUTONOMOUS ROBOTS MAKE FARMERS LIFE EASY?

Krishna Moorthy Parvathi S.M., Detry R., Boigelot B., Mercatoris B.C.N.

Abstract: Autonomous robotic weeding can contribute to long-term sustainability with both economic and environmental benefits. The objective is to develop a small, low-cost robot destroying the weeds autonomously with the highest levels of safety and reliability removing the needs for human supervision. Autonomous navigation in complex and dynamic agricultural fields requires accurate and robust solutions for crop row recognition, SLAM, coverage planning and obstacle avoidance. Here, we identify the technical challenges to realize a fully autonomous agricultural robot.

Contact: sruthimoorthy.krishnamoorthyparvathi@ulg.ac.be

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

DISSIMILARUTY VALUE BETWEEN 2D SHAPES

Kushnir O.

Abstract: I propose a new approach of binary images comparison. First, the skeleton of a binary image is encoded as a chain of primitives. A primitive is a pair of numbers, the first one is the length of the some edge and the second one is the angle between this and the neighbour edges. The width of shape is described by Legendre polynomial coefficients. They are incorporated as the third vector component into the primitive. Then the pair-wise comparison function based on alignment of chains is built.

Contact: kushnir-olesya@rambler.ru

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

LOCAL IMAGE DECRIPTOR CO-OCCURENCE ANALYSIS FOR ROBUST MOBILE SELF LOCALIZATION AND AR OBJECT VISUALIZATION

Lemaire S.

Abstract: We present a novel approach for optimizing the set of geo-referenced image descriptors used for mobile device localization and geo-referenced object visualization. The data set analysis uses a statistical approach which rates the co-occurrence relations between geo-referenced map descriptors. The statistical analysis is able to efficiently reduce the dataset size needed for image based localization and automatically eliminates short-term foreground objects. We also use existing location information and inertial sensors to enable a region based decomposition to circumvent vector quantization methods. The proposed approach is rather general and we show its feasibility on a mobile augmented reality application.

Contact: simon.lemaire@iosb.fraunhofer.de

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

GEOMETRIC OBJECT RECOGNITION IN RANGE IMAGE FOR GRASPING

Mateo C. M., Gil P., Torres F.

Abstract: Nowadays, there is a strong interest in the use of 3D feature descriptors for grasping tasks. The advances on 3D computer vision and 3D sensors allow us to make object recognition, geometric categorization and shape/pose retrieval grasping tasks. Therefore, this work describes a study of two recognition pipelines using 3D normal-based descriptors. On the one hand, descriptors behaviour is evaluated in the recognition process using scenes from Kinect sensors. On the other hand, nowadays we are making an analysis of pose and orientation precision of 3d normal-based descriptors.

Contact: cm.mateo@ua.es

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

BUILDING A STATISTICAL ANATOMICAL MODEL OF CALCANEUS

Melińska A.U, Iskander D.R.

Abstract: We aim to model the shape of calcaneus using computer tomograhy (CT) scans. Calcaneus (heal bone) is a bone that gives a support function for motion of humanbody. Fractures of calcaneus constitute about 60 of foot injuries. Understandingof calcaneus shape and structure is needed to solve many research problems con-nected with the treatment of calcaneus injuries. Basically, the mathematical de-scription of this bone can be applied in image understanding and numerical sim-ulations e.g. in recognition and modeling of bone fractures.

Contact: aleksandra.melinska@pwr.wroc.pl

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

DYNAMIC OUTDOOR 3D SCENE RECONSTRUCTION

Mustafa A., Kim H., Hilton A.

Abstract: Existing systems for 3-D reconstruction require manual interaction and capture using multiple sensors to reconstruct the background scene and segment the dynamic foreground for reconstruction. The scenes are relatively large capture volumes with complex backgrounds and non-uniform illumination. This research is motivated by the demand for 3-D reconstruction of natural outdoor scenes to support film and broadcast production and focuses on a general solution to the problem of dynamic outdoor scene reconstruction from multiple view video.

Contact: a.mustafa@surrey.ac.uk

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

CONSENSUS-BASED TRACKING AND LOCAL MATCHING OF KEYPOINTS

Nebehay G., Pflugfelder R.

Abstract: We propose a novel keypoint-based method for long-term model-free object tracking. The main contributions of our work are the formulation of a novel consensus-based scheme for outlier detection and a method for addressing problems stemming from ambiguous descriptors and clutter. In contrast to competing approaches, we refrain from updating the appearance information during processing. We are able to achieve state-of-the-art results on a dataset as large as 60 sequences.

Contact: georg.nebehay.fl@ait.ac.at

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

A NEW GROUND-TRUTH DATASET FOR INTRINSIC IMAGE RESEARCH

Nestmeyer T., Kiefel M., Gehler P.

Abstract: When taking a picture, the image is formed by an interplay of light with the reflectance properties of the objects in a scene. Recovering these physical properties from a single image is underconstrained. Nevertheless, we believe that this intermediate representation simplifies other tasks, e.g. detection or scene understanding. Since current state-of-the-art ground-truth datasets are rather limited, we would like to create a new dataset to further enable intrinsic image research.

Contact: thomas.nestmeyer@tuebingen.mpg.de

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

EFFICIENT DETECTION OF FAINT CURVED EDGES IN NOISY IMAGES

Ofir N., Galun M., Nadler B., Basri R.

Abstract: We introduce an efficient method to detect faint curved edges in noisy images. The first question we address is how to efficiently detect curved edges. The second question we address is how to decide if a curve in the image indeed corresponds to a (possibly faint) edge. Our method takes advantage of statistical priors on edge contrast and shape. As our experiments demonstrate, compared to previous works our algorithm is more efficient and obtains higher quality of edge detection.

Contact: natiofir@gmail.com

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

SECURE IRIS RECOGNITION USING LOW RESOLUTION MOBILE CAMERAS

Omelina L., Jansen B., Oravec M., Cornelis J.

Abstract: A recent delivery of the iris recognition standard by NIST enables reliable personal identity verification for public applications. The need of security in smartphones resulted in biometrical applications like face and fingerprint recognition. We study the potential of iris recognition in the mobile devices and security aspects of used recognition methods. We proposed an efficient feature extraction method for iris recognition based on pseudo-random optimized convolution kernels.

Contact: lomelina@etro.vub.ac.be

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

SUPER-ROBUST MULTI-VIEW NORMAL FIELD INTEGRATION

Osep A.

Abstract: The main novelty introduced in this work is the first multi-view normal field integration algorithm that robustly reconstructs a surface of an object from normal fields captured in a real-world setup. We fit a surface to the vector field, reconstructed from observed normals. The vector field and the surface consistency information are computed by feature space analysis of normal back-projections.

Contact: osep@vision.rwth-aachen.de

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

MULTI-TARGET TRACKING USING OCCLUSION GEODESICS

Possegger H.

Abstract: Robust multi-target tracking-by-detection requires the correct assignment of noisy detections to object trajectories. We address this problem by exploiting the evolution of occlusion regions, detector reliability, and target motion prediction to handle missed detections. In combination with a conservative association scheme for visible objects, this allows for real-time online tracking of multiple targets from a single static camera.

Contact: possegger@icg.tugraz.at

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

IMAGE OF THE ABSOLUTE CONIC: WHERE IS IT?

Prapitasari L., Grigat R.-R.

Abstract: Image of the absolute conic is the key of most camera self-calibration methods. We propose a simple yet convincing method to solve the projected absolute conic by using only a single view, based on the semi-real quadrangle. The output of every case is a non-degenerate circle. This is the good news! This circle is then employed for the self-calibration process.

Contact: putu.prapitasari@tu-harburg.de

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

INFORMATION PROCESSING FOR FOLIAGE PENETRATING LIDAR

Puneet C., Wallace A., Hopgood J.

Abstract: This ongoing work addresses the following problem: How best to combine and filter 3-Dimentional point cloud data acquired from ground based/aerial LiDAR sensors. In particular we are interested in extracting structural and physiological properties of targets of interest. This project aims to: 1. Maximise information capture of LiDAR in order to support effective foliage penetration and provide effective situational awareness; and 2. Develop Cueing algorithms to reduce target search space for automatic target recognition.

Contact: psc31@hw.ac.uk

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

LOCAL SPARSE REPRESENTATION IN ABNORMAL DETECTION

Ren H., Moeslund T.

Abstract: We propose to detect abnormal events via a sparse subset clustering algorithm. Specifically, we provide a reasonable normal bases through repeated K spectral clustering. Then for each testing feature we first select spatio-temporal neighbors and use them to form a local space. An abnormal event is found if any abnormal feature is found that satisfies: the distance between its local space and the normal space is large. Our evaluations on two datasets validate our method's effectiveness.

Contact: hr@create.aau.dk

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

AN ADAPTIVE REALTIME BACKGROUND MODEL

Ren V., Marani R., DOrazio T., Stella E., Nitti M.

Abstract: The aim of this work is to provide an adaptive background (BG) model able to deal with: - high frame rate videos - dynamic scenes finding a good compromise between the model complexity and its responsiveness.

Contact: reno@ba.issia.cnr.it

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

MULTIPLE OBJECT TRACKING WITH SIMILAR APPEARANCE

Richter S., Fabry B., Le Bohec C., Schneider W., Zitterbart D.P.

Abstract: We investigate the feasibility of a long term multi object tracking based on recordings of an Adlie penguin colony in Antarctica. The optical tracking, in combination with the existing infrastructure to identify individuals via RFID tags, could lead to unique insights regarding social behavior, hierarchical structure and breeding site selection. The targeted track lengths of several hours, the large number of objects (20-500) and similar appearance of each individual pose an interesting challenge.

Contact: richter.sebastian@gmx.net

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

A NOVEL FRONTIER FOR SOFT-BIOMETRICS: LINKING PERSONALITY AND RECOGNIZABILITY IN CHATS

Roffo G., Cristani M.

Abstract: Interacting via text chats is a channel of communication whose usage has augmented considerably in the last years. It is interesting to understand whether social behaviour can emerge in chats, similarly as it does in face-to-face exchanges. In this work, we focus on the writing style of an individual, analysing how it can be recognized given a portion of chat, and how personality comes into play in this scenario. To this aim, we set up a chat service where key-logging functionalities are active, embedded into the Klimble social network. What emerges from this study is that some traits correlate at the 5% significance level with some characteristics of the chatting style of people, captured by stylometric features; at the same time some of such features are very effective in recognizing a person among a gallery of diverse individuals. This seems to suggest that some personality traits may lead people to chat in a particular style, which turns out to be very recognizable. As a result, chatting is definitely more than just typing.

Contact: giorgio.roffo@univr.it

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

VIEWPOINT SIMULATION FOR POSE COMPUTATION

Rolin P., Berger M.-O., Sur F.

Abstract: We want to improve the localization of cameras from a point model obtained through a SfM algorithm. To do so we add to the model photometric descriptors extracted from simulated images.

Contact: pierre.rolin@loria.fr

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

COMPUTER VISION FOR UNMANNED AERIAL SYSTEMS

Sanchez-Lopez J.L.

Abstract: The objective of my research work is to increase the capabilities of Unmanned Aerial System thanks to the use of the Computer Vision. Several applications have been developed like Visual Servoing, Thermal Inspection of Buildings, Autonomous Landing on Helipads, a Visual Quadrotor Swarm or Visual Localization for IARC 14 competition.

Contact: jl.sanchez@upm.es

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

IMAGE-BASED ROAD TYPE CLASSIFICATION

Slavkovikj V., Verstockt S., De Neve W., Van Hoecke S., Van de Walle R.

Abstract: The ability to automatically determine the road type from sensor data is of great significance for automatic annotation of routes and autonomous navigation of robots and vehicles. In this paper, we present a novel algorithm for content-based road type classification from images. The proposed method learns discriminative features from training data in an unsupervised manner. Experiments performed on a comprehensive real-world road image dataset show the advantages of our approach.

Contact: viktor.slavkovikj@ugent.be

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

STOCHASTIC SEGMENTATION TREES

Snell Jake, Zemel Richard S.

Abstract: Many structured output problems such as image segmentation admit multiple correct outputs for a single input. We present a recursive neural network-based framework for modeling multiple output segmentations via a hierarchical tree of image regions. We perform learning by minimizing KL divergence from a target distribution constructed using a task-specific loss function from the ground truths. We conduct experiments on segmentations synthesized from the Penn-Fudan pedestrian dataset.

Contact: jsnell@cs.toronto.edu

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

ACTIVE STRUCTURE ESTIMATION FROM KNOWN MOTION

Spica R., Robuffo Giordano P., Chaumette F.

Abstract: Structure estimation from motion is a classical topic in computer/robot vision. We propose an active strategy that enforces an estimation dynamics equivalent to that of a linear 2nd-order system with desired poles by suitably acting on the estimation gains and on the inputs applied to the system. This can also be combined with execution of a visual servoing task exploiting a novel projection operator to increase robot redundancy. The theory is experimentally validated in various case studies.

Contact: riccardo.spica@irisa.fr

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

GAIT SILHOUETTE RECONSTRUCTION FOR WALKING ANGLE COMPENSATION

Stavropoulos G., Moustakas K., Drosou A., Tzovaras D.

Abstract: Gait analysis has long been in the focus of the research community, since it forms one of the most characteristic periodic activity patterns of human motion. Moreover, there is a wide spectrum of gait related applications ranging from biometrics for recognition purposes [1] to affective related sciences [2]. Provided that most of the current approaches are tested in controlled lab-environments, the present work aims at addressing realistic assumptions for the acquisition of the input gait sequence, since modern application scenarios and use-cases demand that the applied algorithms are invariant to several specific parameters, like the viewpoint and the special user accessories, e.g. bags. In this concept, the current work presents a novel approach for the synthesis of virtual views of real-world gait sequences, based on a holistic based approach for gait analysis (i.e. human silhouette analysis), by following the general principles of multi-viewpoint video and by using only one depth camera. The preliminary experimental results exhibit a significant improvement in the quality of the reconstructed silhouettes and their resemblance with ground truth data. Future work includes the utilization of the proposed method in a highly efficient single-view (i.e. one camera based-) gait recognition system of increased performance, that can be applied in especially difficult realistic situations.

Contact: stavrop@me.com

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

EVENT ANALYSIS USING QSRS AND QUANTITATIVE FEATURES

Tayyub J.

Abstract: Activity understanding and recognition is a major field in computer vision today. Many techniques have been developed to recognise activities from visual data. Our approach focuses on creating and combining descriptive features that would comprehensively describe an activity. We make use of qualitative and quantitative features and propose that the combination of the many outperforms any single one.

Contact: sc12jbmt@leeds.ac.uk

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

DEVELOPMENT OF EMBEDDED COMPUTER VISION SOLUTIONS FOR SURVEILLANCE UAVS TO ASSIST OPERATORS IN THEIR MISSION

Thomas C.

Abstract: UAVs are getting more and more known and used, for civilian or military purposes. My research addresses a wish from customers for a more automated and simple way to operate surveillance UAVs. In my PhD I am working on a system that will be able to detect moving objects and to track them, tracking has been extensively studied by researchers for years, but I have the opportunity of working with both an industrial UAVS designer company, and researchers. Merging information available onboard UAVs with state of the art computer vision can lead to satisfying results. A first algorithm is presented in this poster.

Contact: thomas_castelli@hotmail.com

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

TOWARDS BETTER LAPAROSCOPIC VIDEO DATABASE ORGANIZATION BY AUTOMATIC SURGERY CLASSIFICATION

Twinanda A.P. , Marescaux J., De Mathelin M., and Padoy N.

Abstract: In this work, we introduce the laparoscopic video classification problem, which involves automatically identifying the type of abdominal surgery in a video. We use kernel Support Vector Machines and compare their performance on different types of visual features, which later is improved by combining the visual features using Multiple Kernel Learning [1] approach. The pipeline gives 91.39% accuracy on 151 abdominal videos totaling over 200 hours of 8 kinds of surgeries performed by 10 surgeons.

Contact: twinanda@unistra.fr

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

GREEN: A NEW AUTOMATED EVALUATION METRIC FOR IMAGE TO TEXT

Vedantam R., Zitnick L., Parikh D.

Abstract: We introduce GREEN, a new automatic metric for evaluating approaches that generate descriptions of images. We show that GREEN matches human evaluation beVer than existing metrics (BLEU and ROUGE). We also introduce two new datasets where each image is described with 50 reference sentences. We show that all evaluation metrics correlate much beVer with humans with additional references. We evaluate five state-of-the-art image description approaches as well as human generated descriptions.

Contact: vrama91@vt.edu

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

AUTOMATIC METHOD FOR TUMOR SEGMENTATION FROM 3-POINTS DYNAMIC PET ACQUISITIONS

Verdoja F., Grangetto M., Bracco C., Stasi M., Varetto T., Racca M.

Abstract: A novel technique to segment tumor voxels in 3-points dynamic positron emission tomography (PET) scans is here presented. This algorithm allows the identification of tumoral cells in dynamic FDG-PET scans thanks to their peculiar anaerobic metabolism experienced over time. The proposed tool has been preliminarily tested on a small dataset showing promising performance as compared to the state of the art in terms of both accuracy and classification errors.

Contact: verdoja@di.unito.it

Presentation Type: Poster

Date: Tuesday 15 July 2014

Time: 21:30

Poster Session: 2

VIDEO-BASED ANALYSIS OF TENNIS MATCHES

Vinyes S., Knottenbelt W.

Abstract: Most of the current tennis models are based on player's statistics, such as the points won in the first serve, second serve etc. Our study goes a step further by analysing and modelling the evolution of a single point based on visually-extracted information. The first step in achieving this is the detection and tracking of the different elements of a tennis match (court, players and ball). Some of the challenges that have to be overcome include scene occlusions, camera movements and the small size of the ball. The system presented here is able to detect all the elements in a variety of tennis broadcast videos (eg. different surfaces) and produce annotated tennis videos. In addition to this, and different from current work, our annotated tennis videos also contain a bar showing the accuracy of the court detection and a projection of the players' positions in a virtual court.

Contact: silvia.vinyes@gmail.com

Presentation Type: Poster

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MOTION ROBUST PULSE-SIGNAL DETECTION FROM CAMERA

Wang W., Stuijk S., de Haan G.

Abstract: Humans pulse-signal can be remotely measured by detecting the pulse-induced colour changes on face skin using a regular camera, i.e., remote photoplethysmography (rPPG). Most state-of-the-art rPPG methods are sensitive to subject motions, so we propose a novel framework to improve its motion robustness. The basic idea of our work originates from the observation that a camera can simultaneously sample multiple skin regions in parallel, and each of them can be treated as an independent sensor for pulse measurement. To distinguish the pulse-signal from motion-induced noise, we exploit the spatial-redundancy of the camera to create local pixel-based rPPG sensors and optimize them in the spatio-temporal domain. The performance of our rPPG method is very close to that of the contact-based sensor under realistic situations. Figure 1 shows a snapshot of the real-time demonstration of our method. The green signals are the reference sampled by a contact-based PPG sensor, while the red signals are detected by a camera.

Contact: w.wang@tue.nl

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3D SCENE ANALYSIS BASED ON OPTIMAL NEIGHBORHOODS AND RELEVANT FEATURES

Weinmann M., Jutzi B., Mallet C.

Abstract: 3D scene analysis in terms of automatically assigning 3D points a semantic label is important for a wide range of applications, e.g. object recognition or city modeling. We propose a general framework consisting of (i) optimal neighborhood size selection, (ii) feature extraction, (iii) feature subset selection, and (iv) classification. A detailed evaluation clearly reveals the beneficial impact of using only relevant features extracted from individual neighborhoods with optimal size.

Contact: martin.weinmann@kit.edu

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EFFICIENT OBJECT SEARCH ON A MOBILE ROBOT USING SEMANTIC SEGMENTATION

Wolf D., Bajones M., Prankl J., Vincze M.

Abstract: We propose an efficient semantic segmentation framework for indoor scenes, tailored to the application on a mobile robot. In that scope, a segmentation method especially needs to be fast and robust. We developed a 3D point cloud processing framework based on Randomized Decision Forests, achieving competitive results at sufficiently high frame rates. We show our methods capabilities on two datasets and also applied it on a mobile robot in order to develop an intelligent object search procedure.

Contact: wolf@acin.tuwien.ac.at

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SCENE UNDERSTANDING USING CLOUDS

Workman S., Jacobs N.

Abstract: Clouds are among the dominant features of outdoor scenes, yet most vision algorithms treat their effects on the scene as noise. However, the motion of clouds and appearance changes from the shadows they cast provide strong constraints on both camera and scene geometry. We introduce methods that use observations of an outdoor scene over days and weeks as input for estimating camera calibration and scene geometry. Cloud-based cues are an important alternative to methods that require specific forms of static scene geometry or clear sky conditions.

Contact: scottworkman@uky.edu

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Poster Session: 2

COMPUTER VISION CHALLENGES FOR PLANT PHENOTYPING

Zollo F., Minervini M., Tsaftaris S. A.

Abstract: The observable traits of a plant (phenome) originate from the interaction between genome and environment. An affordable and high-throughput solution to collect and analyse phenotypes is highly desirable. In previous work, we proposed a framework for the automated segmentation of plants in time-lapse images from phenotyping experiments. Currently, our focus is on computer vision challenges (e.g, leaf counting, detection, segmentation), that are key for studying structural properties of plants.

Contact: fabiana.zollo@imtlucca.it

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CAFFE: CONVOLUTIONAL ARCHITECTURE FOR FAST FEATURE EMBEDDING

Jia Y., Shelhamer E., Donahue J., Karayev S., Long J., Girshick R., Guadarrama S., Darrell T.

Abstract: Caffe provides vision scientists and practitioners with:

- a framework for state-of-the-art deep learning algorithms;
- a collection of reference models;
- processing of $>$ 40 million images a day;
- $\approx$ 2.5 ms per image on a single GPU;
- Python and MATLAB bindings for experiments.

in a fully open-source BSD-licensed C++ / CUDA library.

Contact: shelhamer@eecs.berkeley.edu

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