POSTER SESSION BOOKLET

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

University of Catania - University of Cambridge

International Computer Vision Summer School 2012

3R's of Computer Vision:
Recognition, Registration, Reconstruction

Sicily, 15-21 July 2012

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 2012.

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 2012

Roberto Cipolla
Sebastiano Battiato
Giovanni Maria Farinella

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FINITE ELEMENT BASED SEQUENTIAL BAYESIAN NON-RIGID STRUCTURE FROM MOTION

Agudo A., Calvo B., Montiel J. M. M.

Abstract: Navier's equations modelling linear elastic solid deformations are embedded within an Extended Kalman Filter (EKF) to compute a sequential Bayesian estimate for Non-Rigid Structure from Motion (NRSfM). The scene is coded as a Finite Element Method (FEM) elastic thin-plate solid, where the discretization nodes are the sparse set of scene points salient in the image. It is assumed a set of Gaussian forces acting on solid nodes to cause incremental scene deformation.

Contact: aagudo@hotmail.com

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

BUNDLE ADJUSTMENT WITH CAMERA CONSTRAINTS

Albl C., Pajdla T.

Abstract: We propose, design and implement a method of Bundle adjustment (BA) incorporating constraints that lead to shared parameters among cameras. Using these constraints we are able to capture the physical properties of more complex camera systems, such as stereo rig or ladybug, into the BA process. Our method uses alternation between the camera parameters that are free and those that are shared. In tests, which were carried out on synthetic as well as real datasets, we show that using physically justified constraints improves BA result and delivers more accurate reconstruction.

Contact: alblcene@cmp.felk.cvut.cz

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

ROBUST MULTI-FRAME SUPER-RESOLUTION FOR GLOBAL & NON-GLOBAL MOTIONS

Al-Ismaeil K., Aouada D., Mirbach B., Ottersten B.

Abstract: A critical step in multi-frame super-resolution (SR) is the registration of frames based on their motion. We improve the performance of current state of the art super-resolution [1] techniques by proposing a more robust and accurate registration as early as in the initialization stage of the high resolution estimate. Indeed, we solve the limitations on scale and motion by densely upsampling the low resolution frames (LR) up to the super-resolution factor prior to estimating motion or to median filtering. This furthermore ensures a more accurate registration of images for both cases of global and non-global motions where there is a moving object in the scene. In addition, we tested and showed the importance of our work in dealing with low resolution range images.

Contact: kassem.alismaeil@uni.lu

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

COOPERATIVE MOBILE MEDIA

Al-Nuaimi A., Steinbach E.

Abstract: In the Cooperative Mobile Media (CoopMedia) project, we develop algorithms for temporally synchronizing multi-perspective video recordings in UGC scenarios. We furthermore attempt to spatially register the individual views. We are mainly interested in the local position relationships among the views but we also attempt to find the global event location. For that we developed a sensor fusion framework (SFF) as well as visual location recognition system using CBIR.

Contact: anas.alnuaimi@tum.de

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

A MULTI-SENSORY APPROACH FOR ON-THE-FLY 3D SCENE RECONSTRUCTION

Aufderheide D., Krybus W., Edwards G.

Abstract: The automatic reconstruction of scenes or objects based on visual measurements is a general problem in computer vision since decades. This work introduces a novel framework which incorporates different sensory units such as an inertial measurement unit (IMU), a 3D Time-of-Flight (ToF) sensor and a standard RGB camera. The whole system is composed as a parallel sensor fusion network (SFN) which contains single cells for inertial, visual and range measurements. The combination of different modalities leads to a higher robustness of the overall system for scene reconstruction.

Contact: aufderheide@fh-swf.de

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

DATA DRIVEN CORTICAL FOLDING PATTERNS

Bailey L., Collins, D.L.

Abstract: Cortical folding patterns vary considerably in humans, thus providing a challenge for automation of tasks such as gyral labelling and registration. Cortical variability of a population can be quantified at a given 3D subvolume, or chunk, using a data-driven approach involving registration, computing a non-local means patch-based similarity metric for manifold learning, and hierarchical clustering. By examining new subjects on a per-chunk basis, we anticipate improved labelling and registration.

Contact: bailey@bic.mni.mcgill.ca

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

FACIAL EXPRESSION TRACKING USING CLM-Z

Baltrusaitis T., Robinson P.

Abstract: We present 3D Constrained Local Model (CLM-Z) for robust facial feature tracking under varying pose. Our approach integrates both depth and intensity information in a common framework. Our CLM-Z method shows better accuracy and convergence rates over regular CLM formulation. The use of depth information allows our approach to be robust to lighting and pose variations. CLM-Z shows good performance even on noisy depth data from Microsoft Kinect sensor.

Contact: tb346@cam.ac.uk

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

USING DEPTH CAMERAS TO STREAM ENVIRONMENTS

Bannò F.

Abstract: A telepresence system based on real-time reconstruction and streaming of environments is presented. Commodity RGB-Depth cameras are used to perform a real-time acquisition of a dynamic environment. Data is converted to 3D triangle meshes and streamed to remote destinations. There meshes are blended into a smooth visual reconstruction and rendered in an immersive display. The presented system is low-cost and scalable, and can stream environments over the Internet at interactive rates.

Contact: filippo.banno@sssup.it

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

COLOUR CAMERA CALIBRATION INDEPENDENT OF IRRADIANCE

Bastani P., Funt B.

Abstract: In order for a digital colour camera to represent the colours in the environment accurately, it is necessary to calibrate the camera RGB outputs in terms of a colourimetric space such as CIE XYZ or sRBG. This calibration is often done by photographing a calibrated colour checker and then performing a least-squares regression between camera's output at each patch and their corresponding XYZ values. One difficulty with this method is that it is hard to create an environment in which the lighting is completely uniform, which results in inaccurate calibration. In this poster we present a technique for camera calibration that is independent of illuminant irradiance variations across the scene.

Contact: pbastani@cs.sfu.ca

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

MULTI-VIEW STRUCTURE-FROM-MOTION FOR HYBRID CAMERA SCENARIOS

Bastanlar, Y., Temizel, A., Yardimci, Y., Sturm, P.

Abstract: We describe a pipeline to perform structure-from-motion (SfM) for systems with omnidirectional and perspective cameras. We model our cameras of different types with the sphere camera model. We propose an approach for automatic point matching between omnidirectional and perspective images. We robustly estimate the hybrid fundamental matrix with the obtained point correspondences. We apply a weighted triangulation scheme for mixed camera types. Following the addition of multiple images to the structure, we perform sparse bundle adjustment.

Contact: yalinbastanlar@iyte.edu.tr

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

FAST PEDESTRIAN DETECTION USING MULTIPLE CUES COMPUTED ON THE GPU

Beleznai C., Shao D., Schreiber D., Rauter M.

Abstract: We present an algorithmic framework which efficiently computes pedestrian-specific shape and motion cues and combines them in a probabilistic manner to infer the location and occlusion status of pedestrians. The articulated pedestrian shape is represented by a set of sparse contour templates, where fast template matching is carried out. The motion cue is obtained by employing a nonparametric background model. Both cues are computed and evaluated on the GPU. The method achieves fast computation times even in complex scenarios with a high pedestrian density.

Contact: softdan@gmail.com

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

VIDEO PROCESSING FOR HEART RATE MEASUREMENT IN INFANTS

Bernacchia N., Ercoli I., Marchionni P., Scalise L.

Abstract: Non-contact monitoring of physiological parameters represents a challenge at home as well as in hospitals. We present a measurement method, based on image processing of the patient face acquired by a low-cost webcam, which allows to determine the heart rate of preterm neonate patients. A dedicated algorithm, based on Indipendent Component Analysis applied on image sequences was developed. Standard Electrocardiography was used as gold standard to compare results. Data correlation between the two methods is confirmed by Bland-Altman analysis (R=0.94).

Contact: n.bernacchia@univpm.it

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

NON-RIGID REGISTRATION OF CLOUD MOVEMENT

Bernecker D., Riess C., Hornegger J.

Abstract: Our goal is to optimize the interplay between conventional and solar power plants. We require a short-term and highly accurate prediction of the energy output. On a coarse scale, the weather influencing the power output can be predicted from satellite imagery. To achieve a higher temporal and spatial resolution a ground-based camera is required. In a first step, we focus on determining and predicting the movement of clouds using non-rigid registration techniques.

Contact: david.bernecker@cs.fau.de

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

EXTENDED TOPOLOGICAL ACTIVE NETS FOR IMAGE SEGMENTATION

Bova N., Ibáñez O., Cordón O.

Abstract: Topological Active Nets are a deformable model used in image segmentation. They were extended with novel mechanisms to tackle topological changes, an improved external energy term, node movements constraints to avoid crossing links, and a new local search procedure. Since they can fall in local optima of the energy function, they were embedded in a global search framework, the evolutionary approach Scatter Search, considering multiple alternatives in the segmentation process.

Contact: nicola.bova@gmail.com

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

BODY PART OCCLUSION TREATMENT IN MULTI-USER DEPTH IMAGES

Brando A., Fernandes L.A., Clua E.

Abstract: The usage of depth images has advantages of not handling with color appearance and having the depth information. Many Computer Vision work deal with pose and movement recognition but the body part occlu- sion is still a complex challenge. In our work, we propose a method that will make body part occlusion treatment with multiple-users in depth images, taking graph structures for body part detection, tracking, pose recognition, multi-user approach and occlusion treatment with multiple users.

Contact: andrebrandao@ic.uff.br

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

MOBILE AR FOR CULTURAL DISSEMINATION

Brondi R.

Abstract: A huge amount of information about many cultural heritage sites has been extracted over the years by theoretic studies, though all these information is practically invisible to visitors. Mobile Augmented Reality (MAR) application can offer a solution to this lack, providing valuable instruments which allow users to move within the real sites while looking at the environment as it was when it was built.

Contact: r.brondi@sssup.it

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

INTERACTIVE VIDEO SEGMENTATION VIA EFFICIENT FILTERING

Brosch N., Hosni A., Rhemann C., Gelautz M.

Abstract: In [2], we present a fast, interactive segmentation and matting framework for videos. It is based on recent work [5] that recovers high-quality segmentations by smoothing cost maps. Our main contribution is to extend [5] to the temporal domain, as [5] was intended for single images and does not achieve temporally coherent results for videos. Our results are temporally coherent. The binary segmentation can be further refined in a fast, temporally coherent alpha matting step.

Contact: nici.brosch@ims.tuwien.ac.at

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

ACCELEROMETER BASED PERSPECTIVE CORRECTION

Calore E., Frosio I.

Abstract: Because of improper camera orientation, pictures are often affected by perspective distortion. In this work, we show how to use the on-board camera accelerometer to correct the horizon and keystone distortions, without requiring any human intervention.

Contact: enrico.calore@unimi.it

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

REALTIME CCL ALGORITHMS FOR BINARY IMAGES

Calvo-Gallego E., Brox P., Sánchez-Solano S.,

Abstract: A real-time efficient implementation of a two-scan algorithm for labeling connected components in a binary image is presented. The implementation offers a good speed-resource-quality trade-off and has been validated on a FPGA development board.

Contact: calvo@imse-cnm.csic.es

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

ONLINE TRACKING OF GROUP INTERACTIONS BY ANALYZING THE TRAJECTORY DATA

Chen F.

Abstract: A novel method is proposed for automatically detecting group interactions of multiple moving objects from their trajectory data. We model group interactions by mutual interests between objects, where a direction-awared interest map is defined. We group objects into unit interactions framewisely, and associate them between consecutive frames in the tracking paradigm. The performance is investigated by experimental results.

Contact: chen-fan@jaist.ac.jp

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

AN INTEGRATED APPROACH FOR FACE RECOGNITION: FACE IDENTIFICATION USING IMPROVED ABC AND SURF

Chidambaram C., Dorini L.B., Vieira Neto H., Lopes H.S.

Abstract: Face recognition becomes a complex problem and the recognition performance is generally affected with the presence of factors such as scale and illumination variation, pose changes, noise, occlusion and face expressions. The main goal of the face recognition is to identify one or more faces from still images or video images of a scene or from a database of face images using face object or query images. In this context, as the first task, this work presents a novel approach using the improved ABC (Artificial Bee Colony) algorithm to search, detect and identify the face object images in still collective multiple faces images (SCMFIs) based on features generated by the interest point detector and descriptor, SURF (Speeded-UP Robust Features). The robustness of this approach is studied by computational experiments using real images under different conditions such as scale, illumination, rotation and noise. The results show that the improved ABC with SURF can effectively be applied for face identification in SCMFIs and related tasks.

Contact: chidambr@gmail.com

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS1

SMART VISION SYSTEM FOR ADVANCED LGV NAVIGATION AND OBSTACLE DETECTION

Coati A.

Abstract: This poster presents a solution for obstacle detection and navigation support for unmanned vehicles in industrial environments. The first one also allows the detection of hanging obstacles, within a 3D monitored area, outperforming the original bi-dimensional laser scanner based system used for safety. Another vision system is used for tracking a guideline on the ground, that solves problems of localizations and drifts that sometimes can happen using the laser and vehicle odometry only.

Contact: alessandro.coati@gmail.com

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

MULTIMODAL EMOTION RECOGNITION USING AUDIO, VISUAL AND PHYSIOLOGICAL MODALITIES

Conneau AC.

Abstract: The goal of this work is to automatically analyze the emotional state of people with disabilities while they are immersed in virtual environments created for them to improve their condition. It will be based on the processing and fusion of the various signals, be it the audio-visual stimuli presented to the patient, or the signals captured by the different audio-visual, motion and biological sensors (including EEG/ECG electrodes) used to monitor him. The emotions will be naturally expressed by real users which permit us to go beyond the prototypical emotional states and consider a large variety of emotions.

Contact: conneau@telecom-paristech.fr

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

A ONE PER CLASS RECONSTRUCTION RULE FOR CLASS IMBALANCE LEARNING

D'Ambrosio R., Iannello G., Soda P.

Abstract: Class imbalance limits the performance of most learning algorithms since they cannot cope with large differences between the number of samples in each class. A new reconstruction rule for the One-per-Class (OpC) decomposition method is proposed. This method distinguishes between safe and dangerous classifications using sample classification reliability. The approach has been successfully tested on five datasets using three different classification architectures, and it favourably compares with multiclass classifiers and a popular OpC reconstruction rule. Results show that the method compensates class imbalance in multiclass recognition problems and reduces effects due to the skewness between classes.

Contact: r.dambrosio@unicampus.it

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

US/MRI REGISTRATION FOR IMAGE GUIDED NEUROSURGERY

De Nigris D., Collins. D.L., Arbel T.

Abstract: We present a novel approach for the rigid registration of pre-operative magnetic resonance to intra-operative ultrasound in the context of image guided neurosurgery. Our framework proposes maximization of gradient orientation alignment in locations with minimal uncertainty of the orientation estimates, permitting fast and robust performance with processing times as small as 7 seconds and improved accuracy with relation to competing intensity-based methods.

Contact: dante@cim.mcgill.ca

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

VEHICLE DETECTION FROM MULTIMODAL IMAGERY

Dickson C., Wallace A., Kitchin M., Connor B.

Abstract: When moving through a hostile environment, it is important to be able to detect vehicles at a reasonable distance quickly in order to improve situational awareness. On-the-move, mid-to-long range vehicle detection can be achieved by combining cues generated from visible, thermal, and polarimetric imagery, by extracting and merging a set of hypotheses. This project aims to show that utilising additional modalities can improve the vehicle detection ability on-board a moving vehicle.

Contact: cnd3@hw.ac.uk

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

HEAD MOVEMENT ANALYSIS IN CT BRAIN PERFUSION USING IMAGE REGISTRATION TECHNIQUE

Fahmi F., Marqueering H.A., Streekstra G.J., Beenen L.F.M., vanBavel Ed., Majoie C.B.

Abstract: CT Brain Perfusion is a promising tool to support treatment decision of acute ischemic stroke patients, but usually hindered by patients head movement during acquisition. The purpose of this study was to implement a simple method in quantifying range and degree of the movement based on image registration technique. Fifty five CTP dataset were retrospectively evaluated and 3D transformation parameters were extracted to get the pattern of patients head movement. Within this group, average range of severe movement is $11.2° \pm 13.0°$ with translation of $tz = 18.5 \pm 16.4mm$.

Contact: f.fahmi@amc.uva.nl

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

HAND GESTURE RECOGNITION USING TIME-OF-FLIGHT RANGE IMAGING

Ferstl D.

Abstract: Time-of-Flight (ToF) and other depth sensing IR-based cameras are becoming more and more affordable in consumer electronics. Using these cameras reveals completely new methods how we can interact with multimedia devices. In this project we are working on a real-time hand gesture recognition system to work freely in a 3D desktop environment. The use of ToF sensors not only improves the segmentation, but also delivers additional depth information at high frame rates.

Contact: ferstl@icg.tugraz.at

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

SEAMLESS OBJECT RECOGNITION AND SEMANTIC SLAM

Fioraio N., Di Stefano L.

Abstract: Sensing and understanding the world is key for a robot platform to explore an unknown environment by means of a camera sensor. The main challenges usually include camera tracking, 3D scene reconstruction and object recognition. Though many different techniques have been developed in the past to tackle these problems separately, in this work we investigate on how to effectively solve them simultaneously within a general and unified framework.

Contact: nicola.fioraio2@unibo.it

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

REAL-TIME DETECTION AND CLASSIFICATION OF VEHICLES IN TRAFFIC SCENES

Foucart A., Debeir O.

Abstract: Detection and classification of vehicles in traffic scenes is useful both for traffic analysis and for the enforcement of highway fees. The purpose of this research is to provide a set of algorithms to gather useful information on the vehicles, and to perform classification, on different camera set-ups and with as few human supervision as possible. The first step is to perform robust background / foreground segmentation. Next steps include structure from motion analysis, and pattern recognition.

Contact: afoucart@ulb.ac.be

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

RECOGNITION, REGISTRATION AND RECONSTRUCTION FOR UNMANNED AERIAL VEHICLE(UAV)

Fu C.

Abstract: Recognition, Registration and Reconstruction for UAVs have been researched and applied in many civil applications by the Computer Vision Group(CVG) at UPM, such as Security, Environment, Agricultural, Imaginary, Mapping, Monitoring and Inspection aspects, which are combined with the Image Stabilization, Image mosaicing, Flight control, Visual guidance, 3D reconstruction, Aerial image enhancement and Augmented reality techniques.

Contact: fu.changhong@upm.es

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

OCCUPANCY ANALYSIS OF SPORTS ARENAS USING THERMAL IMAGING

Gade R., Jorgensen A. and Moeslund T. B.

Abstract: This work presents a system for automatic analysis of the occupancy of sports arenas. By using a thermal camera for image capturing the number of persons and their location on the court are found without violating any privacy issues. The images are binarised with an automatic threshold method and reflections and occlusions are dealt with through special designed algorithms. Tests in ten different arenas showed that the system can very precisely distinguish between zero, some or many persons at the court and give a good indication of which parts of the court that has been used.

Contact: rg@create.aau.dk

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

SEMI-AUTOMATIC LIVER TUMOR SEGMENTATION WITH HMMF MODEL

Häme Y., Pollari M.

Abstract: A semi-automatic tumor segmentation method for CT images is presented to reduce manual labor and time required for treatment planning and evaluation. The segmentation is based on non-parametric intensity distribution estimation and a hidden Markov measure field (HMMF) model, using a spherical shape prior. The method outperformed existing methods when evaluated with a public data set, and produced good results even for noisy data and tumors with low contrast and ambiguous borders.

Contact: yh2475@columbia.edu

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

FALSE ALARM REDUCTION, INTRUDER DETECTION AND CLASSIFICATION IN A VISUAL SURVEILLANCE SYSTEM

Hebbalaguppe R., McGuinness K., Kuklyte J., O'Connor N

Abstract: The proposed algorithm reduces false alarms by intruder detection systems - which are most often raised due to illumination changes, presence of rain/snow, animals and random bug movement within a sensors field of view. We demonstrate preliminary results of filtering out false events using stochastic motion features & classify events. This work aims to increase the probability of true detection to validate alarms which leads to faster response times and maximum utilization of police resources.

Contact: ramya.hebbalaguppe2@mail.dcu.ie

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

SINGLE-PARTICLE RECONSTRUCTIONS FROM CRYO-ELECTRON MICROSCOPY IMAGES

Hommelhoff Jensen K.

Abstract: Cryo-electron microscopy (cryo-EM) is a form of transmission electron microscopy, aimed at reconstructing a minimally distorted sample form cryo-electron microscope projections, which typically have a very low signal-to-noise ratio. In the single particle reconstruction problem, there are several randomly oriented copies of the particle available. To reconstruct it one must deal with the two main computational problems: (1) to recover the underlying imaging geometry, i.e., the relative position and orientation of the particle in each image, and (2) to solve the ill-posed reconstruction problem. We are utilizing the principle of Bayesian, statistical inversion in both the image registration and image reconstruction problems to optimally cope with the high amount of noise. For the image registration part, we are currently investigating model-based methods that give the optimal result. The Bayesian approach also allows the incorporation of the structural prior information into the reconstruction problem for which we are intended to develop efficient statistical algorithms. We are additionally investigating evaluation methods to objectively assess the validity of the reconstructions.

Contact: katrine@diku.dk

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

PHOTOGRAMMETRIC CAMERA NETWORK DESIGN FOR MICRO AERIAL VEHICLES

Hoppe C., Wendel A., Zollmann S., Irschara A., Bischof H.

Abstract: To obtain a complete image-based 3D reconstruction of a scene by images obtained by an MAV, view planning is essential. We propose a novel camera network design algorithm suitable for MAVs for close range photogrammetry that exploits prior knowledge. Our algorithm automatically determines a set of camera positions that guarantees important constraints for image based 3D reconstruction. On synthetic and on outdoor experiments, we demonstrate that our camera network design obtains detailed 3D reconstructions with a reduced number of images at the desired accuracy level.

Contact: hoppe@icg.tugraz.at

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

RESOLUTION AWARE 3D MORPHABLE MODEL

Hu G., Chan C.-H., Kittler J., Christmas B.

Abstract: The 3D Morphable Model (3DMM) is currently receiving considerable attention for human face analysis. Most existing work focuses on fitting a 3DMM to high resolution images. However, in many applications, fitting a 3DMM to low-resolution images is also important. In this paper, we proposed a Resolution Aware 3DMM (RA-3DMM), which consists of 3 different resolution 3DMMs: High-Resolution 3DMM (HR- 3DMM), Medium-Resolution 3DMM (MR-3DMM) and Low-Resolution 3DMM (LR-3DMM). RA-3DMM can automatically select the best model to fit the input images of different resolutions. Experiments were conducted on PIE and XM2VTS databases. Experimental results verified that HR-3DMM achieved the best performance for input image of high resolution, and MR-3DMM and LR-3DMM worked best for medium and low resolution input images, respectively. The RA-3DMM model has been applied to pose correction of face images ranging from high to low resolution. The face verification results obtained with the pose-corrected images show considerable performance improvement over the result without pose correction in all resolutions.

Contact: g.hu@surrey.ac.uk

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

CONTENT BASED IMAGE RETRIEVAL IN DOCUMENT CHARACTERIZATION

Ilie M., Onose D.

Abstract: We study the use of content based image retrieval techniques for document characterization. Traditionally such systems use OCR approaches to retrieve information from binary stored documents in order to later classify the documents according to keywords. This method limits the query possibilities to text only. The proposed approach uses queries composed of both images and keywords in order to obtain better results.

Contact: mihai.ilie@windriver.com

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

CONTEXT-AWARE CROWD ANALYSIS AND PEOPLE COUNTING FOR INFOMOBILITY

Iocchi L., Pennisi A.

Abstract: Mobility in large touristic cities, where needs of citizen and tourists are different, is a very relevant problem and infomobility is thus increasingly important. Since active technologies are more invasive, a complete passive sensor system is needed. This work presents a development and experimentation of techniques for automatic estimation of the number of people present in a bus stop area and an approach integrating 3D data analysis coming from a stereo camera.

Contact: pennisi@dis.uniroma1.it

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

AUTOMATIC MITOSIS DETECTION USING TEXTURES IN HISTOPATHOLOGY

Irshad H., Roux L., Racoceanu D.

Abstract: Accurate counting of mitosis in histopathological images plays a critical role in cancer diagnosis and grading. Manual counting of mitosis is tedious and subject to considerable inter- and intra-reader variations. Our goal is to provide an improved technique which can assist pathologists in mitosis detection and counting. The proposed method, which is based on most favorable texture features combination, examine the separability between different channels of color spaces and selects the best channel for mitosis detection in histopathological images. Blue Ratio, thresholding and morphological processing was applied to select the candidate for mitosis. A total of 22 first and second order statistics features were extracted and used in classification of mitosis. The proposed method has been tested on MITOS dataset provided for an ICPR 2012 contest. It achieved 81% detection rate on a testing test.

Contact: humayun.irshad@gmail.com

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

AN IMAGE PROCESSING MODEL OF EDGE VISIBILITY BASED ON HUMAN PERCEPTION

Joulan K., Hautière N., Brmond R.

Abstract: The concept of edge detection is mainly considered as a first step in a bottom-up approach of Computer Vision. Most detectors compute the edge strength from the gradients modulus in an image. Others operators are inspired of current knowledge about the Human Visual System (HVS) in order to mimic some of its components. We follow this trend and propose a new detector based on the visibility of edges in an image for a human observer. The main contribution is to propose an unified framework, biologically inspired, which mimics human vision and computes both edge localization and edge visibility. We propose a new definition of true and false edges, relevant for the HVS : a true edge is visible for a human observer whereas a false edge is an edge which is not detected by the observer. In this framework, edges are included in the primal sketch of the images which is simulated by using a Differences of Gaussians at various scales, in the spatial domain. The visibility value on the edges is computed from the contrast sensitivity function (CSF). We compute the visibility as the ratio between contrast and contrast detection threshold, from the CSF, on the objects edges. Our model is in good agreement with some classical results in human vision, such as Webers law and Riccos law. Furthermore, to evaluate the predictions of the framework with respect to human performance, a psycho-visual experiment is performed on a detection task of discs with 30 subjects. We found a good quantitative agreement and effective results showed that the model is consistent with some classical laws from HVS and with an psycho-visual experiment. This work may contribute among others to low vision simulation.

Contact: karine.joulan@ifsttar.fr

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

MULTIMODAL MOOD RECOGNITION FOR ADAPTIVE AMBIENCE CREATION IN CARE CENTRES FOR ELDERLY

Katsimerou C., Redi J., Heynderickx I.

Abstract: Elderly just relocated in care centers may experience negative emotional states, such as depression or anxiety. This often implies the need for extra personal or institutional care and extra concern for relatives. Our goal is to develop an intelligent, fully automated system able to assess the emotional state of the elderly using a multimodal approach and act adaptively to improve it, without needing further human intervention.

Contact: C.Katsimerou@tudelft.nl

Presentation Type: Poster

Date: Monday 16 July 2012

Time: 17:20 - 19:00

Room: PS2

SCENE RECONSTRUCTION FROM PASSIVELY CAPTURED POINT CLOUDS

Keane T., Cahill N., Pelz J.

Abstract: Given sets of video streams and images that passively capture indoor/outdoor scenes, they can be processed through a bundle adjustment algorithm to determine their 3-dimensional (3-D) point correspondences. The correspondences present a geometrically calculated 3-D point cloud, but one that is often noisy, irregularly sampled, and discrete. We are currently developing a novel approach to generate a scale-space reconstruction estimate of the imaged surface, that is smooth and continuous.

Contact: tommypkeane@gmail.com

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

VESICLE ANALYSIS IN ELECTRON MICROSCOPE IMAGES

Khanmohammadi M., Sporring J., Darkner S, Nyengaard J. R., Nava N.

Abstract: This is a preliminary study for analysing the distribution of synaptic vesicles using electron microscopic (EM) images of slices from rat brains. We aim to detect the synaptic vesicles and investigate statistical models for their distribution in the presynaptic neuron. The specimens are prepared at Aarhus University from male rats. The images are acquired using FEI Morgagni transmission electron microscope with a SISIII MegaView digital camera. Each dataset investigates one synapse. First, each EM image is corrected using a quadratic bias fit. Next, the images are registered using a rigid transformation to a common image based coordinate system. Finally, we measure the shortest distance of the vesicles to the synaptic cleft.

Contact: mh.khanmohammadi@gmail.com

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

DYNAMIC CAMERA PLACEMENT AND RECONFIGURATION FOR MULTI CAMERA NETWORKS

Konda K. R., Conci N.

Abstract: Objective of the presentation is to present a research proposal for Dynamic reconfiguration and placement of multi-camera networks for various computer vision applications like event detection, Visual coverage, face recognition etc. Idea is to develop a dynamic algorithm which modifies the concerned camera parameters dynamically based on a generic metric which would take into account,user defined preferences. Complexity is paramount since we change the parameters dynamically

Contact: konda@disi.unitn.it

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

TOWARDS A THEORY ON PERCEPTION THRESHOLDS

Lezama J., Grompone R., Randall G., Morel JM.

Abstract: This work is framed in the effort to relate perceptual thresholds to the non-accidentalness principle. In particular, we follow the theory of "a contrario" detection, a formalization of this principle. Our aim is to provide a full formalization of simple perceptual tasks where modeling and psychophysical experimentation are both possible. At the same time, we are inspired by the perceptual laws found by the Gestalt school in the 30's. We selected the classic problem of detecting geometric structures in dot patterns. In particular, in this work we focus on the alignment of points.

Contact: jlezama@gmail.com

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

SIFT-BASED MULTI-VIEW COOPERATIVE TRACKING FOR SOCCER VIDEO

Li H., Flierl M.

Abstract: In this work, SIFT features are used to extract the inter-view and inter-frame correlation among related views. Hence, accurate 3D information of each player can be efficiently utilized for real time multiple player tracking. By sharing the 3D information with all cameras and exploiting the perspective diversity of the multi-camera system, occlusion problems can be solved effectively.

Contact: haopeng@kth.se

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

DIFFUSION-GEOMETRIC MAXIMALLY STABLE COMPONENT DETECTION IN DEFORMABLE SHAPES

Litman R., Bronstein A. M., Bronstein M. M.

Abstract: Maximally stable component detection is a very popular method for feature analysis in images, mainly due to its low computation cost and high repeatability. With the recent advance of feature-based methods in geometric shape analysis, there is significant interest in finding analogous approaches in the 3D world. In this work, we formulate a diffusion-geometric framework for stable component detection in non-rigid 3D shapes, which can be used for geometric feature detection and description.

Contact: roeelitm@post.tau.ac.il

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

OBJECT RECOGNITION BASED ON HIERARCHICAL CONTOUR FEATURES

Liu Y.

Abstract: The Bag-of-Features approach to pattern analysis has been widely used in visual recognition. It has been demonstrated to provide two main benefits of discrimination and reliability. Current approaches to local feature extraction mainly contribute to expressing visual texture information, while the contour features under investigation in this work have the potential to capture essential boundary (or internal) object shape information. Visually, an object can be treated as a collection of contour fragments which can be extracted by means of local patches. In this experiment, we extracted robust visual descriptors, densely and hierarchically, to represent contour features for object recognition.

Contact: y.liu.3@research.gla.ac.uk

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

STAGE-BASED 3D SCENE RECONSTRUCTION FROM SINGLE IMAGE

Liu Y., Izquierdo E., Hao P.

Abstract: Holistic scene understanding is a major goal in research of computer vision. We study this problem in terms of structural reconstruction of 3D scene from single view image. First step is geometrical layout analysis by low-level features. We allocate images into seven recurring classes which labels the image with rough scene geometries. Then, we propose an adaptive autonomous scene reconstruction algorithm that adopts specific approaches for different scene types. This approach can compromise to quality and complexity of the input image.

Contact: yixianliu@eecs.qmul.ac.uk

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

3D WIDE BASELINE CORRESPONDENCES USING DEPTH-MAPS

Marcon M., Frigerio E., Sarti A., Tubaro S.

Abstract: Points matching between two or more images of a scene shot from different viewpoints is the crucial step to define epipolar geometry between views or build a 3D model of the framed scene. Unfortunately in most of common cases robust correspondences between points in different images can be defined only when small variations in viewpoint position, focal length or lighting are present between images. In this paper [1], we present a novel matching method where depth-maps are integrated with 2D images to provide robust descriptors even in wide baseline acquisition setup.

Contact: efrigerio@elet.polimi.it

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

MULTIMODAL ANALYSIS OF DANCE PERFORMANCE

Masurelle A.

Abstract: In this poster, a presentation of my PhD's subject, Multimodal Analysis of Dance Perfomances, is carried out. The goal is to develop methods for automatically recognize dance steps/movements and characterize them based on the analysis of various data streams (images, depth-maps, audio, motion, ...). Since the beginning of my PhD, I have worked on: inventory of human activity dataset, multimodal post-synchronization, synchronized setup for multimodal recordings, HMM-based gesture recognition.

Contact: aymeric.masurelle@telecom-paristech.fr

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

AN AUTONOMOUS ROBOT FOR STEREOVISION 3D MAPPING

Merta T., Kowalczuk Z.

Abstract: The described work is focused on generating a 3D map based on robotic stereovision. A robot can translocate in a static environment and generate images from different locations. In a consequence the depth map is obtained using a changeable stereo baseline. The priority of the robot is to map the environment without moving towards the object and satisfy a given precision.

Contact: tommerta@gmail.com

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

UAV LOCALIZATION USING VISION GPS AND INERTIAL SENSORS

Metge J., Megret R., Giremus A., Berthoumieu Y.

Abstract: Precise and robust localization is a key issue to improve services and autonomy of small Unmanned Aerial Vehicles (UAVs) in complex environments. Vision based localization, fused with inertial and Global Positioning System (GPS), provides information required to address this challenge. A Bayesian framework is adopted. Then a sparse Factor Graph representation is used to solve for the localization efficiently. Application of the approach to the mosaicking of terrains from UAV is demonstrated.

Contact: julien.metge@ims-bordeaux.fr

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

AUTOMATIC LEAF PARTS DETECTION FOR ADVANCED LEAF SHAPE RETRIEVAL

Mzoughi O., Yahiaoui I. and Boujemaa N.

Abstract: Understanding the morphological diversity of plant leaves is a central challenge in biodiversity conservation. Traditionally, botanists got tired of manually assigning labels (about leaf parts) to each species. Recently, the proliferation of shape descriptors forms a new era of automatic leaf representation. However, faced with the large amount of species, botanical knowledge, especially about leaf parts, is important to enhance their precision, hence a crucial need to extract them from image.

Contact: olfa.mzoughi@inria.fr

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

NAKAGAMI-BASED OBJECT DETECTION IN 2D FETAL ULTRASOUND USING ADABOOST

Namburete A.I.L., Rahmatullah B., Noble J.A.

Abstract: In obstetrical ultrasound, the image plane for determination of gestational age is identified by the presence and absence of anatomical landmarks within the image. In the 20 to 22 weeks of gestation early signs of trisomy 18 can be detected by the appearance of the choroid plexus (CP). We propose a method to detect the presence of the CP in 2D ultrasound fetal brain images. We compared the performance of the detection using three feature sets: intensity-based, and empricially-fit Nakagami u and w parameter features. The Nakagami u parameter had the highest detection accuracy (72.73%).

Contact: ana.namburete@eng.ox.ac.uk

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

SOURCE CAMERA IDENTIFICATION INVARIANT TO ZOOM

Novozámský A., Mahdian B., Saic S.

Abstract: In 2006 was proposed one of the most effective source camera identification technique based on uneven sensitivity of pixels. This unevenness causes unique noise for each sensor known as Photo-Response Non-Uniformity (PRNU). We found that the resulting PRNU is changing when using the zoom in compact cameras. The aim of this poster is analyze these changes and propose methodology for the detection PRNU independent of the zoom.

Contact: novozamsky@utia.cas.cz

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

NON LINEAR REGISTRATION OF BRAIN MRI IMAGES AND MEASUREMENT OF ATROPHY

Pai A., Sorenson L., Nielsen M.

Abstract: The purpose of the work is to accurately quantify structural changes in brain. We present a method that involves an extension of a previously reported intensity based non-rigid image. The global motion is defined by a rigid transformation followed by a local motion descriptor in the form of b-splines. We apply these methods on publicly available subjects from the Alzheimers Disease Neuroimaging Initiative (ADNI) data and present statistics.

Contact: akshay.pai.u@gmail.com

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

EFFICIENT VIDEO-BASED 3D RECONSTRUCTION

Park M.-G., Yoon K.-J.

Abstract: Visual modeling from a hand-held camera has long been a popular topic in computer vision. We are aiming at developing an efficient 3D modeling framework so that normal users can easily obtain a 3D model of an object (or a scene) using a digital camera or a smart phone.

Contact: mpark@gist.ac.kr

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

A FRAMEWORK FOR BIOMETRIC-BASED VIDEO RETRIEVAL

Perlin H. A., Lopes H. S.

Abstract: The amount of video recordings has increased in recent years. Such data require efficient management and searching procedures, since a huge amount of analysis is accomplished by humans, frequently resulting in a tedious and inefficient work. Aiming at reducing the human effort, this paper proposes the development of a framework for the analysis of video contents. The key idea is providing mechanisms to perform high-level semantic queries to retrieve relevant information in videos.

Contact: hugo.perlin@ifpr.edu.br

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

SEMI-AUTOMATIC 2D TO 3D IMAGE CONVERSION USING SCALE-SPACE RANDOM WALKS AND A GRAPH CUTS BASED DEPTH PRIOR

Phan R., Rzeszutek R., Androutsos D.

Abstract: We present a semi-automated method for converting 2D images to stereoscopic 3D. Given sparse user-defined strokes determining a rough estimate of the depths, we produce a depth map for making stereoscopic image pairs. Our work is related to a similar scheme using Random Walks segmentation, but is complex, with many processing steps. Noting the merits, we propose a simpler system incorporating Graph Cuts segmentation. Results show good quality stereoscopic images, using a more simplified method.

Contact: rphan@ee.ryerson.ca

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

PERCEPTUALLY MOTIVATED SHAPE CONTEXT WHICH USES SHAPE INTERIORS

Premachandran V., Kakarala R.

Abstract: We propose a novel technique to capture the interior shape properties of an object. A given shape is approximated into a set of densely sampled interior points. We also sample a set of sparse points that lie on the contour of an object, and describe the shape, at each of these sparse points, using the Solid Shape Context(SSC). Matching shapes is formulated as an order-preserving assignment problem. SSC captures the overall shape structure in a better way than the contour-based shape descriptors.

Contact: vittalp@pmail.ntu.edu.sg

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

PATCH - COLLABORATIVE SPECTRAL SURFACE DENOISING

Rosman G. Dubrovina A. Kimmel R.

Abstract: We present a new framework for denoising of point clouds by patch-collaborative spectral analysis. A collaborative generalization of each surface patch is defined, combining similar patches from the surface. The Laplace-Beltrami operator of the collaborative patch is then used to selectively smooth the surface in a robust manner.

Contact: rosman@cs.technion.ac.il

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS1

LEARNING BAG-OF-FEATURES REPRESENTATIONS FOR HANDWRITING RECOGNITION

Rothacker L., Fink G. A.

Abstract: Unconstrained handwriting recognition has to cope with the great va- riabilities found in human writing. Recognition systems capture these by using statistical models based on handcrafted features. However, recent trends in computer vision show that recognition can still be improved by estimating also feature representations statistically. In this spirit we propose to learn the complete recognition model from sample data. First experiments show promising results for Ara- bic script.

Contact: leonard.rothacker@tu-dortmund.de

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

A LASER-BASED DETECTION SYSTEM FOR AUTONOMOUS VEHICLES

Sabbatelli M.

Abstract: This poster presents a laser-scanner based system for obstacle detection for autonomous vehicles. It allows to detect the objects on ground by processing a pixmap, derived by a low level fusion system of laser data. Also it analyzes the obstacles and identifies possible vehicles. This solution is helpful to support camera based systems under different visual conditions. The Laser Obstacle Detector (LOD) is also used to support the navigation system to plan the correct trajectory during driving.

Contact: smario@ce.unipr.it

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

3D RECONSTRUCTION OF SMALL ARCHEOLOGICAL OBJECTS USING AFFINE INVARIANCE IN STEREO IMAGES

Saidani M., Ghorbel F.

Abstract: In this paper we present a contribution to the problem of 3D surface reconstruction under affine projections in stereo image. Method starts from using the affine invariance to characterize shape by external contour. Such approximation is interesting if we consider small objects regards to the distance from sensors. Additionally, a methodology to estimate the affine transformation that best align the matched contours is also presented: a scale factor α; , a shift value l_0 and an affinity matrix A are computed to establish a local matching of points that preserves the circular order of points. In order to validate the proposed matching methodology, some results on stereovision context are exposed with scene containing small archeological 3D objects.

Contact: maweheb.saidani@gmail.com

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

WHAT DOES MAKE AN ABSTRACT ARTWORK EMOTIONAL?

Sartori, A.

Abstract: Artworks evokes strong emotional response Art movements employ different techniques to convey emotions People are able to read the emotional messages from abstract paintings Can a machine learn what makes an artwork emotional? We demonstrate: Which parts of the artwork evoke what emotion Why a specific painting is perceived as emotional Evidential quantification of positive and negative emotions can be used to predict the way in which people would observe paintings

Contact: andreza.sartori@disi.unitn.it

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

PREDICTING HUMAN GAZE USING QUATERNION DCT IMAGE SIGNATURES AND FACE DETECTION

Schauerte B., Stiefelhagen R.

Abstract: We introduce a novel saliency detection method using quaternion type-II DCT image signatures and use MCT-based face detection to model the influence of faces on the visual saliency. We evaluate the approach on the Toronto and FIFA eye-tracking data sets. We achieve state-of-the-art results on the Toronto data set and come close to the ideal AUC on the FIFA data set - with less than one millisecond to calculate the QDCT saliency map.

Contact: schauerte@kit.edu

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

VISUAL CORTEX INSPIRED FEATURES FOR OBJECT DETECTION IN X-RAY IMAGES

Schmidt-Hackenberg L., Yousefi, M.R. and Breuel, T.M.

Abstract: Visual cortex inspired feature extractors (vcx) imitate the brain's visual cortex, the best existing object detection system. We benchmarked two different implementations, Mutch and Lowe's SLF-HMAX and Pinto et al.'s V1-like, against the visual bag of words approach using SIFT and PHOW. The task was gun detection in X-ray images of air flight luggage. The vcx outperformed the conventional approach, probably due to the textureless nature of X-ray images and the use of geometric information.

Contact: ludwig@iupr.com

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

TOWARDS NEXT GENERATION BARCODE SCANNING

Sörös G., Flörkemeier C.

Abstract: Smartphones and tablets are increasingly used to scan visual codes that act as physical hyperlinks to digital information. Compared with the outstanding performance of enterprise laser scanners, smartphone cameras suffer from motion/shake blur and limited image resolution. In this project, we propose to turn every smartphone into an enterprise-grade barcode scanner by adapting the latest research results in space-time super resolution to the barcode domain.

Contact: gabor.soros@inf.ethz.ch

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

APPROXIMATE GAUSSIAN FILTER BASED ON SPECTRUM SPARSITY

Sugimoto K., Kamata S.

Abstract: We present an approximate Gaussian filter based on spectrum sparsity of Gaussian kernel. Our method can run just in one pass with a compact workspace and achieve high speed filtering because of its compatibility to modern computer architecture such as CPU cache. Experiments show that our method outperforms conventional approximations in terms of calculation cost and high-precision stability.

Contact: sugimoto@asagi.waseda.jp

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

AN IMAGING SOLUTION FOR HAND HYGIENE EDUCATION

Szilágyi L., Nagy M., Lehotsky Á., Haidegger T.

Abstract: Healthcare Associated Infections (HAI) yearly cause 150,000 deaths and 30B (direct and indirect) costs in Europe. In this study we provide a method and apparatus to teach and verify proper hand hygiene, in order to combat HAI. The system uses digital imaging technology to identify and quantify properly washed regions of the hand.

Contact: lalo@ms.sapientia.ro

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

COMPUTER VISION ALGORITHMS ON MULTI-CORE EMBEDDED SYSTEMS

Tagliavini G., Bonfietti A., Marongiu A., Ruggiero M., Benini L.

Abstract: There are many different approaches to boost execution efficiency of CV algorithms on embedded platforms. We have taken into account three feature extraction algorithms (SIFT, SURF and FAST) and their different implementations, to provide an insight on the key characteristics of their workloads. The experiments have been performed on different Android-based multicore platforms. This type of analysis is strategic to identify directions of evolution for future embedded processors

Contact: giuseppe.tagliavini@unibo.it

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

SEGMENTATION OF BRAIN MR IMAGES VIA DISCRIMINATIVE DICTIONARY LEARNING AND SPARSE CODING

Tong T., Wolz R., Hajnal J., Rueckert D.

Abstract: We propose a novel method for the automatic segmentation of brain MRI images by using discriminative dictionary learning and sparse coding techniques. In the proposed method, dictionaries and classifiers are learned simultaneously from a set of brain atlases, which can then be used for reconstruction and segmentation of a target image. This is in contrast to most existing image labeling approaches that rely on comparing image similarities between atlases and target images. The proposed method was evaluated on the hippocampus extraction of 202 ADNI images. We studied the influence of different parameters and compared with two other methods. For the segmentation of hippocampus, we achieved the highest median Dice coefficient of 0.872 on 202 images, especially a median overlap of 0.866 on 41 AD subjects, which is competitive compared with state-of-the-art methods.

Contact: t.tong11@imperial.ac.uk

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

MEDICAL IMAGE REGISTRATION USING EVOLUTIONARY COMPUTATION

Valsecchi A., Damas S., Santamaria J.

Abstract: We introduce two intensity-based medical IR technique based on genetic algorithms and scatter search, two prominent families of evolutionary techniques. The algorithms use a modern, real-coded design for representing solutions and define operators. Also, they combine a multiresolution strategy with a restart procedure, increasing their reliability. Two studies on synthetic and real IR tasks show our methods are able to outperform classic gradient-based methods as well as other heuristics.

Contact: valsecchi.andrea@gmail.com

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

LARGE SCALE TRACKING OF STEM CELLS USING SPARSE CODING AND COUPLED GRAPHS

Vestergaard J. S., Dahl A. L., Holm P., Larsen R.

Abstract: Stem cell tracking is an inherently large scale problem. The challenge is to identify and track hundreds or thousands of cells over a time period of several weeks. This requires robust methods that can leverage the knowledge of specialists on the field. The tracking pipeline presented here consists of a dictionary learning method for segmentation of phase contrast microscopy images. Linking of the cells between two images is solved by a graph formulation of the tracking problem.

Contact: jsve@imm.dtu.dk

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

IMPROVING THE FLOCK OF TRACKERS PERFORMANCE IN THE TLD FRAMEWORK

Vojir T., Matas J.

Abstract: We present an improvement of the Flock of Trackers (FoT). We propose a novel iFoT tracker with improves the underlying structure and introduces a novel local tracker reliability estimators, which renders the FoT tracker faster and more robust. We also evaluated the iFoT in the Tracking-Learning-Detection (TLD) framework for the long-term object tracking of an a prior unknown object, since the FoT plays an important role in this framework as a short-term tracker.

Contact: vojirtom@cmp.felk.cvut.cz

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

HISTORICAL HANDWRITTEN DOCUMENT IMAGE ANALYSIS AND RECOGNITION

WANG P., Eglin V.

Abstract: Indexing and searching collections of historical handwritten document images has always been a challenge due to the variation of handwriting and noise of the document images. In this work, we try to establish a robust handwriting description based on a combination of a set of relevant properties: structure (skeleton and boundaries), texture, salient interest points. Our model attempts to utilize the information of the object from both morphological and topological aspects.

Contact: superwpeng@gmail.com

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

PRIME SHAPES IN NATURAL IMAGES

WU Q. , HALL P.

Abstract: Shape has been well studied in many disciplines, yet to the best of our knowledge the question as to whether there are a set of simple shapes that appear commonly in the world around us has never been asked. If such a set exists, then the elemental shapes could play a similar role in shape analysis as the primary colours do in colour analysis. We provide evidence that regular shapes populate real world images to a statistically significant degree. Using three different image databases, and two shape descriptors, we empirically show that shapes such as triangles, rectangles, and ellipses (up to an affine transform) are observed at a much higher rate than random shapes. This result has potential value in applications such as scene understanding, visual object classification, and matching. because qualitative shapes can be used as features.

Contact: tommywu1987@gmail.com

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

MULTI-CORE EFFICIENCY OPTIMIZATION FOR PYRAMID ALGORITHM IN IMAGE PROCESSING

Xu T., Cockshott P.

Abstract: Pyramid algorithm is a fundamental approach that is widely used in computer vision, image processing and signal processing areas. However, it is costly to build a pyramid since many times of convolution calculations are needed. Therefore, how to optimize the efficiency of this algorithm is quite an important issue to tackle with. As the development of computers, the use of multi-core CPUs is becoming common and the number of cores that can be used is increasing over time as well. Thus, the main aim of this paper is to optimize the efficiency for pyramid algorithm by paralleling the calculations using multi-core CPUs.

Contact: t.xu.1@research.gla.ac.uk

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

EFFICIENT FACE ALIGNMENT WITH STRUCTURED OUTPUT LEARNING

Zheng S., Hare S., Torr P., Warrell J., Crook N.

Abstract: Face alignment problem is how to predict the location of facial landmarks in a given images with prior face shape model. Addressing this problem is essential for many computer vision applications like face recognition and face animation. Existing approaches [2,3] such as active shape models and active appearance models perform well in tackling the problem of accurate face alignment. However, most of the approaches not only have limitations in generalization and efficiency but also suffer from poor detection initialization. We develop an efficient face alignment approach to address these problems. A structured output learning framework is established based on constrained local models [1,4,5] which have good generalisation. In this case, searching and optimizing a probability distribution model for each landmark can be achieved in a single framework. For efficiency, we employ a binary approximation of the model to speed up the framework. Inspired by the system of tracking-learning-detection (TLD), we utilize a simple learning model to estimate detectors' errors and update it to avoid poor detection initialization for face alignment. We also present a face alignment implementation for a mobile device. The proposed approach is evaluated on well-known benchmarks as well as tested on a popular mobile device.

Contact: szhengcvpr@gmail.com

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

3R'S IN ONE: INTEGRATING RECOGNITION, REGISTRATION, AND RECONSTRUCTION

Zia M.Z., Stark M., Schindler K.

Abstract: Today's object class detectors are tuned to robust 2D matching rather than accurate 3D pose and shape estimation, encouraged by benchmarks as Pascal VOC. We therefore revisit ideas from early days of computer vision, namely 3D geometric object class representations for recognition which recover geometrically far more detailed object hypotheses than 2D bounding boxes, including relative 3D positions of object parts, fine-grained 3D geometric categorization, and allow ultrawide baseline matching.

Contact: mzia@ethz.ch

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

COLLECTIVE PENGUIN DYNAMICS

Zitterbart DP., Fabry B.

Abstract: In polar regions, social behavior is crucial for the survival of several species. One prominent example for collective behavior is the huddling phenomena in emperor penguin colonies. Due to its remote location long term observation of animals is often accomplished by autonomous photographic observatories. To learn about the animals behavior computer vision methods are used to extract key information like position, locomotion, posture, and shape from the automatically recorded images.

Contact: daniel.zitterbart@awi.de

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

HIGHLY OPTIMIZED LANDMARK LOCALIZATION IN MEDICAL IMAGES

Major D., Schulze F., Hladuvka J., Bühler K.

Abstract: Rapid and memory efficient detection of structures and landmarks in medical 3D image data is a key component for many medical applications. Having these goals in mind, we developed a highly optimized classifier using probabilistic boosting trees (PBT). Memory efficiency was achieved applying a block cache data structure. Tests on real world clinical datasets showed that our optimized approach outperforms standard setups of the classifier even in an environment with limited memory resources. Our current work deals with the selection of an optimal set of candidates from different detectors for the localization of anatomical landmarks.

Contact: david.major@vrvis.at

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

Room: PS2

MULTIPLE PEOPLE DETECTION AND TRACKING WITH EXPLICIT OCCLUSION REASONING

Tang S., Andriluka M., Schiele B.

Abstract: In this work we consider the problem of detection and tracking of multiple people in crowded street scenes. State-of-the-art tracking-by-detection approaches perform well in scenes with relatively few people, but are severely challenged in scenes with large number of subjects that partially occlude each other. This limitation is due to the current people detectors that often fail when person becomes strongly occluded. We observe that typical occlusions in street scenes are due to overlaps between people and propose a people detector tailored to various occlusion patterns. Instead of treating partial occlusions as distractions, we leverage the fact that person/person occlusions result in very characteristic appearance patterns that can be used to improve detection results. We demonstrate the performance of our occlusion-aware person detector on a new dataset of people with controlled level of occlusion and on two challenging publicly available benchmarks outperforming single person detector in each case.

Contact: david.major@vrvis.at

Presentation Type: Poster

Date: Tuesday 17 July 2012

Time: 17:50 - 19:30

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