

POSTER SESSION BOOKLET



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

University of Catania - University of Cambridge

International Computer Vision Summer School 2015

Learning to see

Sicily, 12-18 July 2015

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 2015.

Best Presentation Prize

A subset of the submitted posters will be selected by the school committee for short oral presentation. Two best presentation prizes (supported by Qualcomm and Amazon) will be given to the best presentations selected by the school committee.

Scholarship

A scholarship (sponsored by Toshiba Research Europe) will be 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, June 2015

*Roberto Cipolla
Sebastiano Battiato
Giovanni Maria Farinella*

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BUILDING TRAINING IMAGE SET FOR IMAGE CLASSIFICATION FROM SOCIALLY TAGGED IMAGES

Abdulhak Sami A., Riviera W., Cristani M.

Abstract: Training image sets creation is one of the challenging and important tasks, which classifier base their performances. However this is usually perceived as inferior compared to the development of searching and selecting descriptive visual features techniques. Furthermore, building a good and desirable training image set automatically remains a problematic and greatly unsolved. In this work, we tackle this problem; exploiting textual tags given by the crowd to images on social websites like Flickr. Unfortunately these tags are noisy in many cases. Our approach leverages this shared knowledge, and collects images spanning the visual variance of an object class, removing at the same time the noise by different filtering query expansion techniques. Comparative results promote our method, which is capable to automatically generate in few minutes a training dataset leading to an 81.23% of average precision on the PASCAL VOC 2012 dataset.

Contact: sami.naji@univr.it

Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

HIERARCHICAL TRANSFER OF SEMANTIC ATTRIBUTES FOR ZERO-SHOT LEARNING

Al-Halah Z., Stiefelhagen R.

Abstract: In the common approach, attributes are learned and transferred without taking into consideration the embedded structure between the categories in the source set. Such information provides important cues on the intra-attribute variations. We propose to capture these variations in a hierarchical model that expands the knowledge source with additional abstraction levels of attributes. We provide a novel transfer approach that can choose the appropriate attributes to be shared with an unseen class.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

GRAPEVINE FLOWER ESTIMATION ON 2D IMAGES TAKEN UNDER FIELD CONDITIONS AND WITH STOCHASTIC SCENE

Aquino A., Millan B., Diago M.P., Rey C., Fernández J., Gutiérrez S., Tardáguila J.

Abstract: A great challenge for the scientific community in viticulture is early yield prediction. For this, flowering and fruit set assessment are of special interest since they highly influence grapevine yield. A new methodology based on mathematical morphology and pyramidal decomposition for segmenting inflorescence grapevine flowers in 2D digital images taken under field conditions is presented. The algorithm was tested on 40 images of 4 different *Vitis vinifera* L. varieties, providing Precision and Recall values of 83.38% and 85.01%, respectively.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

HIGH RELIEFS FROM 3D SCENES

Arpa S., Süsstrunk S., Hersch R. D.

Abstract: We present a method for synthesizing high reliefs, a sculpting technique that attaches 3D objects onto a 2D surface within a limited depth range. The main challenges are the preservation of distinct scene parts by preserving depth discontinuities, the fine details of the shape, and the overall continuity of the scene.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

LIFE-LONG VISUAL LOCALIZATION USING PROBABILISTIC TEMPORAL INFERENCE

Arroyo R., Bergasa L. M., Romera E., Alcantarilla P. F.

Abstract: Life-long visual localization is a challenging computer vision topic because of the strong appearance transformations that a place usually suffers due to geometric changes, dynamic elements, weather or seasons. We have designed a method named ABLE which can visually recognize locations at different times of day, along the months or seasons. Our current objective is also the application of a probabilistic detection of geometric changes across the four seasons in 3D reconstructed environments.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

PRUNING TAXONOMIES FOR FASTER E-SVM EVALUATION

Becattini F., Seidenari L., Del Bimbo A.

Abstract: Recently ensembles of Exemplar-SVMs have shown intriguing results in scene understanding contexts, improving over simpler non parametric nearest neighbor methods, thanks to their label transfer properties. However the evaluation of large ensembles is prohibitive even on medium sized datasets like PASCAL VOC2007. We propose a method to speed-up the evaluation of Exemplar-SVMs exploiting the joint distribution of exemplar classifier scores at a little loss in accuracy.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

ROBUST AGGREGATION OF GWAP TRACKS FOR LOCAL IMAGE ANNOTATION

Bernaschina C., Fraternali P., Galli L., Martinenghi D., Tagliasacchi M.

Abstract: Automatic segmentation and tagging of an image can enable more flexible querying paradigms, even though it is notoriously an hard problem due to the presence of occlusions, noise etc. Human computation is emerging as a viable alternative when automatic approaches fail to reach their goals. For example games with a purpose use game mechanics to engage player into the process. We propose an aggregation algorithm that deals with the problem of malicious users, improving the quality of the results.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

NON-PARAMETRIC AND PARAMETRIC LEARNING METHODS FOR THE INVERSE DYNAMICS MODELLING OF THE ARM OF THE ICUB HUMANOID ROBOT

Chalikonda Prabhu K., Metta G.

Abstract: Analytical models for robot dynamics often perform suboptimal in practice due to various nonlinearities (friction, elasticity etc) and difficulty in accurately estimating the dynamic and kinematic parameters. Machine learning techniques are viable solutions and less sensitive to these problems. Besides these regularization parameters shown affect in estimating inertial parameters for force control, object recognition & pose estimation.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

SHAPE FROM PHASE: INTEGRATED LEVEL SETS AND SHAPE DENSITIES

Corring J. , Rangarajan A.

Abstract: Probability densities enable robust modeling for point clouds. Signed distance functions provide a geometric characterization of shapes as implicit surfaces. These representations overlap in application yet the two have no standard shared representation. We introduced a complex valued parametric model, dubbed the Complex Wave mixture, embodying both. The phase carries the level set and the modulus squared has the density. Experiments showcase the versatility of the representation.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

GOCARB: APPLYING COMPUTER VISION TO DIETARY ASSESSMENT AND CHRONIC DISEASES

Dehais J., Anthimopoulos M., Diem P., Mougiakakou S.

Abstract: Individuals with Type 1 Diabetes (T1D) require accurate carbohydrate (CHO) counting to control their disease, with counting errors under 20 grams per meal. The present work counts CHO for the user through computer vision and smartphones. The followed methodology makes use of four pillars of computer vision: i) detection, ii) segmentation, iii) recognition and iv) 3D reconstruction.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

HIERARCHICAL TEMPORAL GRAPHICAL MODEL FOR HEAD POSE ESTIMATION AND SUBSEQUENT ATTRIBUTE CLASSIFICATION IN REAL-WORLD VIDEOS

Demirkus M., Precup D., Clark J. J., Arbel T.

Abstract: Head pose and attribute estimation in real-world videos has been receiving attention due to its applicability to a wide range of contexts. Here, we propose a hierarchical graphical model that probabilistically estimates head pose and then -given the estimated head pose- facial attribute from real-world videos, by leveraging the temporal pose information over frames. Experiments on large, real-world video sequences reveal that our approach significantly outperforms the state-of-the-art methods.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

TEMPLATE-BASED STATISTICAL SHAPE MODELLING ON DEFORMATION SPACE

Demisse G., Aouada D., Ottersten B.

Abstract: A statistical model for shapes in R^2 or R^3 is proposed. Shape modelling is a difficult problem mainly due to the non-linear nature of its space. Our approach considers curves as shape contours, and models their deformations with respect to a deformable template shape. Contours are uniformly sampled into a discrete sequence of points. Hence, the deformation of a shape is formulated as an action of transformation matrices on each of these points. A parametrized stochastic model based on Markov process is proposed to model shape variability in the deformation space. The model's parameters are estimated from a labeled training dataset. Moreover, a similarity metric based on the Mahalanobis distance is proposed. Subsequently, the approach is successfully tested for shape recognition, synthesis, and retrieval.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

SUPER-SPARSE REGRESSION FOR FAST AGE ESTIMATION FROM FACES AT TEST TIME

Demontis A., Biggio B., Fumera G., Roli F.

Abstract: Age estimation from faces is a challenging problem with several potential applications. Current methods exploit nonlinear regression to estimate the subject's age, matching the submitted face image against a set of face templates that potentially includes all training faces. We overcome this issue by proposing a super-sparse regression technique that drastically reduces the number of reference templates without compromising estimation accuracy, and also provides more interpretable decisions.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

PROSTATE TUMOR LOCALIZATION USING MULTI-PARAMETRIC MRI AND PRIOR KNOWLEDGE

Dinh C., Haustermans K., Steenbergen P., Ghobadi G., Lerut E., Oyen R., Isebaert S., Ou Y., Christos D., van der Heide U.

Abstract: Multi-parametric (mp-)MRI is increasingly used for tumor detection and localization in prostate because of its ability to visualize tissue structure and to reveal tumor characteristics. However, tumor localization based on mp-MRI is limited in distinguishing prostate cancer from benign confounders. In this paper we enhance the performance of mp-MRI by incorporating prior knowledge from two sources: a population-based tumor probability map and patient-specific biopsy examination results.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

LEARNING TO TRANSFORM IMAGES FROM SAMPLES

Montagner I. S., Hirata Jr R., Canu S.

Abstract: Designing image operators is a hard task. W-Operator Learning studies how to estimate a local image transformation from samples that contain an example of the input and its expected output. We present its basic formulation, state of the art, open problems and challenges and outline possible future lines of work.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

3D SEGMENTATION OF TOMOGRAMS FROM ENERGY MATERIALS

Emerson M. J., Dahl A. B., Conradsen K.

Abstract: In developing energy technologies, material properties have to be investigated to ensure efficiency and lifetime. High resolution volumetric scanning has become essential to understand the material's 3D microstructure and automated quantification methods are necessary to obtain size and shape measurements from this data. The focus here is on segmenting the different elements in a 3D dataset of glass fiber used for wind turbine blades. This is the first step when studying the geometry of the material. The 3D segmentation method presented is a flexible supervised segmentation method that allows to handle volumetric data. It is an extension of the 2D segmentation method based on a dictionary of image patches and corresponding label patches.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

MULTI-VIEW HYPOTHESES TRANSFER FOR ENHANCED OBJECT RECOGNITION IN CLUTTER

Fäulhammer T., Zillich M., Vincze M.

Abstract: Common 3D object recognition methods face problems in real-world situations with clutter, occlusion or non-textured objects. Recent multi-view systems overcome these problems by exploiting beneficial vantage points of the static environment. Minimizing assumptions on the scene and objects of interest made by these systems, we present an efficient online multi-view method, which integrates information of the captured environment merging individual single-view recognition outputs. Our method achieves state-of-the-art results for the Challenge dataset at reduced computational time. Further evaluations on the more challenging TUV dataset show an increase in f-score and object pose accuracy over the number of observations.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

MANITEST: ARE CLASSIFIERS REALLY INVARIANT?

Fawzi A., Frossard P.

Abstract: We introduce a rigorous and systematic framework to assess the invariance of any classifier to geometric transformations. Leveraging a manifold perspective, we cast our problem as the computation of geodesics along the manifold of transformed images, and propose the Manitest approach, built on the efficient Fast Marching algorithm. We show that Manitest quantifies in particular the importance of data augmentation for learning invariance, and the increasing invariance with the depth of a CNN.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

A GENERATIVE PROBABILISTIC TOPIC APPROACH FOR TASK-DRIVEN VISUAL ATTENTION MODELING

Fernández-Torres M. A., González-Díaz I., Díaz-de-María F.

Abstract: The huge amount of visual data available nowadays constitutes an important source of information that requires of analysis techniques to automatically select regions of interest. Our objective is to develop an expert training system to model task-driven visual attention in different scenarios. In this approach, task-driven visual attention is considered as a combination of several subtasks, learned in an unsupervised way using a generative probabilistic topic model based on Latent Dirichlet Allocation (LDA).

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

POSE INDEPENDENT FACE RECOGNITION BY LOCALIZING LOCAL BINARY PATTERNS VIA DEFORMATION COMPONENTS

Masi I., Ferrari C., Del Bimbo A., Medioni G.

Abstract: In this work we address the problem of pose independent face recognition with the gallery set containing one frontal face image per enrolled subject. The approach uses a set of aligned 3D models to learn deformation components using a 3D Morphable Model (3DMM) that will be fit to a non frontal 2D face image in order to render a frontal view. LBP histograms are then computed on such frontal view over patches centred on the projected 3D vertices.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

JOINT FEATURE SELECTION WITH LOW-RANK DICTIONARY LEARNING

Foroughi H., Ray N.

Abstract: We propose a joint feature selection (FS) method by integrating dictionary learning and low-rank matrix approximation and apply it to image classification. The objective function finds a subset of features that preserve the reconstructive relationship of the data by minimizing the ratio of within-class reconstruction residual to between-class reconstruction residual in the subset of selected features. Simultaneously $l_{2,1}$ -norm minimization is applied to jointly select features. Our method shows superior performance over several FS methods on different benchmark datasets.

Contact: homa@ualberta.ca

Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

COSFIRE MODELS FOR DESCRIBING OBJECTS AS ARRANGEMENTS OF CIRCULAR REGIONS

Gecer B., Azzopardi G., Petkov N.

Abstract: We propose blob-based C-COSFIRE filters to model a given object of interest in terms of diffuse circular regions in a specific mutual spatial arrangement. A C-COSFIRE filter combines the responses of a collection of DoG filters of different scales, in all dimensions of a color space, and at certain relative positions. Its parameters are determined in an automatic configuration process that analyses the properties of a given object of interest. We show its effectiveness on two benchmark data sets.

Contact: baris.gecer@cs.bilkent.edu.tr

Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

OPTIMIZED PATCHMATCH FOR NEAR REAL TIME AND ACCURATE LABEL FUSION

Giraud, R., Ta, V.-T., Papadakis, N., Collins, D.L., Coupé, P.

Abstract: In this work, we introduce a new patch-based method using the PatchMatch (PM) algorithm to perform segmentation of anatomical structures. Based on an Optimized PatchMatch Label fusion (OPAL) strategy, the proposed method provides competitive segmentation accuracy in near real time, compared to state-of-the-art methods. Results show the excellent performance of OPAL, since the proposed method obtained the highest median Dice coefficient (89.3%) in less than 1 sec per subject.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

A SHAPE CONSISTENCY MEASURE FOR IMPROVING THE GENERALIZED HOUGH TRANSFORM

Hahmann F., Gabriel E., Böer G., Meyer C., Schramm H.

Abstract: We present a general framework for object localization. It combines a GHT-based voting procedure with a classifier for rating the voting characteristic of the model at individual Hough cells. By using a Random Forest classifier to assess the shape regularity of the GHT voting pattern and incorporating this measure as a weighting factor for the GHT votes a stronger focusing of the Hough space is achieved. The method has been successfully evaluated on the task of iris and epiphysis localization.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

MINING VISUAL EVIDENCE FOR HISTORICAL DOCUMENT DATING

He S., Schomaker L.

Abstract: The goal of MPS is to date historical documents by visual elements about writing style. Our basic assumption is that the handwriting style of historical documents undergoes a gradual visual change. The main work is to automatically discover recurring visual elements on the time line, despite the subtle difference in visual style.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

MULTI-DRIVE GLOBAL MAP GENERATION

Hellmund A., Schreiber M.

Abstract: This poster presents an approach to the automated vision-based road map generation using low-cost GNSS sensors targeting the localization and action planning of autonomously driving vehicles. Multiple drives of the same track are fused to obtain an efficient representation of globally referenced lane markings. The track-to-track association of features is implemented by exploiting regularity patterns of lane markings. The achieved global position accuracy on real-world data is in the range of 2m.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

PREDICTING VIDEO AESTHETICS THROUGH VISUAL DESCRIPTORS

Hernández-García A., Fernández-Martínez F., Díaz-de-María F.

Abstract: Automatic aesthetics prediction of multimedia content is bound to be a powerful tool due to its range of applications (recommender systems, audiovisual production, marketing...). Our objective is threefold: 1) Describe a procedure to automatically derive labels from YouTube videos in an unsupervised way. 2) Present 8 families of visual descriptors that achieve 71% accuracy. 3) Discover best and worst families to enrich future research.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

UNIFIED LIGHT-FIELD CORRECTION FOR SPATIAL CALIBRATION OF OPTICAL SEE-THROUGH HEAD-MOUNTED DISPLAYS

Itoh Y., Klinker G.

Abstract: eye and the image screen of an Optical See-Through Head-Mounted Display (OST-HMD) is one of the crucial issues in realizing seamless augmented reality (AR) experiences. The success of this calibration hinges upon proper modeling of the HMD-eye system— a projector-camera system. The system is typically conceptually broken down into an eye part and an HMD part. To investigate optical aberration issues more deeply, this paper breaks the HMD part down even further. The optics of OST-HMDs causes two different aberrations that degrade the calibration quality: the optical aberration of incoming light from the physical world, and the image aberration of light from the image screen of the OST-HMD. This paper proposes a calibration method that corrects both aberrations simultaneously for arbitrary eye position given an OST-HMD system. We expand our light-field correction approach to the image aberration, and provide a unified calibration method which corrects both aberrations simultaneously for arbitrary eye position. Our method is camera-based and has an offline learning and an online correction step. We verify our method in exemplary calibrations of two different OST-HMDs: a professional and a consumer OST-HMD. The results show that our method significantly improves the calibration quality compared to conventional methods. The accuracy is comparable to 20/50 visual acuity. The results indicate that only by correcting both the aberrations simultaneously can improve the quality.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

ACCURATE DEPTH MAP ESTIMATION FROM A LENSLET LIGHT FIELD CAMERA

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

Abstract: This paper introduces an algorithm to estimate accurate depth map from a lenslet light field camera. Our algorithm estimates multi-view stereo correspondences at sub-pixel accuracy using a cost volume. Our key idea to build accurate costs is threefold. First, sub-aperture images are displaced using the phase shift theorem. Second, gradient costs are adaptively aggregated using the angular coordinate of the light field. Third, feature correspondences between the sub-aperture images are utilized as an additional constraint. With the cost volume, a multi-label optimization propagates and corrects depth map at weak texture regions. Finally, we iteratively refine local depth map by fitting local quadratic function to estimate a non-discrete depth map. Since a micro-lens image contains unexpected distortions, we also present a method to correct the error. The effectiveness of our algorithm is demonstrated through challenging real world examples, with comparisons to the performance of state-of-the-art depth estimation algorithms.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

TACKLING BACKGROUND DIFFERENTLY

Jetley S., Romera-Paredes B., Torr P.

Abstract: Practical vision systems need to identify objects from amongst n different classes of interest while distinguishing them from the residual image content i.e. the background. Background does not have one consistent definition, yet existing approaches, including the highly successful CNNs, treat it as a regular object category and attempt to learn its appearance. We propose a new deepnet architecture for tackling background that can also support class embeddings thus enabling an improved classification and zero-shot performance.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

HOUGH FOREST FOR EYE'S KEY-POINTS DETECTION

Amine K., Renaud S., Jérôme R., Michel C.

Abstract: Eyes is one of the most salient feature of the human face. Some key-points such as pupil and corners allow to access to important information which can be used in several computer vision applications. Eyes appearance is very sensible to head pose variations, illumination condition and image resolution which decrease the accuracy of the existing method. We propose a robust method based on Hough regression trees evaluated on challenging public datasets.

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Presentation Type: Poster

Date: Monday 13 July 2015

Time: 21:30

Poster Session: 1

DIRECT DEBLURRING OF TEXT IMAGES USING CONVOLUTIONAL NEURAL NETWORKS

Kotera J., Hradis M.

Abstract: We address the problem of blind deblurring and denoising of degraded text images and we show that this type of highly structured data can be successfully restored by convolutional neural network. The network is trained to reconstruct high-quality images directly from blurry inputs without assuming any specific degradation model. Our method significantly outperforms existing blind deconvolution methods, including those optimized for text, in terms of both image quality and OCR accuracy.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

LEARNING THE STEREOSCOPIC CAMERA CALIBRATION BIAS

Krešo I., Šegvić S.

Abstract: The main idea of the proposed approach for improving the accuracy of the egomotion is to correct the camera calibration by exploiting the known groundtruth motion. The correction is described by a discrete deformation field over a rectangular superpixel lattice covering the whole image. The deformation field is recovered by optimizing the reprojection error of point feature correspondences in neighboring stereo frames under the groundtruth motion. We evaluate the proposed approach by performing leave one out evaluation experiments on a collection of sequences from the KITTI dataset.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

VERIFICATION OF LARGE SCALE SURFACE GEOMETRY OF INJECTION MOLDED SUR- FACES

Kristensen R. L., Aanæs H.

Abstract: The nature of the molding process of wind turbine blades can induce unwanted defects in the topography of their leading edge. This project seek to develop a computer vision based technique for automatic localization of such defects, which can be used in the rectification process. Currently, focus is on data acquisition as the optical properties of the material of the blades proves difficult for established light based techniques. A possible solution might be the use of UVA light in combination with a structured light based stereo triangulation technique.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

CORRESPONDENCE SEARCH FOR MULTI-VIEW DEPTH AND FLOW RECONSTRUCTION

Lasinger K., Galliani S., Schindler K.

Abstract: We present a multi-view stereo matching approach. Reformulating the Patch-Match Stereo idea in scene space, we start from randomly initialized 3D planes for each pixel position. Planes with high photometric correlation are propagated to neighboring planes, converging into accurate depth and normal maps after few iterations. A subsequent fusion step creates consistent point clouds. Future research will focus on volumetric flow estimation of fluids from multiple cameras.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

REAL-TIME IMAGE RECONSTRUCTION FROM DENSE BINARY PIXELS

Litany O., Remez T., Bronstein A.

Abstract: We study a variant of a sensor with binary threshold pixels and propose a reconstruction algorithm combining a Maximum-Likelihood data fitting term with a sparse synthesis prior. We also show an efficient hardware-friendly real-time approximation of this inverse operator, which we name MLNet. Promising results are shown on synthetic data as well as on HDR data emulated using multiple exposures of a regular CMOS sensor.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

UNDERSTANDING DEEP NEURAL REPRESENTATIONS BY INVERTING THEM

Mahendran A., Vedaldi A.

Abstract: Feature representations are the corner stone of several computer vision algorithms. But what does a feature vector capture? We propose a general method to visually answer this question. We invert HOG, DSIFT and layers of a reference ConvNet. Several layers of the ConvNet retain accurate image information, with different degrees of geometric and photometric invariance

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

FAST AND ROBUST TEXTURE MAPPING FOR 3D PERSON SCANNING

Maier R., Stückler J., Cremers D.

Abstract: We propose a fast and robust method for improving the appearance of 3D models of persons scanned with commodity depth sensors. The low-resolution RGB images are used for computing texture maps of the models using a weighted median computation scheme. Compared to simple volumetric blending within a signed distance volume or using weighted mean, this leads to more detailed results. Moreover, our approach computes textures in less than a minute and is hence highly practical for 3D person scanning.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

HAND GESTURE RECOGNITION BASED ON DEPTH INFORMATION FOR HUMAN MA- CHINE INTERACTION

Mantecón T.

Abstract: The main goal is to be able to recognize different hand gestures using depth information for different tasks of Human Machine Interaction. The final application is related to perform some actions at the Ground Control Station of an Unmanned Aerial Vehicle.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

RGBD CAMERA APPLICATIONS: FROM INFANTS TO ADULTS

Manzi A., Grassi A., Cavallo F.

Abstract: The advent of depth cameras, so-called RGB-D sensors (e.g. Kinect, Xtion), has made it feasible and economically sound to capture in real-time both color images and depth maps with appropriate resolution and accuracy. This technology can provide three-dimensional data structure, which has shown to be advantageous for human detection. The present work shows the use of depth cameras for two different applications: the tracking of infant movements and the classification of the adult's posture.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

MOBILE PLATFORM FOR “ON-THE-GO” MONITORING OF VINEYARDS BY DIGITAL IMAGING

Millan B., Aquino A., Diago M. P., Rey C., Fernández J., Gutiérrez S., Tardáguila J.

Abstract: Image analysis can provide valuable information for the vineyard status assessment in an objective and reliable way. A quick method for image capturing, simple and fast is a key factor to introduce image analysis as an efficient tool to vineyard management. An ATV (All Terrain Vehicle) was used as a base for an automated image acquisition system integrating automatic shuttering, lighting, GPS receiver and a flexible structure that allows easy camera fixing.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

TUMOUR STAGE CLASSIFICATION BASED ON HETEROGENEITY OF PHARMACOKI- NETIC PERFUSION MAPS IN DCE-MRI

Mirecka J., Irving B., Kannan P., Jenkinson M., Schnabel J. A.

Abstract: Development of anti-angiogenic drugs affecting the tumour blood supply introduced a need for better treatment response evaluation than standard tumour size measurement. DCE-MRI is an effective tool for quantifying changes in tumour perfusion. During tumour growth, proliferation of tumour cells is often faster than angiogenesis resulting in abnormal vasculature and leading to highly heterogeneous perfusion patterns. Texture analysis was used to model and predict the growth stage of a tumour based on the heterogeneity of DCE-MRI perfusion measures.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

OCR-BASED APP FOR DRUG THERAPY SELF-MANAGEMENT

Montanini L., Gambi E., Spinsante S.

Abstract: Elderly people usually suffer from a reduced visual ability. For these subjects, applications able to display in a facilitated way the data of drugs to be taken, can be very useful. This paper shows an Android-based app, exploiting the on board camera sensor of the mobile device and OCR technology, able to interpret the name written on the drug package and display its details on the screen. Experimental results show the efficacy of the application in correctly recognize the names of medicines.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

ADAPTING LBP TO TEXT

Nicolaou A., Karatzas D., Bagdanov A.

Abstract: Local Binary Patterns are among the most powerful texture classification methods. Although they have been used for classifying text-as-texture, their popular of-the-self variants are sub-optimal for many phenomena related to text. In this work we present the SRS-LBP which is adapted to text and experiments of its application on several text-tasks. Furthermore, we provide a qualitative analysis of LBP application on textual data that is consistent with experiments.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

FAST 2D VIDEO STABILIZATION, SIMULATING A STATIC CAMERA

Nikolov A., Dimov D.

Abstract: The current research concerns the problem of video stabilization ‘in a point’, which aims to stabilize all video frames according to one chosen reference frame to produce a video, shot by a static camera. To solve the problem we propose an effective combined approach (3x3OF9x9). It fuses our development for fast 2D video stabilization (which improves) with the most lightweight (imprecise) version of the Optical Flow approach, applying Otsu segmentation to the moving objects.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

GENERIC OBJECT TRACKING IN URBAN STREET SCENES

Osep A.

Abstract: We propose a generic tracking approach which does not follow the often used tracking-by-detection principle. Our method generates a set of object proposals from 3D stereo data and jointly infers relevant objects and their trajectories. Our approach successfully tracks a large variety of unknown, generic objects in challenging street scenes based on stereo depth information.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

MULTI-MODAL PERSON RE-IDENTIFICATION USING RGB-D CAMERAS

Pala F., Satta R., Fumera G., Roli F.

Abstract: Person re-identification consists of recognizing individuals across different sensors of a camera network. In this work we investigate whether the re-identification accuracy of clothing appearance descriptors can be improved by fusing them with anthropometric measures extracted from depth data, using RGB-D sensors. We also propose a dissimilarity-based framework for building and fusing multi-modal descriptors of pedestrian images, as an alternative to the widely used score-level fusion.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

DEEP CONV NETS FOR ROBOTIC VISION

Pasquale G., Ciliberto C., Odone F., Rosasco L., Natale L.

Abstract: Providing robots with accurate and robust recognition capabilities in the real-world today is a challenge. Concurrently, deep Conv Nets perform remarkably well on large-scale image retrieval tasks. We investigate how latest results on deep learning can advance robotic visual recognition systems as that of the iCub humanoid robot. We benchmark the performance of the resulting system on a dataset, that we will release, acquired in a framework that reflects the iCub's daily visual experience.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

STAIR DETECTION AND MODELLING FROM A WEARABLE DEPTH CAMERA

Perez-Yus A., Lopez-Nicolas G., Guerrero J. J.

Abstract: In this work we propose a method to detect, locate and parametrise stairs with a wearable RGB-D camera. Our algorithm detects if the horizontal planes in the scene are steps of a staircase judging their dimensions and relative positions. With these planes we obtain a scaled model of the staircase with the spatial location and orientation with respect to the subject. Experiments show that the system is able to perform in real-time and works even under partial occlusions of the stairway.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

RECONSTRUCTION OF 3D SURFACE DATA FROM MULTI-VIEWPOINT IMAGES

Qian N., Shakibajahromi B., Kiani S., Yu Z.

Abstract: For decades various techniques have been developed to accurately extract the 3D surface data from images taken with cameras from different positions. The presented method models objects and scenes with a directional point cloud from multi-viewpoint images. The position and normal vector of the reconstructed point are further adapted under different cues to generate the optimized 3D surface data.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

A BASELINE FOR VISUAL INSTANCE RETRIEVAL WITH DEEP CONVOLUTIONAL NETWORKS

Razavian A. S., Sullivan J., Carlsson S., Maki A.

Abstract: This paper presents simple pipelines for visual instance retrieval exploiting image representations based on convolutional networks (ConvNets), and demonstrates that ConvNet image representations outperform other state-of-the-art image representations on six standard image retrieval datasets for the first time. Unlike existing design choices, our image representation does not require fine-tuning or learning with data similar to the test set. Furthermore, we consider the challenge "Can you construct a tiny image representation with memory requirements less than 32 bytes that can successfully perform retrieval?" We report the promising performance of our ConvNet based tiny representation.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

EFFICIENT SEMANTIC 3D MODELLING FOR LARGE-SCALE URBAN AREAS

Richard A., Blaha M., Vogel C., Schindler K.

Abstract: We propose a new method to efficiently generate interpreted large 3D city models, starting from aerial data. Given a set of images of a scene, semantic 3D reconstruction aims to densely reconstruct both the 3D shape of the scene and a segmentation into semantic object classes. This joint approach leads to more complete and accurate interpreted 3D models. So far, related methods were limited to small toy scenes given their large memory footprint and computational cost. To scale them up to large scenes, we set up an adaptive multi-resolution framework.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

A REAL-TIME MULTI-SCALE VEHICLE DETECTION AND TRACKING APPROACH FOR SMARTPHONES

Romera E., Bergasa L. M., Arroyo R.

Abstract: Vehicle detection is a widely researched topic due to its applications to ADAS or autonomous driving. We present a vehicle detection and tracking pipeline that is able to run on an iPhone in real-time. A multi-scale proposal and simple road geometry considerations based on the vanishing point are combined to overcome the computational constraints. Our algorithm is tested on a publicly available motorway dataset, thus demonstrating its applicability to real driving environments.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

CLOUD IMAGING AND ANALYSIS USING GROUND-BASED CAMERAS

Savoy F. M., Dev S., Lee Y. H., Winkler S.

Abstract: Fine scale cloud monitoring is needed for a variety of applications such as weather observation, solar energy production forecast or ground-to-satellite and ground-to-air communication signal attenuation modelling and mitigation. Whole Sky Imagers are devices capturing pictures of the sky at regular intervals. We build our own prototypes and use their images to detect clouds and cloud types, track cloud location and movement and measure the cloud bottom altitude using several such devices.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

RECOGNIZING PEOPLE BY THEIR PERSONAL AESTHETICS: A STATISTICAL MULTI-LEVEL APPROACH

Segalin C.

Abstract: This paper presents a study on personal aesthetics, a recent soft biometrics application where the goal is to recognize people by considering the images they like. Here we propose a multi-level approach, where each level is intended as a low-dimensional space where the images preferred by a user can be projected, and similar images are mapped nearby, namely a Counting Grid. Multiple levels are generated by adopting Counting Grids at different resolutions, corresponding to analyze images at different grains. Each level is then associated to an exemplar Support Vector Machine, which separates the images of an individual from the rest of the users. Putting together multiple levels gives a battery of classifiers whose performances are very good: on a dataset of 200 users, and 40K images, using 5 preferred images as biometric template gives 97% of probability of guessing the correct user; as for the verification capability, the Equal Error Rate is 0.11.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

PART LOCALIZATION BY EXPLOITING DEEP CONVOLUTIONAL NETWORKS

Simon M., Rodner E., Denzler J.

Abstract: Current fine-grained classification approaches often rely on a robust localization of object parts to extract localized feature representations suitable for discrimination. However, part localization is a challenging task due to the large variation of appearance and pose. In this paper, we show how pre-trained convolutional neural networks can be used for robust and efficient object part discovery and localization without the necessity to actually train the network on the current dataset. Our approach called "part detector discovery" (PDD) is based on analyzing the gradient maps of the network outputs and finding activation centers spatially related to annotated semantic parts or bounding boxes. This allows us not just to obtain excellent performance on the CUB200-2011 dataset, but in contrast to previous approaches also to perform detection and bird classification jointly without requiring a given bounding box annotation during testing and ground-truth parts during training. The code is published online.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

AUTOMATIC ANALYSIS OF HUMAN SPERM

Nissen M., Nielsen M., Almstrup K., Nielsen T.

Abstract: Quality analysis of human sperm is both labour intensive and subjective. We present our project on automating this analysis, dataset, initial approach of using a convolutional neural network for segmentation and object recognition of sperm and round cells, and our preliminary results giving us a test accuracy of 0.9334.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

CONTACTLESS BIOMETRIC HAND GEOMETRY RECOGNITION USING A LOW-COST 3D CAMERA

Svoboda J., Bronstein M. M., Drahansky M.

Abstract: In the past decade, the interest in using 3D data for biometric person authentication has increased significantly, propelled by the availability of affordable 3D sensors. In biometric modalities such as hand recognition, several studies have shown the potential advantage of using 3D geometric information, however, no commercial-grade systems are currently available. In this work, we present a contactless 3D hand recognition system based on the novel Intel RealSense camera.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

TOWARDS LIFELOGGING VIDEO SEGMENTATION

Talavera E.

Abstract: Life-logging is described as the automatic digital capture of a person's everyday activities by a wearable device. Life logs analysis, by recording a first-person view of the world, aims to improve the quality of life by providing life habits and activity patterns to be improved or changed.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

WHO IS ALIVE

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

Abstract: Subject detection is an important task in computer vision. Most existing methods rely on supervised learning of physical appearance features, which are highly restricted to the pre-trained appearance model while still suffering from false detection of human-similar objects. In this paper, we propose a novel unsupervised method to detect alive subjects in video using physiological features, i.e., heartbeat. Our basic idea originates from the observation that only living skin tissue of a human presents pulse-signal, which can be exploited as the feature to distinguish real human from non-human objects in videos. The proposed method, demonstrating the state-of-the-art performance in numerous challenging experiments, is the first method that uses pulse to robustly detect alive subjects in realistic scenarios.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

VISUALIZING TEXT RECOGNITION NETWORK

Xie W. D., Noble J. A., Zisserman A.

Abstract: In this work, we aim to answer two questions: What makes a text image belong to a class? What hierarchical features has been learnt? To This end, we trained deep convolutional network for text recognition and visualize canonical image of a class.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

OVERLAPPING CONVEX OBJECTS SEGMENTATION

Zafari S., Eerola T., Sampo J., Kälviäinen H., Haario H.

Abstract: Segmentation of overlapping objects aims to address the issue of representation of multiple objects with partial views. Overlapping or occluded objects occur in various applications, such as morphology analysis of molecular or cellular objects in biomedical and industrial imagery where quantitative analysis of individual objects by their size and shape is desired [2, 3]. The main focus of this research is to analyze overlapping objects in an image to distinguish individual objects and estimate their contours by utilizing the shape priors.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

Time: 21:30

Poster Session: 2

APPEARANCE-BASED GAZE ESTIMATION IN THE WILD

Zhang X., Sugano Y., Fritz M., Bulling A.

Abstract: In this work we study appearance-based gaze estimation in the wild. We present the MPIIGaze dataset that contains 213,659 images we collected from 15 participants during natural everyday laptop use. We also present appearance-based gaze estimation using multimodal convolutional neural networks that outperforms other state-of-the-art methods. We present an extensive evaluation of several state-of-the-art image based gaze estimation algorithms on three current datasets, including our own.

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Presentation Type: Poster

Date: Tuesday 14 July 2015

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Poster Session: 2