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**Wolfgang Osten
Dmitry Nikolaev
Jianhong Zhou**
Editors

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Contents

vii	<i>Conference Committee</i>
xi	<i>Introduction</i>

SESSION 1 MACHINE VISION PRINCIPLES AND METHODS

12084 02	Proof of concept to secure the quality of research data [12084-1]
12084 03	Garbage detection and classification method based on YoloV5 algorithm [12084-2]
12084 04	Anomaly detection with partitioning overfitting autoencoder ensembles [12084-4]
12084 05	Progressive integration of visibility constraints for implicit functions [12084-7]
12084 06	Automated byproduct segmentation in grain images [12084-11]
12084 07	A multimodal semantic segmentation for airport runway delineation in panchromatic remote sensing images [12084-21]
12084 08	Unsupervised clustering-based analysis of the measured eye-tracking data [12084-27]
12084 09	TransGSnet: transformer-embedded ground segmentation of point cloud for rough roads [12084-32]
12084 0A	An I-vector-based approach for discriminating between patients with Parkinson's disease and healthy people [12084-34]
12084 0B	Application of modified Levenshtein distance for classification of noisy business document images [12084-38]
12084 0C	Homological assessment of data representations [12084-41]
12084 0D	Enhancement of the super pixel-CNN based road segmentation using cycle consistent adversarial network [12084-53]
12084 0E	Combination of visual and semantic criteria for automated selection of region proposals in a bounding box [12084-3]
12084 0F	Few-shot object detection with anti-confusion grouping [12084-12]
12084 0G	Parameter decoupling strategy for semi-supervised 3D left atrium segmentation [12084-19]

- 12084 OH **Text-based sequential image generation** [12084-23]
- 12084 OI **Efficient table border segmentation with asymmetric convolutions** [12084-54]
- 12084 OJ **CheckScan: a reference hashing for identity document quality detection** [12084-58]

SESSION 2 MACHINE VISION APPLICATIONS

- 12084 OK **The high variety of image wafer inspection field** [12084-6]
- 12084 OL **Face age verification for access control application** [12084-9]
- 12084 OM **Determination of the porous structure parameters from experimental images for the porous phantoms generation algorithm** [12084-17]
- 12084 ON **A framework to derive geospatial attributes for aircraft type recognition in large-scale remote sensing images** [12084-20]
- 12084 OO **Image-based damage detection on TiN-coated milling tools by using a multi-light scattering illumination technique** [12084-31]
- 12084 OP **Bangla sign digits recognition using depth information** [12084-36]
- 12084 OQ **SAR image ship target detection based on sea-land segmentation and YOLO anchor free** [12084-37]
- 12084 OR **Character sequence prediction method for training data creation in the task of text recognition** [12084-55]
- 12084 OS **Indoor visual mapping and navigation for blind people** [12084-59]
- 12084 OT **Joint motion context and clip augmentation for spatio-temporal action detection** [12084-40]
- 12084 OU **Advertisement replacement in video** [12084-47]

SESSION 3 MACHINE LEARNING

- 12084 OV **Robust deep unsupervised learning framework to discover unseen plankton species** [12084-8]
- 12084 OW **Exploring loss functions for optimising the accuracy of Siamese neural networks in re-identification applications** [12084-13]
- 12084 OX **Hole detection in aquaculture net cages from video footage** [12084-22]

- 12084 0Y **Few-shot object detection via metric learning** [12084-25]
- 12084 0Z **A novel machine learning approach based on fast multi-scale hybrid wavelet network for supporting diagnosis of neuromuscular disorders** [12084-26]
- 12084 10 **Two-stream deep representation for human action recognition** [12084-29]
- 12084 11 **Method for training a compact discrete neural network descriptor** [12084-33]
- 12084 12 **Method for copyright protection of deep neural networks using digital watermarking** [12084-39]
- 12084 13 **3D human pose estimation for martial arts analysis through graph convolutional networks** [12084-43]
- 12084 14 **Automatic metadata information extraction from scientific literature using deep neural networks** [12084-44]
- 12084 15 **Integrating single-shot Fast Gradient Sign Method (FGSM) with classical image processing techniques for generating adversarial attacks on deep learning classifiers** [12084-48]
- 12084 16 **Bi-direction co-attention network on visual question answering for blind people** [12084-49]
- 12084 17 **2D-projected tree model reconstruction from monocular images and DNN** [12084-57]
- 12084 18 **Convolutional neural networks based weapon detection: a comparative study** [12084-16]
- 12084 19 **MOG: a background extraction approach for data augmentation of time-series images in deep learning segmentation** [12084-24]
- 12084 1A **Auto-clustering pairs generation method for Siamese neural networks training** [12084-30]
- 12084 1B **Wavelet network-based deep learning system for image classification** [12084-35]
- 12084 1C **Zero-shot learning and classification of steel surface defects** [12084-45]
- 12084 1D **Autonomous monitoring of finishing pigs using side-view cameras and deep learning** [12084-50]
- 12084 1E **Joint alignment and compactness learning for multi-source unsupervised domain adaptation** [12084-52]
- 12084 1F **Deep neural networks for moving object classification in video surveillance applications** [12084-56]
- 12084 1G **Virtual restoration of paintings based on deep learning** [12084-60]

12084 1H **Melatect: a machine learning approach for identifying malignant melanoma in skin growths**
[12084-61]

SESSION 4 COMPUTATIONAL IMAGING

12084 1I **Depth estimation from a single CD-SEM image using domain adaptation with multimodal data**
[12084-14]

12084 1J **X-ray and visible spectra circular motion images dataset** [12084-42]

12084 1K **Improvement of measurement reduction of tomographic images using non-negativity of brightness** [12084-18]

12084 1L **TomoSLAM: factor graph optimization for rotation angle refinement in microtomography**
[12084-46]

SESSION 5 BIG DATA

12084 1M **A new approach for integrating data into big data warehouse** [12084-28]

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Introduction

Meanwhile we all are aware that we experience currently a very special period. But we are sure that most of the people have not expected that this time of drastic restrictions will last so long. All private, social, economic, cultural, and academic areas are negatively influenced. But for a certain time it was totally underestimated how strong this pandemic will disturb the international scientific cooperation. We all miss our personal meetings with lively discussions and active knowledge transfer which are of invaluable value for the progress of the sciences. Last year we finished my preface with the hope that we will meet in November 2021 in Rome onsite and not again in another virtual room. Unfortunately, this outlook was obviously too optimistic. Consequently, we organized another virtual conference from which we report in these proceedings.

If we consider all the challenges that such a more or less anonymous event causes, then we can still conclude that the 14th ICMV was a successful event again. More than 80 participants took actively part on the eleven sessions across the four conference days. We started again with three invited lectures given by recognized international experts in machine vision.

Dr. Ferraro from the Institute of Applied Sciences & Intelligent Systems in Naples reported about, "*Learning strategies for the recognition and classification of micro-objects through holographic footprints*". In his talk he discussed the impressive advantages of digital holographic microscopes for the identification of single biological cells and microplastics pollutions in water. The second invited talk was given by Dr. Vittorio Murino from the University of Verona, Italy. In his talk entitled with, "*Multimodal scene understanding leveraging acoustic images*" he emphasized the advantage of a multimodal approach for feature recognition in acoustic images. Finally, Dr. Konstantin Bulatov from the Russian Academy of Sciences reported in his invited talk, "*Anytime algorithms of machine vision*" about a class of algorithms that can return a valid solution to a problem even if the event is interrupted before it ends. The algorithm is expected to find better and better solutions the longer it keeps running. Some examples from OCR and computed tomography illustrated the benefit of that approach for machine vision.

The conference continued with eighteen contributed papers presented in five special sessions:

- Camera Based and Mobile Recognition (organized and chaired by Prof. Vladimir Arlazarov from Federal Research Center "Computer Science and Control" of the Russian Academy of Sciences) with six presentations,
- Advanced Imaging and Tomography (organized and chaired by Prof. Alessia Cedola from The Sapienza University of Rome, Rome unit Nanotec CNR, Italy) with six presentations,
- Machine Vision for Autonomous Driven Cars under Harsh Environmental

- Conditions (chaired by Prof. Wolfgang Osten, University Stuttgart, Germany) with six presentations,
- New methods and applications for multimedia security (organized and chaired by Prof. Andrey Kuznetsov from the Samara National Research University, Russian Federation) with six presentations, and
 - Computer Optics Journal (chaired by Prof. Artem Nikonov from the Samara University, Russian Federation) with four presentations.

Afterwards five technical sessions with thirty-four presentations completed the program that ended with an award ceremony for the best papers in all sessions that were selected by the respective chairs.

What we would like to highlight also for this 14th conference has an extremely international character of participants. Scientists from all over the world came together again to present and discuss their latest findings in computer vision for an interested audience.

These proceedings are a collection of fifty-seven papers that were presented at the conference. For the structure of that volume, we used a more simplified classification into five topics:

- 1 – Machine Vision Principles and Methods,
- 2 – Machine Vision Applications,
- 3 – Machine Learning,
- 4 – Computational Imaging, and
- 5 – Big Data

We hope that the reader gets this way a good impression about the wide diversity of new approaches and applications in machine vision. In fact, machine vision is not a very young but nevertheless an emerging field. Many aspects of the digitization and AI hype such as the Internet of Things (IoT), the digital factory, universal public safety, machine learning, deep learning, computer vision, computational imaging, active vision, robotics, and autonomous vehicles are affected by new technologies that are actually developed and implemented in this field. Therefore, we look ahead with great interest to the 15th International Conference on Machine Vision which will hopefully take place onsite in Rome in the autumn 2022.

Our deep thanks goes again to Prof. Alessia Cedola as local chair with the hope that she is ready to organize the meeting next year onsite in Rome. Until then, the articles in this volume will hopefully find a grateful audience and will be a source of new inspiration. But actually our thanks go to all participants of the 14th conference and especially to the organizers.

Wolfgang Osten
Dmitry Nikolaev
Johan Debayle