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Wolfgang Osten
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Introduction

There are some signs that this time of uncertainty and less welcome restrictions will come to an end. During the past two years we have learned that there are alternative ways to organize a scientific conference: with personal appearance and direct discussion, fully separated and only virtually connected by the Internet, and a mixture of both. After two years of all virtual conferences, this year we made the first step towards a traditional and most effective scientific meeting by taking the chance to offer a hybrid conference, where the participants could decide between remote access and onsite participation. And is there a better place for an inspiring conference than the eternal city Rome. Three days filled with new findings, interesting discussions, and unforgettable encounters made the Fifteenth International Conference on Machine Vision another successful event.

There were 86 participants (38 online and 48 onsite) that took part in the 12 sessions across the 3 conference days. We started again with 3 keynote lectures and one invited talk, all given by recognized international experts in machine vision. Prof. Zhang from the State University of New York reported online about Learning with Knowledge Distillation. Dr. Ferraro from the Institute of Applied Sciences & Intelligent Systems in Naples informed the audience about the latest research of his famous group in the field of Tomographic Flow Cytometry by Digital Holography. "Learning strategies for the recognition and classification of micro-objects through holographic footprints". In his talk he showed in a very impressive way the potential of 3D visualization and quantification of cells by the fusion of both techniques. One high point of the keynote session was presented then by Prof. Ahlers, founder of ProxyVision. In his mix of a historic review and future outlook, he discussed the paradigm shift in image processing and machine vision. Several application domains such as automotive and aerospace were addressed. The final invited talk was given by Dr. Elandaloussi, founder of Syperion, and was about several aspects of automation by visual sensing in open cast mining. It was reported on the advantages of point cloud transformation of rough distance data for complex information processing with respect to the derivation of relevant landscape data for the mining procedure.

The conference was continued with fourteen contributed papers presented in 2 special sessions:

- Machine Vision for Autonomous Vehicles (chaired by Prof. Wolfgang Osten) with 7 presentations,
- Machine Vision based Stress, Cognition, and Emotion Sensing in Driver/Occupant Monitoring Systems (chaired by Prof. Peter Corcoran) also with seven presentations.

Afterwards 8 technical sessions with 57 papers completed the program that ended with an award ceremony for the best papers given in all sessions. Eight awardees could be recognized for their outstanding presentations.
that were selected by the respective chairs.

What we would like to highlight also for this Fifteenth International Conference on Machine Vision the participation of scientists from all over the world. Especially many young researchers from developing countries came together and contributed to the very special international flair of that conference.

These proceedings are a collection of 66 papers that were presented at the conference. For the structure of that volume, we used the following classification into 8 topics:

1 – Target Detection and Tracking with 9 papers,
2 – Image Segmentation with 6 papers,
3 – Image Recognition and Modeling with 9 papers,
4 – Intelligent Image Detection and Application with 11 papers,
5 – Digital Image Analysis and Methods with 8 papers,
6 – Computer Vision and Computer Aided Imaging with 11 papers,
7 – Image Classification and Encryption with 5 papers,
8 – Image and Signal Analysis with 7 papers.

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 Artificial Intelligence 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 developed and implemented in this field.

Therefore, we look ahead with great interest to the 16th International Conference on Machine Vision which will take place as hybrid event again in the autumn of 2023, in Yerevan, Armenia. Until then, the collection of articles presented in this volume will hopefully find an interested audience and will be a source of new inspirations for future innovations and findings.

Our thanks go to all participants of the Fifteenth International Conference on Machine Vision, and especially to the organizing committee group, who did a great job to ensure a wonderful hybrid event in Rome.

Wolfgang Osten
Dmitry Nikolaev
Jianhong Zhou