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Wolfgang Osten
Dmitry Nikolaev
Jianhong Zhou
Editors

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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 Nikonorov 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 leaning, 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