IEEE Transactions on Evolutionary Computation
Special Issue on Evolutionary Computer Vision

I. AIM AND SCOPE

Evolutionary computer vision (ECV) is at the intersection of two major research fields of artificial intelligence: computer vision and evolutionary computation. This special issue aims to provide an overview of state-of-the-art contributions to the latest research and development in the discipline. Computer vision includes methods for acquiring, processing, analyzing, and understanding images. The aim is to design computational models of human and animal perception. ECV is an interdisciplinary research area where analytical methods combined with powerful stochastic optimization and meta-heuristic approaches produce human-competitive results. From an engineering standpoint, ECV aims to design software and hardware solutions useful for solving challenging computer vision problems. From a scientific viewpoint, the goal is to enhance our current understanding of visual processing in nature and replicate this within a seeing machine. ECV is a well-established research discipline as evolutionary algorithms are more efficient than classical optimization approaches for the discontinuous, non-differentiable, multimodal, and noisy search, optimization, and learning problems arising in many computer vision tasks. Evolutionary algorithms have also demonstrated their ability as robust approaches to cope with the fundamental steps of image processing, image analysis, and computer vision pipeline (e.g., restoration, segmentation, registration, classification, reconstruction, or tracking).

We are particularly interested in submissions that present methods, software, hardware, and data collections that stand against state-of-the-art computer vision, machine learning, deep learning, and other approaches. Availability of code, software, and data in an open-source format is strongly encouraged as this promotes the natural advancement of the discipline, although it is not formally required. They must be well documented and made available for public download or in exceptional cases (like real-world problems) upon request.

II. TOPICS

We welcome submissions on the following topics related to new theories and evolutionary computation methods for early visual processing, intermediate visual processing, and high-level vision. Next, a non-exhaustive list of topics:

- Image restoration and noise reduction;
- Image classification, segmentation and clustering;
- Feature selection, extraction, and learning;
- Interest point and edge detection and description;
- Matching and registration;
- 3D reconstruction of real-world scenarios;
- Automatic design of algorithms for visual attention;
- Object detection and tracking;
- Face detection and recognition;
- Evolutionary robot vision;
- Sensor planning and camera placement;
- Video and motion analysis;
- Content-based image retrieval;
- Medical imaging, Earth sciences and other areas.

ECV includes evolutionary algorithms for image processing and analysis, machine vision, robotics, pattern recognition, cognitive computation, and machine learning. The methodologies comprise genetic programming, genetic algorithms, evolutionary strategies, evolutionary programming, and swarm intelligence. This special issue also looks for multi-objective optimization, evolutionary learning, coevolution, and cross-fertilization with other soft computing techniques like neural networks and fuzzy logic.

This special issue looks for submissions that discuss the swarm and evolutionary algorithm's role in the existing computer vision landscape; this includes adapting the proposed methodologies with other existing software and the challenges in implementing these systems using GPUs and grid/cloud/parallel computing technologies. The special issue's scope includes works on automated design and benchmark methods to analyze problem characteristics or any other algorithm design component to alleviate the computational burden while considering real-time applications. We also welcome submissions that propose comparisons between evolutionary-based heuristics, hand-made designs, and other optimization techniques for challenging real-world image processing, image analysis, or computer vision applications.

Papers that focus on technical aspects such as descriptions of software architectures or user manuals will not be considered. Instead, the submission shall focus on the proposed method, data collection, or software/hardware made towards swarm and evolutionary algorithms applied to image processing, image analysis, and computer vision.

III. SUBMISSION

Manuscripts should be prepared according to the Information for Authors section of the journal found at https://cis.ieee.org/publications/t-evolutionary-computation/tevc-information-for-authors, and submissions should be made through the journal submission website at https://mc.manuscriptcentral.com/tevc-ieee, selecting the Manuscript Type ECV Special Issue Papers and adding Evolutionary Computer Vision to the Editor-in-Chief comments. Submission of a manuscript implies that the author's original and unpublished work is not submitted for possible publication elsewhere.

IV. IMPORTANT DATES

Submission opens: February 1, 2022
Submission deadline: June 30, 2022
First review notification: September 30, 2022
Revision due: November 30, 2022
Final acceptance notification to authors: January 31, 2023

V. GUEST EDITORS

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