



**INVITED SESSION SUMMARY**

**Title of Session:**

Computational learning theory and advances from Heuristics to Hyperheuristics:  
new trends and applications in hard optimization and constraint reasoning

**Name, Title and Affiliation of Chair:**

Dr. Hajer Ben Othman, ENSI, University of Manouba, Tunisia  
Dr. Moez Hammami, ISGT, University of Tunis, Tunisia  
Pr. Sadok Bouamama, HCT, UAE and ENSI, University of Manouba, Tunisia

**Details of Session (including aim and scope):**

The enormous computational cost thwarts the application of an exhaustive search for hard optimization problems, which is generally impossible to realize in a bearable time. For these reasons, heuristics and metaheuristics have been widely applied to tackle this problem. However, their application to specific problems requires problem-specific coding and parameter adjusting to produce good results. Hyperheuristics are new optimization approaches with a higher abstraction level than metaheuristics. The strength of hyperheuristics is that they perform on a search space of low-level problem-specific heuristics rather than directly on the search space of solutions, as is the case with metaheuristic approaches. Hyperheuristics uses machine learning techniques to decide when and where to apply every low-level heuristic. Then, hyperheuristics could be more accessible to adapt to any specific optimization problem. Moreover, graph theory, machine learning, and social behavior could inspire the latter. Nowadays, this branch of artificial intelligence that deals with designing and analyzing new algorithms to infer and/or discover and/or learn patterns to solve problems based on sample data is called computational learning theory. This special session focuses on but is not limited to, new works showing original computational algorithms and proving their efficiency on well-known problems.

This special session is mainly expected to invite recent original research on the following topics:

- Genetic algorithms
- Particle swarm
- Honey bee optimization
- Ant colony
- Mimetic algorithms
- Firework algorithms
- cockroach algorithms
- Local search
- Distributed hyperheuristics
- Distributed metaheuristics
- Parallel metaheuristics
- Parallel hyperheuristics
- Constraint reasoning
- New heuristics
- New metaheuristics
- New hyperheuristics
- Machine learning
- Graph theory-inspired solutions
- Computational learning theory application for real-life problems

**Main Contributing Researchers / Research Centres (tentative, if known at this stage):**

- Hajer BEN OTHMAN, ENSI, University of Manouba, Tunisia
- Hamza GHARSELLAOUI, ENSI, University of Manouba, Tunisia
- Khaoula BOUAZZI, CRISTAL, University of Lille, France
- Sadok BOUAMAMA, ENSI, University of Manouba, Tunisia
- Maurice CLERC, Independent Consultant, France
- Russell EBERHART, Purdue School of Engineering and Technology, Indianapolis, USA

- David E. GOLDBERG, University of Illinois Urbana-Champaign, Illinois, USA
- Moez HAMMAMI, ISG Tunis, University of Tunis, Tunisia
- James KENNEDY, US Bureau of Labor Statistics, Washington DC, USA
- Ouajdi KORBAA, ISIT'COM, University of Sousse, Tunisia
- Patrick SIARRY, University of Paris 12, France
- Moncef TAGINA, ENSI, University of Manouba, Tunisia
- Elgazali TALBI, INRIA DOLPHIN, Polytech'Lille, University of Lille 1, France

**Website URL of Call for Papers (if any):**

<http://kes2025.kesinternational.org/cmsISdisplay.php>

**Email & Contact Details:**

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