Invited Speaker BRACIS
Gabriela Ochoa (University of Stirling)

Short Bio:

Gabriela Ochoa is a Professor of Computing Science at the University of Stirling in Scotland. Her research lies in the foundations and applications of evolutionary algorithms and metaheuristics, with emphasis on autonomous search, fitness landscape analysis and visualization, and combinatorial optimization. She holds a PhD from the University of Sussex, UK, and has held academic and research positions at the University Simon Bolivar, Venezuela, and the University of Nottingham, UK. Her recent work on network-based models of fitness landscapes has enhanced their descriptive and visualization capabilities, producing a number of publications including 4 best-paper awards and 4 other nominations at leading venues. She collaborates cross-disciplines in the use of evolutionary algorithms to healthcare and conservation. She has been active in organization and editorial roles within leading Evolutionary Computation conferences such as the Genetic and Evolutionary Computation Conference (GECCO), Parallel Problem Solving from Nature (PPSN), and Journals such as IEEE Transactions on Evolutionary Computation, Evolutionary Computation, and ACM Transactions on Evolutionary Learning and Optimization (TELO). She is a member of the ACM SIGEVO executive board and was recognized in 2020 In EvoSTAR for her outstanding contributions to the field.

Title:
Complex Networks in Search and Optimization

Date/Hour:
December 3, 2021 – 10:00 (Timezone: GMT – 3)

Abstract:
This talk will present our recent findings and visual (static, animated, 2D and 3D) maps characterizing computational search spaces. Many natural and technological systems are composed of a large number of highly interconnected units; examples are neural networks, biological systems, social interacting species, the Internet and the World Wide Web. A key approach to capture the global properties of such systems is to model them as graphs whose nodes represent the units, and whose links stand for the interactions between them. This simple, yet powerful concept has been used to study a variety of complex systems where the goal is to analyze the pattern of connections between components in order to understand the behavior of the system.

This talk overviews recent results on local optima networks (LONs), a network-based model of fitness landscapes where nodes are local optima and edges are possible search transitions among these optima. We will also introduce search trajectory networks (STNs) as a tool to analyze and visualize the behavior of metaheuristics. STNs model the search trajectories of algorithms. Unlike LONs, nodes are not restricted to local optima but instead represent given states of the search process. Edges represent search progression between consecutive states. This extends the power and applicability of network-based models. Both LONs and STNs allow us to visualize realistic search spaces in ways not previously possible and bring a whole new set of quantitative network metrics for characterizing and understanding computational search.