Unveiling the properties of structured grammatical evolution

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Resumen:

Structured grammatical evolution (SGE) is a new genotypic representation for grammatical evolution (GE). It comprises a hierarchical organization of the genes, where each locus is explicitly linked to a non-terminal of the grammar being used. This one-to-one correspondence ensures that the modification of a gene does not affect the derivation options of other non-terminals. We present a comprehensive set of optimization results obtained with problems from three different categories: symbolic regression, path finding, and predictive modeling. In most of the situations SGE outperforms standard GE, confirming the effectiveness of the new representation. To understand the reasons for SGE enhanced performance, we scrutinize its main features. We rely on a set of static measures to model the interactions between the representation and variation operators and assess how they influence the interplay between the genotype-phenotype spaces. The study reveals that the structured organization of SGE promotes an increased locality and is less redundant than standard GE, thus fostering an effective exploration of the search space

Sobre Nuno Lourenço:

Nuno Lourenço is an Assistant Professor (non-Tenure) at the University of Coimbra, where he obtained is PhD in Information Science and Technology in 2016. He has been with the Centre for Informatics and Systems of University of Coimbra (CISUC) since 2009, as member of the Evolutionary and Complex Systems (ECOS) group. His main research interests are in the areas Bio-Inspired Algorithms, Optimisation and Machine Learning. He was appointed as a Senior Research Officer at the University of Essex in United Kingdom, where we worked in the development of a smart solution to improve the everyday commutes of people in the Essex County. He has authored or co-authored several articles in journals and top conferences from the Evolutionary Computation and Artificial Intelligence areas. He has been involved as a researcher in many national and international projects.