A Neutral Mutation Operator in Grammatical Evolution

ID 2814635
Author(s) Oesch, Christian; Maringer, Dietmar
Author(s) at UniBasel Maringer, Dietmar ; Oesch, Christian ;
Year 2015
Title A Neutral Mutation Operator in Grammatical Evolution
Editor(s) Angelov, P.; Atanassov, K. T.; Doukovska, L.; Hadjiski, M.; Jotsov, V.; Kacprzyk, J.; Kasabov, N.; Sotirov, S.; Szmidt, E.; Zadrożny, S.
Book title Intelligent System'2014
Volume 322
Publisher Springer International Publishing
Place of publication Cham, Heidelberg, New York, Dordrecht, London
Pages 439-449
ISSN/ISBN 978-3-319-11312-8 ; 978-3-319-11313-5
Series title Advances in Intelligent Systems and Computing
Number 322
In this paper we propose a Neutral Mutation Operator (NMO) for Grammatical Evolution (GE). This novel operator is inspired by GE's ability to create genetic diversity without causing changes in the phenotype. Neutral mutation happens naturally in the algorithm; however, forcing such changes increases success rates in symbolic regression problems profoundly with very low additional CPU and memory cost. By exploiting the genotype-phenotype mapping, this additional mutation operator allows the algorithm to explore the search space more efficiently by keeping constant genetic diversity in the population which increases the mutation potential. The NMO can be applied in combination with any other genetic operator or even different search algorithms (e.g. Differential Evolution or Particle Swarm Optimization) for GE and works especially well in small populations and larger problems.

Digital Object Identifier DOI 10.1007/978-3-319-11313-5_39
ISI-number WOS:000360172200039