Journal of Automata, Languages and Combinatorics **26** (2021) 1–2, 109 – 124

NON-PRESERVING ACCEPTING SPLICING SYSTEMS

Victor Mitrana[(A)] Andrei Păun[(B)] Mihaela Păun[(C)]
José Ángel Sánchez Martín[(A)]

[(A)] *Department of Information Systems, Universidad Politécnica de Madrid, Crta. de Valencia km. 7 – 28031 Madrid, Spain*
`victor.mitrana@upm.es` `joseangel.sanchez.martin@alumnos.upm.es`

[(B)] *Faculty of Mathematics and Computer Science, University of Bucharest, Str. Academiei 14, 010014 Bucharest, Romania*
`apaun@fmi.unibuc.ro`

[(C)] *National Institute for Research and Development of Biological Sciences, Independentei Bd. 296, 060031 Bucharest, Romania*
`mihaela.paun@gmail.com`

ABSTRACT

We define a variant of accepting splicing system such that the history preserving property is dropped, namely every new generation of strings is obtained by applying splicing to the set of strings of the previous generation altogether with a predefined finite set of axioms. The condition for halting the computation is defined by a finite set of strings. The computation halts, and the input string is accepted, as soon as a string in the halting set is obtained. We present here simulations of two computationally complete models: 2-tag systems and Turing machines, both deterministic and nondeterministic. Although all these models are computationally complete and can be simulated by each other, we are interested to investigate the computational as well as descriptional complexity of our direct simulations.

Keywords: non-preserving splicing, accepting splicing system, 2-tag system, Turing machine

1. Introduction

Although not so frequent as RNA splicing, DNA may also be recombined under the influence of restriction enzymes and ligases. This phenomenon, which is called DNA *splicing*, is used in genetic engineering for several purposes: to allow simple organisms to produce different useful compounds (hormones, hydrocarbon fuels, etc.), to genetically modify plants for making them more resistant, to obtain better adapted organisms, etc. Two organic compounds, called *enzymes*, are used in the recombination of DNA sequences. Some enzymes are used to cut the DNA molecule at specific

Work supported by a grant of the Romanian National Authority for Scientific Research and Innovation, project number POC P-37-257.