

Bounded-Addition Fuzzy Simple Splicing Systems

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Abstract

A splicing system is one of the early theoretical models for DNA computing. In a splicing system, two strings of DNA molecules are cut at the specific recognition sites and the prefix of the first string is attached to the suffix of the second string, and vice versa, thus yielding the new strings. For a specific type of splicing system namely the simple splicing systems, the recognition sites are the same for both strings of DNA molecules. It is known that splicing systems with finite sets of axioms and splicing rules only generate regular languages. Hence, different types of restrictions have been considered for splicing systems in order to increase their generative power. Recently, fuzzy splicing systems have been introduced where truth values (i.e., the fuzzy membership values) from the closed interval $[0, 1]$ are assigned to the axioms of splicing systems. Then, the truth values of every generated string z from strings x and y using a fuzzy bounded-addition operation over their truth values is calculated. In this paper, some properties of bounded-addition fuzzy simple splicing systems are investigated. It can be proven that fuzzy simple splicing systems with bounded addition operation can increase the generative power of the splicing languages generated.

Keywords: Formal Language Theory, Fuzzy Splicing System, Restriction, Bounded-Addition, Simple Splicing System