Abstract

In a way to minimize the gap between digital computing and DNA computing, it is needed to transfer DNA between the two fields, and to make use of the two technologies in generating ideas of data integrity and information security. One of the critical problems in amino acid analysis is how to establish a digital coding system to better reflect the properties of amino acids and their degeneracy. This paper introduces a method to convert digital data to the form of DNA and then to the form of amino acids using the natural RNA codons distribution on the 20 natural amino acids which preserves their biological properties. The Decoding method also convert the amino acids to a digital form. The method solves the problem of ambiguity that more than one codon correspond to the same amino acid. Applicability and reversibility of the method is proven and successfully implemented.

The presented encoding method can serve in DNA computers and biological experiments by representing data in the form of amino acids. This mainly aims at increasing the flexibility of converting data between biological medium and digital medium. Although it does not include the
use of secret key but it can also be used as an auxiliary factor in cryptographic and steganographic applications like data integrity and digital signature.

References


Index Terms

Computer Science

Security

Keywords

Amino acids; binary data; digital encoding; DNA; RNA; cryptography; secret writing; Ambiguity
steganography; biological simulation.