

Special identity subgraph in genetic code

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Abstract

The genetic code is a series of codons that stores genetic information about protein molecule formation. The identity graph of a group G is a graph in which the vertex set is the set of all elements of the group and two vertices in G are adjacent if $a \cdot b = e$, where e is the group's identity element. Let H be a subgroup of G then the identity graph drawn for the subgroup H is known as the identity special subgraph of G (special identity subgraph of G). In this study, we looked at the special identity graph in the genetic code algebra. Different measures of centrality have been thoroughly discussed in our current study. Aside from this investigation, research is being conducted on the correlation coefficients between different measures of centrality, as well as the clustering coefficient, degree of distribution, and skewness.

Keywords amino acid; centrality measure; correlation coefficient; clustering coefficient; degree of distribution; genetic code; identity subgraph.

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1 Introduction

Biological science is one of the important areas in which mathematics have been successfully applied for long time. This area may be referred as mathematical biology or biomathematics. Various mathematical formulae and method of working are used in biology. Genetics is one of the important branches of biology. Every organism is constituted by the cells. Chromosomes can be thought of as being made up of strings of genes. The DNA is found in the cells of all living organisms and is situated in the nucleus, organized into chromosomes. Other than the nucleus, a very small amount of DNA is also found in the mitochondria. The genetic code is the set of rules that guide the translation of DNA into 20 amino acids, which constitute the fundamental units of protein in living cells (Fig. 1). A codon is a sequence of three bases of DNA from the 4 bases: Adenine (A), Cytosine (C), Guanine (G), and Thymine (T) which specifies one amino acid. As there are four bases so we have total 64 codons. The codons UAA , UGA , UAG signal the end of the polypeptide chain during translation which are known as stop codons. The codon AUG initiates the translation process which is known as start codon. Mathematically, for a sequence of DNA, four letters: A ,

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