Polinomial karakteristik dan nilai eigen dari beberapa matriks representasi graf matahari berarah siklik = The characteristic polynomials and the eigenvalues of several matrix representation of directed cyclic sun graph

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Abstrak

Suatu graf berarah dapat direpresentasikan dengan beberapa matriks representasi, seperti matriks adjacency, anti-adjacency, in-degree laplacian, dan out-degree aplacian. Dalam paper ini dibahas polinomial karakteristik dan nilai-nilai eigen dari matriks adjacency, anti-adjacency in-degree laplacian, dan out-degree Laplacian graf matahari berarah siklik. Bentuk umum polinomial karakteristik dari matriks adjacency graf matahari berarah siklik dapat diperoleh dengan menghitung jumlah nilai determinan matriks adjacency subgraf terinduksi siklik dari graf tersebut. Kemudian polinomial karakteristik dari matriks anti-adjacency dapat dicari dengan menghitung jumlah nilai determinan matriks anti-adjacency subgraf terinduksi siklik dan subgraf terinduksi asiklik dari graf matahari berarah siklik. Selanjutnya bentuk umum polinomial karakteristik dari matriks in-degree Laplacian dan out-degree Laplacian dicari dengan menggunakan ekspansi kofaktor matriks-matriks tersebut. Nilai-nilai eigen dari matriks adjacency, matriks anti-adjacency, matriks in-degree Laplacian dan matriks out-degree Laplacian dapat berupa bilangan riil dan bilangan kompleks yang dapat dicari dengan pemfaktoran polinomial karakteristik dengan menggunakan metode Horner ataupun dengan menggunakan bentuk eksponensial dari bilangan kompleks.
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A directed graph can be represented by several matrix representations, such as adjacency matrix, anti-adjacency matrix, in-degree Laplacian matrix, and out-degree Laplacian matrix. In this paper we discuss the general form of characteristic polynomials and eigenvalues of adjacency matrix, anti-adjacency matrix, in-degree Laplacian matrix, and out-degree Laplacian of directed cyclic sun graph. The general form of the characteristic polynomials of adjacency matrix can be found out by counting the sum of the determinant of adjacency matrix of directed cyclic induced subgraphs from directed cyclic sun graph. Furthermore, the general form of the characteristic polynomials of anti-adjacency matrix can be found out by counting the sum of the determinant of anti-adjacency matrix of the directed cyclic induced subgraphs and the directed acyclic induced subgraphs from directed cyclic sun graph. Moreover, the general form of the characteristic polynomials of in-degree Laplacian and out-degree Laplacian matrix can be found by using the cofactor expansion of those matrices. The eigenvalues of the adjacency, anti-adjacency, in-degree Laplacian, and out-degree Laplacian can be real or complex numbers, which can be figured out by factoring the characteristic polynomials using horner method or the exponential form of the complex numbers.