

THE R -MATRIX COMPLETION PROBLEM

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Abstract: Matrix completion problem (MCP) is a very well-established process of rebuilding a matrix's unknown elements. A $m \times m$ matrix B is a R -matrix if for every $r = 1, 2, \dots, m$, the sum of all $r \times r$ principal minors of B is negative. A digraph D possesses R -completion if it is possible to complete any partial R -matrix that defines D to a R -matrix. In this article we have examined the R -matrix completion problem. Here some necessary as well as some sufficient conditions for a digraph to have the R -completion are discussed. In addition, the digraphs of order up to four that possesses R -completion have been categorized. Finally, a comparative discussion between R -matrix completion and N -matrix completion is provided.

Keywords and Phrases: Partial matrix, R -matrix, Matrix completion, Digraph.

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1. Introduction

In Matrix completion problem the missing elements of a partially observed matrix are estimated or filled in. This problem arises in various fields such as machine learning, statistics, signal processing and different allied areas. The goal of MCP is to predict the missing values in the matrix based on the observed entries and certain assumptions about the underlying structure of the data.

MCPs are studied for numerous varieties of matrices, but the utmost significant class of matrices is positive definite (PD) matrices. In 1984 Burg initiated