

# The Symmetric Arctic Rank of Boolean Matrices and the Clique Covering Content of Graphs

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Let  $G$  be a simple undirected graph on  $n$  vertices and let  $A = A(G)$  be the (Boolean)  $(0, 1)$  adjacency matrix of  $G$ . Let  $\rho_{sa}(A)$  be the minimum  $|B|$  over all possible factorizations of  $A$  of the form  $BB^t$  for some (Boolean)  $n \times k$   $(0, 1)$  matrix  $B$  and some  $k$  where  $|B|$  denotes the number of nonzero entries in  $B$ . This function,  $\rho_{sa}(A)$ , is called the *symmetric arctic rank* of  $A$ . Let  $\mathcal{C}(G)$  denote the set of all clique covers of  $G$ , and let  $\mathbb{C}(G)$  be the minimum over  $\mathcal{C}(G)$  of sum of the orders of the cliques composing the clique cover. This function,  $\mathbb{C}(G)$ , is called the *clique cover content* of  $G$ . It is shown that  $\mathbb{C}(G) = \rho_{sa}(A(G))$  and some properties and problems are presented.