MAX-ROW-Consecutive-Ones-Property

Algorithms in Comparative Genomics

Definition (C1P). A matrix (or sub-matrix) has the *Consecutive Ones Property (C1P)* if its columns can be ordered such that in each row, the 1 entries are consecutive (there is no 0 entry between two 1 entries).

Definition (Ci1P). A matrix (or sub-matrix) has the *Circular Ones Property (Ci1P)* if its columns can be ordered such that in each row, either the 1 entries are consecutive (there is no 0 entry between two 1 entries), or the 0 entries are consecutive (there is no 1 entry between two 0 entries); in other words the 1 entries are consecutive when the order of columns is viewed as a circle.

Definition (component-Ci1P). A matrix is *component-Ci1P* if its columns can be partitioned such that a row has 1s only in one part and each part is Ci1P.

MAX-ROW-component-Ci1P [1]. Given a matrix with weighted rows, find a subset of rows of maximum cumulative weight such that the obtained sub-matrix is component-Ci1P. If each row contains exactly two ones, this is possible in polynomial time.

Note. In [1], each column is assigned a maximum cardinality m which we here set to one and thus omit.
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References

[1] J. Maňuch, M. Patterson, R. Wittler, C. Chauve, and E. Tannier. Linearization of ancestral multichromosomal genomes. *BMC bioinformatics*, 13(19):S11, 2012.