

專題演講

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題目： Computational Synthetic Biology, Group Testing, and Hamiltonian Cycles.

摘要：

Motivated by applications in synthetic biology, we show how to construct large collections of orthogonal de Bruijn sequences. In particular, we prove that there are at least $s/2$ mutually-orthogonal order- k de Bruijn sequences on alphabets of size s for all k . Based on this approach, we present a heuristic which proves capable of efficiently constructing optimal collections of mutually-orthogonal sequences for small values of s and k , which supports our conjecture that $s - 1$ mutually-orthogonal de Bruijn sequences exist for all s and k .

The second part of the talk, we discuss approaches to identify the locations of critical DNA or RNA sequence signals which couples large-scale synthesis with sophisticated designs employing combinatorial group testing and balanced Gray codes. The kernel construction of these synthetic sequence design is related to the construction of 2-consecutive group test design is related to the the middle levels (Revolving Door) conjecture. It is conjectured that there is always a Hamilton cycle in the middle levels of the Hasse diagram of partially-ordered set of subsets of a k -set.