Title: Centralized coded caching schemes and piggyback codes
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Abstract: The theory of networking coding has deep influence in many aspects of modern information science. In this talk, we will introduce two important applications of network coding in wireless network communication and distributed storage systems, namely, centralized coded caching schemes and piggyback codes.

The centralized coded caching scheme is a technique proposed by Maddah-Ali and Niesen as a solution to reducing the network burden in peak times in a wireless network system. Recently, Yan, Cheng, Tang and Chen reformulate the problem as designing a corresponding placement delivery array. Surprisingly, we find that this problem can be reviewed in a hypergraph perspective. We show that designing a feasible placement delivery array is equivalent to constructing a linear and (6, 3)-free 3-uniform 3-partite hypergraph. Several new results and constructions arise from our novel point of view.

Distributed storage system has attracted a lot of attentions in the last decades, due to its high reliability and efficiency in the data storage. The piggyback code is introduced by Rashmi, Shah and Ramchandran to reduce the repair complexity and bandwidth in the repair of a failed node of a distributed storage system. Rashmi, Shah and Ramchandran also construct a piggyback code which can reconstruct every failed systematic node as quickly as an MDS code does and only has an average repair bandwidth rate $\frac{r-1}{2r-1}$. In this talk, we will present a new construction which reduces the rate from $\frac{r-1}{2r-1}$ to $\frac{\sqrt{2r-1}}{r}$.