Integer Programming for Finding Maximum Quasi-Cliques and Dense Subgraphs

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Abstract. Given a simple graph and a constant gamma, a gamma-quasi-clique is defined as a subset of vertices that induces a subgraph with an edge density of at least gamma. This well-known clique relaxation model arises in a variety of application domains. The maximum gamma-quasi-clique problem is to find a gamma-quasi-clique of maximum cardinality in the graph and is known to be NP-hard. This talk discusses mixed integer programming formulations for solving the maximum gamma-quasi-clique problem. The corresponding linear programming relaxations are also analyzed. Finally, we also consider generalizations for solving the maximum f-dense subgraph problem, which, for a given function f seeks for the largest k such that there is a subgraph induced by k vertices with at least f (k) edges.