Forbidden Configurations and Forbidden Families

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For a graph G, the extremal number $ex(n, G)$ is defined to be the maximum number of edges an n vertex graph can have without containing G as a subgraph. There exists a natural extension of this function to the problem of avoiding hypergraphs.

We will say that a matrix A is simple if it is a (0,1)-matrix with no repeated columns (i.e. it is the incidence matrix of a simple hypergraph). Given a (0,1)-matrix F, we say that a matrix A has F as a configuration, denoted $F \prec A$, if there is a submatrix of A which is a row and column permutation of F. We define $\mathrm{forb}(m, F)$ to be the maximum number of columns an m-rowed simple matrix that does not contain F as a configuration can have. More generally, we define $\mathrm{forb}(m, \mathcal{F})$ for $\mathcal{F}$ a set of matrices to be the maximum number of columns an m-rowed simple matrix that avoids every matrix of $\mathcal{F}$ can have.

In this paper we compute asymptotic values for $\mathrm{forb}(m, \{F, G\})$ when F and G are minimal quadratic or minimal cubic configurations.

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