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Triple intersection numbers of metric and cometric association schemes

An association scheme is called *metric*
if its intersection numbers satisfy the triangle inequality,
i.e., $p_{ij}^h \neq 0$ implies $|i-j| \leq h \leq i+j$
for some ordering of its relations.
Dually, an association scheme is called *cometric*
if its Krein parameters satisfy the triangle inequality
for some ordering of its eigenspaces.
Metric association schemes correspond precisely to distance-regular graphs,
and their parameters can be derived from a subset of the intersection numbers
which are usually written as the *intersection array*.
Similarly, the parameters of a cometric association scheme
can be computed from the *Krein array*.

A package for the Sage computer algebra system has been developed
for checking feasibility of a given intersection array
for a distance-regular graph.
It has been used to compute triple intersection numbers
for certain feasible intersection arrays,
from which nonexistence of the corresponding graphs has been then shown.

Recently, Williford [1] has published a list of feasible Krein arrays
for primitive 3-class cometric association scheme on up to 2800 vertices.
Gavrilyuk has suggested that the above mentioned software
be used to compute triple intersection numbers for the open cases in the list.
We have been able to use these computations to rule out several open cases.

This is joint work with Alexander Gavrilyuk.

[1] J. S. Williford. Primitive 3-class Q-polynomial association schemes, 2017.

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