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## Hypercubical Set Labellings of Graphs

### Abstract for the Combinatorics Seminar 2013 February 5

I will review some recent work on labellings of the vertex set  $V$  of a graph  $G$  by subsets of a finite set  $X$ . There are many different reasons for and conditions on such labellings. Often, the labelling  $f$  is required to be injective; then it is called a *set valuation* of  $G$ .

The power set of  $X$  can be viewed as a graph, the *hypercube*  $Q$ , in which subsets are adjacent if they differ by one element, i.e.,  $|S \oplus T| = 1$ . ( $\oplus$  denotes symmetric difference.) Then  $f$  is an injection  $V(G) \rightarrow V(Q)$ . The  $G$ -distance  $d_G(u,v)$  can be compared with the  $Q$ -distance  $d_Q(f(u),f(v))$ , and one may require that the ratio of the distances is a constant,  $k$ . Then  $f$  is called a *uniform distance-compatible set labelling* of  $G$  (in India) or a *k-scale embedding* of  $G$  into  $Q$  (in France).

There are a plethora of open problems. In particular, 1-scale hypercube embeddings have been characterized; embeddable graphs are called *partial cubes* and there is quite a literature. 2-scale embeddings are the next most important case and have not been characterized.

This talk is based on a paper "Uniform distance-compatible set-labelings of graphs" by Prof. Sr. K.A. Germina (to appear in JCISS).

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