

## Coloring rational points to forbid given distances

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If  $(X, d)$  is a metric space and  $D$  is a set of positive real numbers, the distance graph  $G(X, D)$  is the graph with vertex set  $X$ , with  $x, y$  adjacent if and only if  $d(x, y)$  is in  $D$ . The  $k$ th Babai number of  $X$ , denoted  $Bk(X)$ , is the maximum chromatic number of  $G(X, D)$  as  $D$  ranges over sets of  $k$  positive real numbers. With  $Q^n$  denoting the set of rational points in  $n$ -dimensional real space, equipped with the usual Euclidean metric, we have that  $B1(Q^2) = 2$  and  $B2(Q^2) = 4 = B1(Q^3)$ , and we have a number of results on coloring  $Q^3$  and  $Q^4$  which, perhaps happily, leave  $B2(Q^3)$  and  $B1(Q^4)$  still undiscovered.