

# Geometry and Combinatorics of a Hamming Space of Sequences in Problems of Parameter Control in Genetic Algorithms

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**Abstract.** Genetic algorithms (GAs) use representations of candidate solutions by linear codes that are elements of a finite vector space (a space of finite length strings from a finite alphabet). We consider the geometry of this space generated by a metric, such as the Hamming metric. In some idealised models, the objective function of an optimisation problem (also called a fitness function) can be related to the distance from some target point. The problem of minimisation of this distance requires some combinatorial analysis, and we derive the formula for the intersection of spheres in a Hamming space. If time allows, we shall also discuss the property of weak monotonicity of the objective function relative to the distance.