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Application of Chase and Escape to Combinatorial Optimization Problems.

Chasing and evading is a mathematical problem which have attracted many mathematical minds in history. For example, one of the earliest problems is to find the path of the chaser who is chasing an evader moving in a circle with a constant speed. The chaser also moves with a constant speed with its velocity vector pointing to the position of the evader. Interests in these problems have grown in various directions, such as "differential game theory" and "discrete search games" . Recently, we have proposed and extended model of chases and escapes in groups, called "Group Chase and Escape".

The main theme of this paper is to propose an idea of applying this chase and escape problem to optimization problems, such as combinatorial optimizations. There are various ways by which we can seek such applications. We here present an approach to identify the states of evaders and chasers with configuration states of the optimization problems. Thus, both evaders and chasers are given associated cost function, which we try to optimize. We perform a chase-and-escape game on the "landscape" of the cost function trying to find the optimized state with the lowest cost.