

Title: A competitive search game with a moving object

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Abstract: We introduce a discrete-time search game, in which two players compete to find an invisible object first. The object moves according to a time-varying Markov chain on finitely many states. The players are active in turns.

We show that this game admits a value, and for any error-term $\epsilon > 0$, each player has a pure (subgame-perfect) ϵ -optimal strategy. Interestingly, a 0-optimal strategy does not always exist. The ϵ -optimal strategies are robust on all finite but sufficiently long horizons, and in the discounted version of the game with a discount factor is close to 1. We derive results on the analytic and structural properties of the value and the ϵ -optimal strategies. Moreover, we examine the performance of the finite truncation strategies, which are easy to calculate and to implement. We devote special attention to the important time-homogeneous case, where additional results hold.