Optimal Strategies in "Locks, Bombs, and Testing" (LBT) Problem for the Case of Independent Protection

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Abstract

This thesis constructs a Defense/Attack resource allocation model. Defenders use "locks" to protect their boxes from Attackers, and Attackers use "bombs" to destroy as many boxes as possible. The first models of such a type were given by E. Borel. Later such models were extensively analyzed at the initial stage of Game Theory development under the general title (Colonel) Blotto game. Previous LBT model focuses on violence patterns produced by attackers with different levels of capacity to see whether rebel capacity influences how rebels fight (the attack timing).

We sought to extend this problem into a situation with an extra setting where rebels can test vulnerability of boxes before placing bombs. In previous problems the goal was to find violence patterns produced by the rebels. Here, we are interested in the optimal strategy of placing bombs. Further, our problem discusses the optimal strategy for defenders to allocate locks even when attackers have already applied their best strategy for placing bombs. After posing the basic problem we then examine several specific cases with dependent and independent, identical and non-identical, locks distribution in valued boxes by using Bayes' Posterior distribution and Monte Carlo simulations.

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