Minimax Approximation and Probability.
Estimating the parameter of a biased coin

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Abstract

The estimation of the parameter of a biased coin from the result of a few tosses is a classical problem in Probability. In this talk, we study this problem, showing an alternative procedure to the classical Maximum Likelihood method. This procedure exhibits a striking resemblance with the solution of a well–known problem in Approximation Theory, namely, the minimization of the Lebesgue function in polynomial interpolation. We use minimax approximation techniques to solve our problem, and the asymptotics of the solutions (optimal estimators) as the number of tosses tends to infinity is shown.

On the other hand, the problem is also framed in the Game Theory by means of a two–player game, for which the Nash–equilibrium is established and the corresponding pair of optimal strategies is studied and completely solved for the particular case of $n = 2$ tosses.

Some numerical experiments are also displayed and further investigations are posed.

This is a joint work with D. Benko (Univ. South Alabama, Mobile, USA), D. Coroian and P. Dragnev (Indiana Purdue Univ., Fort Wayne, USA).