Kelly Gambling, Information Rate, and Bet Hedging in Evolutionary Models

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Abstract: We will critically review the insights of Kelly in what was arguably the first convincing attempt at adopting concepts and tools from information theory for analysis in a different field, in light of Shannon's famous caution against jumping on "the bandwagon" of information theory. How deep were the links of gambling optimization to information that Kelly had identified, and what was perhaps misconstrued? We then see how such ideas, optimizing the expected exponential rate of return, proportional betting and the informational value of a side-information channel were treated in the context of evolutionary models of fitness maximization under fluctuating environments. I highlight the analytic and conceptual limitations of such models, and propose further extensions and generalizations to the Kelly information-theoretic framework to better account for evolutionary processes.

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