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MULTI-ARMED BANDIT ALGORITHM FOR BEST SHARPE RATIO DETECTION

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Abstract:

The computational agent or program in a bandit problem is required to perform a maximization of the long-run reward obtained from the environment. However, this maximization may be constrained in several ways depending on the problem. For example, in ultra-reliable wireless communications, apart from maximizing the data rate (reward) - the network must ensure that the signal strength is not highly intermittent (risk). Similarly, in finance, an investment strategy depends on a low level of volatility (risk) just as much as it does on the average returns (reward). The risk-adjusted performance of a portfolio is characterized using a quantity known as the Sharpe Ratio. This is a ratio where the numerator is the average return - adjusted against any risk-free means of returns. Correspondingly, the denominator is the standard deviation of these returns over the same time period. In this paper we propose a bandit algorithm that discovers, with least experimentation, a particular financial time series that has the highest Sharpe Ratio among the many time series available.

Keywords: decision-making under uncertainty, bandit problem, financial times series, Sharpe Ratio.

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