Mach Learn (2012) 87:221–258
DOI 10.1007/s10994-012-5281-z

PAMR: Passive aggressive mean reversion strategy for portfolio selection

Bin Li · Peilin Zhao · Steven C. H. Hoi · Vivekanand Gopalkrishnan

Received: 11 September 2010 / Accepted: 1 February 2012 / Published online: 21 February 2012

Abstract This article proposes a novel online portfolio selection strategy named "Passive Aggressive Mean Reversion" (PAMR). Unlike traditional trend following approaches, the proposed approach relies upon the mean reversion relation of financial markets. Equipped with online passive aggressive learning technique from machine learning, the proposed portfolio selection strategy can effectively exploit the mean reversion property of markets. By analyzing PAMR's update scheme, we find that it nicely trades off between portfolio return and volatility risk and reflects the mean reversion trading principle. We also present several variants of PAMR algorithm, including a mixture algorithm which mixes PAMR and other strategies. We conduct extensive numerical experiments to evaluate the empirical performance of the proposed algorithms on various real datasets. The encouraging results show that in most cases the proposed PAMR strategy outperforms all benchmarks and almost all state-of-the-art portfolio selection strategies under various performance metrics. In addition to its superior performance, the proposed PAMR runs extremely fast and thus is very suitable for real-life online trading applications. The experimental testbed including source codes and data sets is available at http://www.cais.ntu.edu.sg/~chhoi/PAMR/.

Keywords Portfolio selection · Mean reversion · Passive aggressive learning · Online learning

Editor: Nicolo Cesa-Bianchi.

B. Li · P. Zhao · S.C.H. Hoi (✉)
School of Computer Engineering, Nanyang Technological University, Singapore 639798, Singapore
e-mail: chhoi@ntu.edu.sg

B. Li
e-mail: s080061@ntu.edu.sg

P. Zhao
e-mail: zhao0106@ntu.edu.sg

V. Gopalkrishnan
Deloitte Analytics Institute, Singapore, Singapore
e-mail: vivekanand@deloitte.com