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Probability Distributions, Trading Strategies and Leverage: An Application of Gaussian Mixture Models to the Morgan Stanley High Technology 35 Index

The purpose of this paper is twofold. Firstly, to assess the merit of estimating probability density functions rather than level or classification estimations on a one-day-ahead forecasting task of the Morgan Stanley High Technology 35 Index (MSHT) time series. This is implemented using a Gaussian mixture model neural network, benchmarking the results against standard forecasting models, namely a naïve model, a moving average convergence divergence technical model (MACD), an autoregressive moving average model (ARMA), a logistic regression model (LOGIT) and a multi-layer perceptron network (MLP). Secondly, to examine the possibilities of improving the trading performance of those models with confirmation filters and leverage.

While the two network models outperform all of the benchmark models, the Gaussian mixture model does best: it is worth noting that it does well on a time series where the training period is showing a strong uptrend while the out-of-sample period is characterised by a downtrend.