

A Generalized Framework for Adaptive Machine Learning Deployments in Algorithmic Trading

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Abstract : A generalized framework for adaptive machine learning deployments in algorithmic trading is introduced, tested, and released as open-source code. The presented software aims to test the hypothesis that recent data contains enough information to form a probabilistically favorable short-term price prediction. Further, the framework contains various adaptive machine learning techniques that are geared toward generating profit during strong trends and minimizing losses during trend changes. Results demonstrate that this adaptive machine learning approach is capable of capturing trends and generating profit. The presentation also discusses the importance of defining the parameter space associated with the dynamic training data-set and using the parameter space to identify and remove outliers from prediction data points. Meanwhile, the generalized architecture enables common users to exploit the powerful machinery while focusing on high-level feature engineering and model testing. The presentation also highlights common strengths and weaknesses associated with the presented technique and presents a broad range of well-tested starting points for feature set construction, target setting, and statistical methods for enforcing risk management and maintaining probabilistically favorable entry and exit points. The presentation also describes the end-to-end data processing tools associated with FreqAI, including automatic data fetching, data aggregation, feature engineering, safe and robust data pre-processing, outlier detection, custom machine learning and statistical tools, data post-processing, and adaptive training backtest emulation, and deployment of adaptive training in live environments. Finally, the generalized user interface is also discussed in the presentation. Feature engineering is simplified so that users can seed their feature sets with common indicator libraries (e.g. TA-lib, pandas-ta). The user also feeds data expansion parameters to fill out a large feature set for the model, which can contain as many as 10,000+ features. The presentation describes the various object-oriented programming techniques employed to make FreqAI agnostic to third-party libraries and external data sources. In other words, the back-end is constructed in such a way that users can leverage a broad range of common regression libraries (Catboost, LightGBM, Sklearn, etc) as well as common Neural Network libraries (TensorFlow, PyTorch) without worrying about the logistical complexities associated with data handling and API interactions. The presentation finishes by drawing conclusions about the most important parameters associated with a live deployment of the adaptive learning framework and provides the road map for future development in FreqAI.

Keywords : machine learning, market trend detection, open-source, adaptive learning, parameter space exploration

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