Dauphine | PSL UNIVERSITÉ PARIS — LAMSADE UMR CNRS 7243 laboratoire d'analyse et modélisation de systèmes pour l'aide à la décision — AI CONNECT

Deep RL for algorithmic trading, Eric Benhamou

Executive summary

- **Deep Reinforcement Learning (DRL)** applications to finance are still unknown, whereas it is the **technique of choice** in games and has reached spectacular levels of efficiency, robust **in non stationary environments**.
- In this work, we apply deep policy gradient methods to optimal trading decision.
- We show this leads to acceptable results and provide **a model free alternative to rule based trading algorithms**.

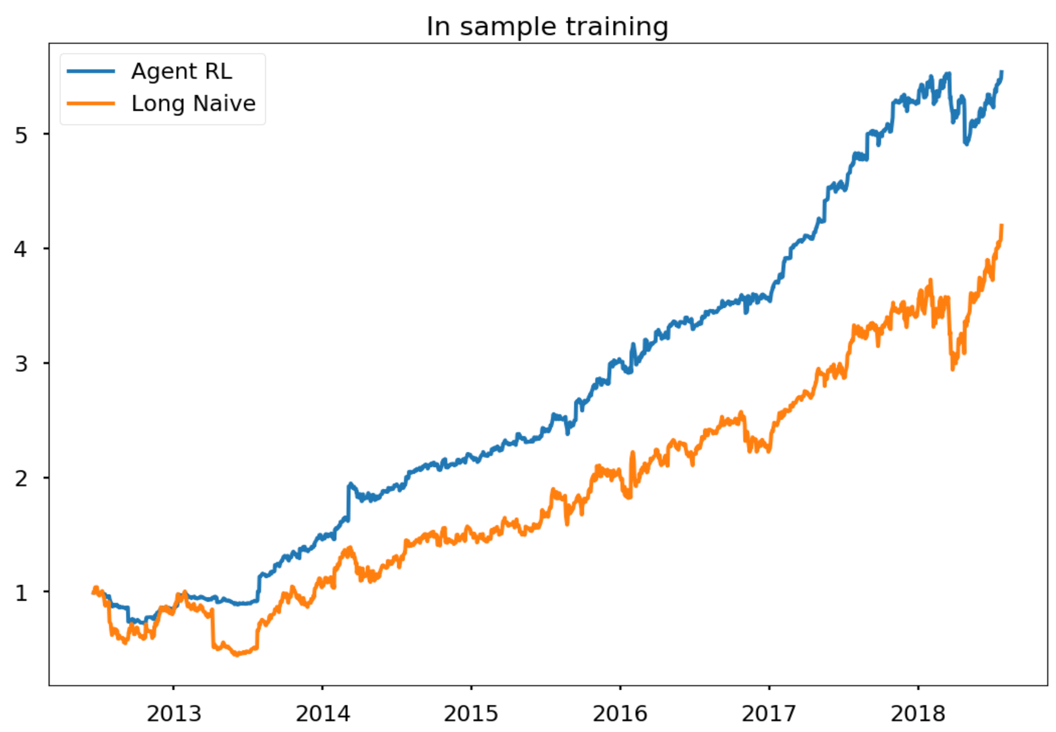
Motivating Questions

- Can an artificial agent learn to trade successfully? **[Yes]**
- Can data non-stationarity be solved? **[Yes]**
- Can we do with a few thousands points? **[Yes]**
- If markets change, can the agent act appropriately? **[Yes]**

Experiment

- Done on Facebook stock
- Train: 01June2012 to 31May2018 (1,509 days = 87.7%)
- Test: 01June2018 to 04Apr2019 (212 days = 12.3%)
- Train mostly bullish
- Test quite different from train
- Impact of learning rate

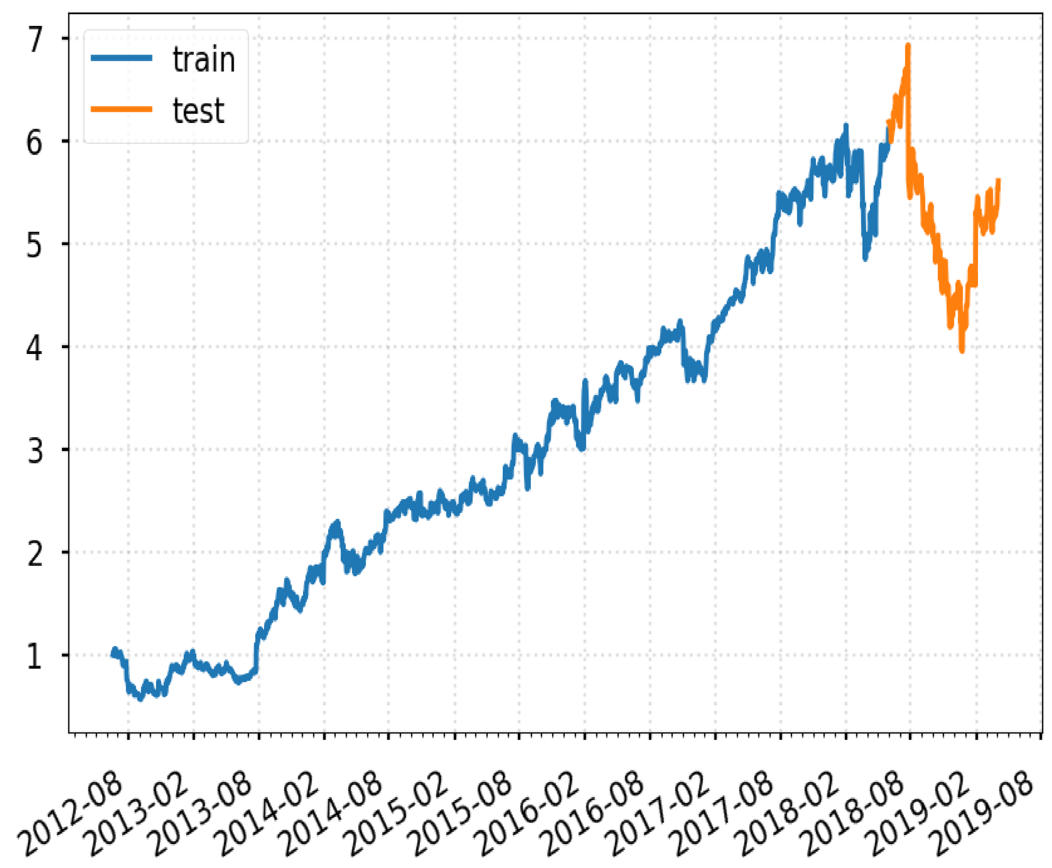
Train



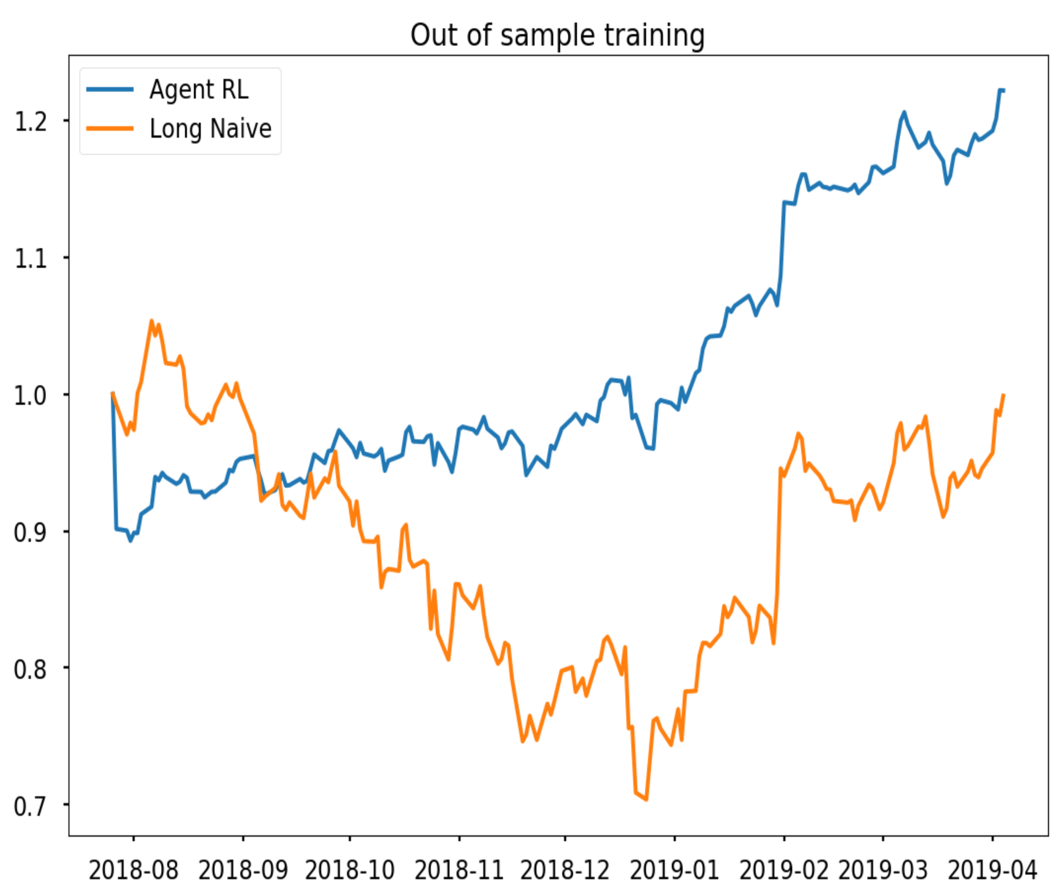
Key concepts

- Problem solved using A3C method as in [4] and [3]
- Non Markovianity handled by large buffer (20 days)
- Q function: 2 × 256 ELU + softmax activation
- Reward with Sharpe ratio for better risk balance than [1] or [2]
- Iteration though deep policy gradient method faster than [5]

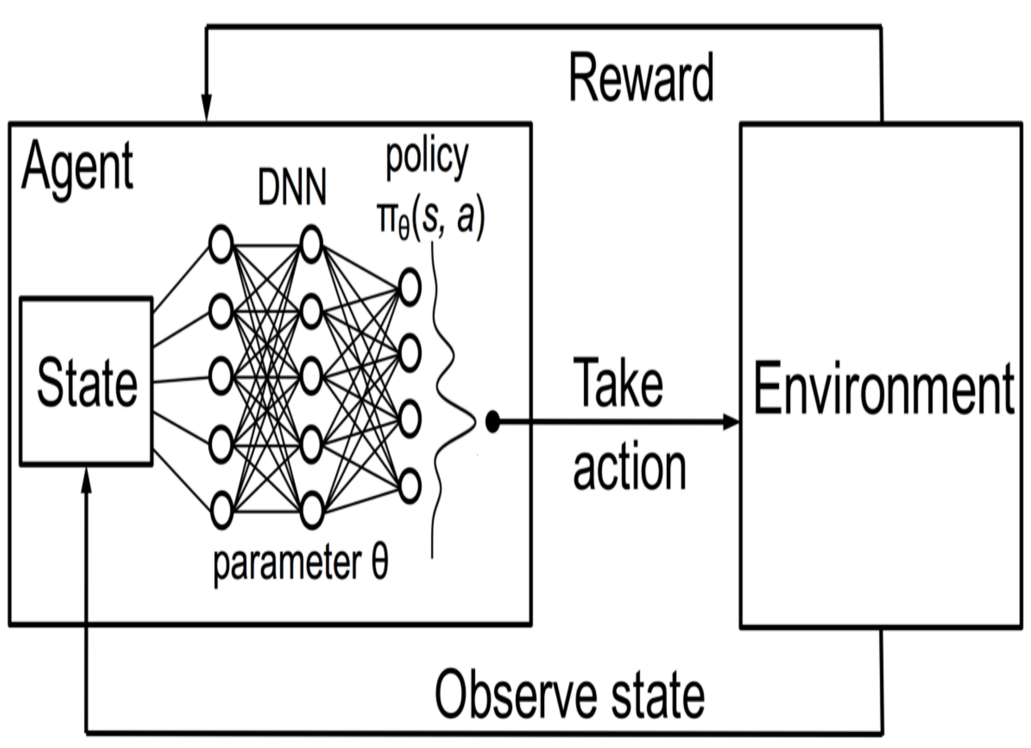
Data



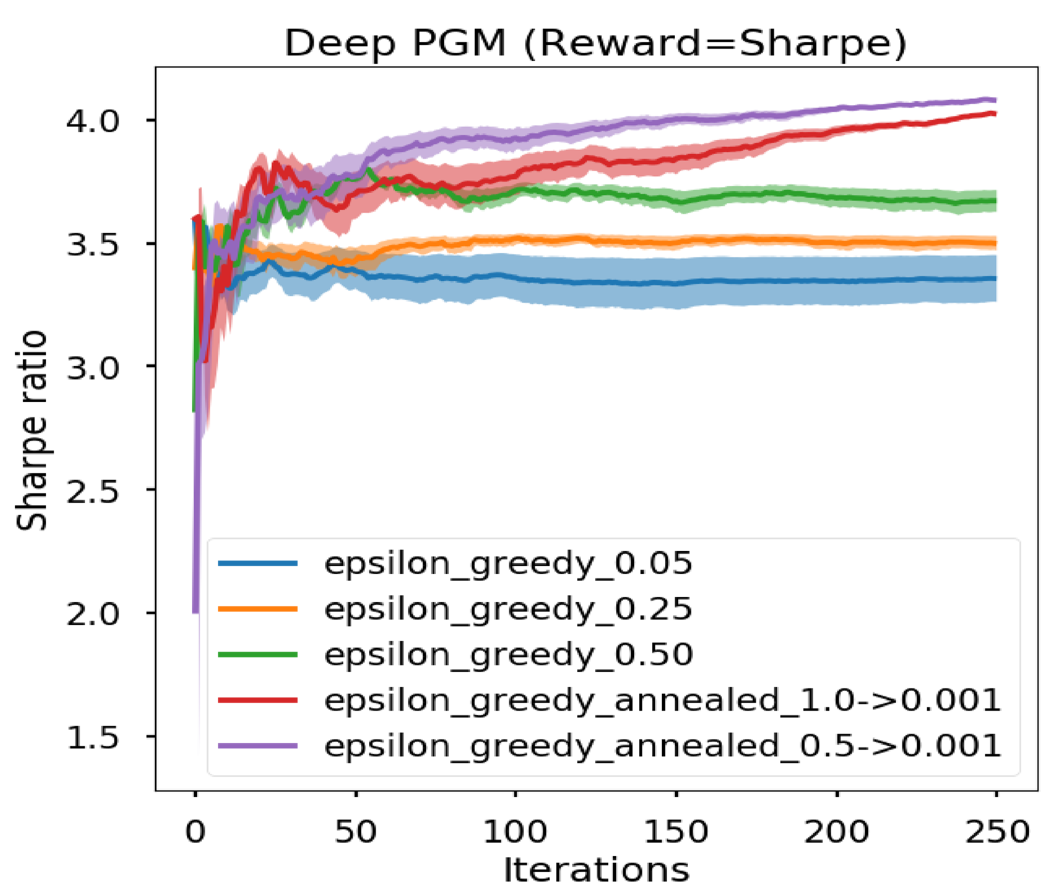
Test



Model



Results



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