Preliminary Results of Deep RL Portfolio Management
(an Independent Research Project of Kamer Ali Yuksel)

A Deep Reinforcement Learning model is trained for portfolio-management. Transaction cost is **1%**. Portfolio includes 14 companies (5 Energy, 5 Pharma, 4 Others), which are automatically selected by the model out of S&P500 during training (without survivorship bias). Up to 1.5x leverage was employed.

Below are out-of-sample results from the blind-set at 2017 that is not even used for the hypertuning:

Sharpe Ratio: 4.56x Sortino Ratio: 12.39x Stability Ratio: 0.98x
Tail Ratio: 2.18x Maximum Drawdown: 4.82% Value-At-Risk: 0.90%

The model is only trained with 4 years of historical data (2013-2016) and tested over the year 2017.To keep the model completely blind, all hypertuning during the model development is done using data before 2013.

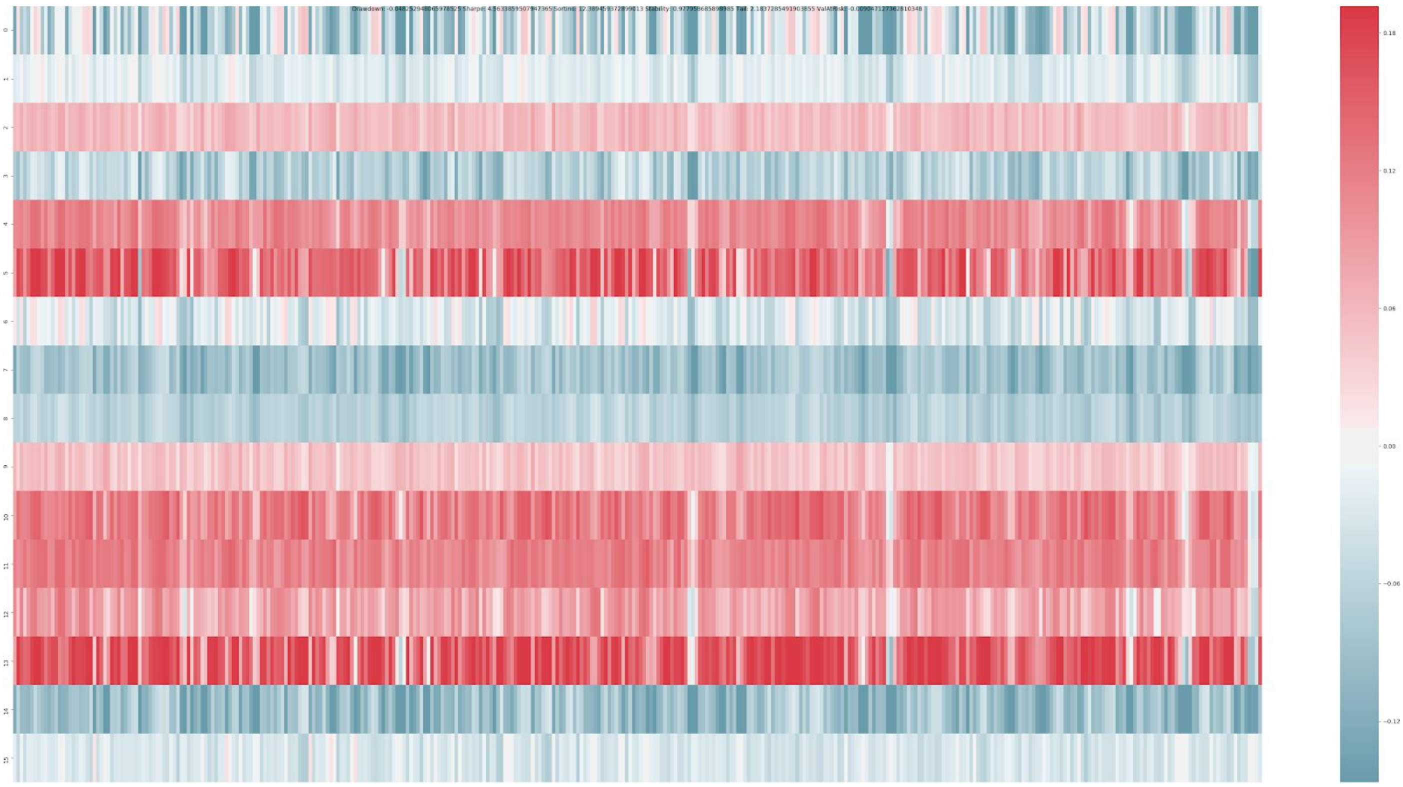
In the following pages, you can observe the daily portfolio weights and transactions in 2017 as well as the cumulative and weekly returns. The model exploits their correlations and hedges them against each other.

A prior work on FX market is submitted to IEEE Intelligent Systems Special Issue on Fintech and AI, and a part of this work was open-sourced in the following repository:https://github.com/kayuksel/forex-rl-challenge

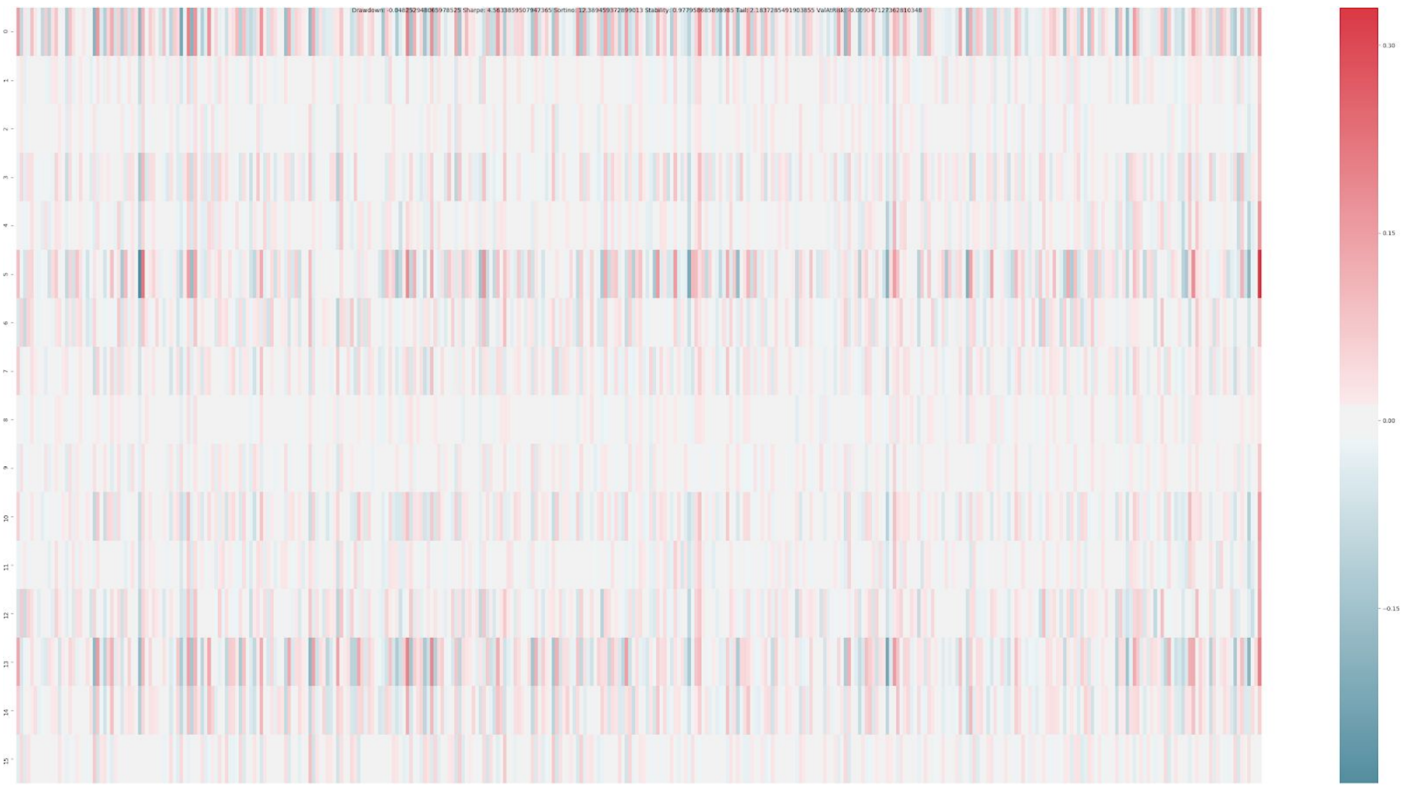
The model performance on 2018 & 2019 can also be provided upon request by the end of this year (2019). Further experiments about the technique will be presented at QuatMinds conference in the upcoming year.

Kamer Ali Yuksel is the Chief Data Scientist (CDS) of an Anti-Money Laundering startup, Hawk:AI. He was previously also CDS at ConnectedLife GmbH, a global All-in-One Smart Living and Health solution provider. He co-founded two startups (LivingRooms GmbH and OTA Expert Inc) and also worked in internationally reputable research institutes including Socio-Digital Systems (Human Experience & Design) Group in Computer Mediated Living Laboratory of Microsoft Research Cambridge (MSRC) and Quality & Usability Group of Deutsche Telekom Innovation Laboratories (T-Labs), besides the Computer Vision & Pattern Analysis (VPALAB), Computer Graphics (CGLAB) and Distributed Artificial Intelligence (DAI-Labor) laboratories of Sabanci University and Technical University of Berlin (TU-Berlin); where he was funded by the Technological and Scientific Research Council of Turkey (TUBITAK) and the German Federal Ministry of Education and Research (BMBF). His research includes (Deep) Machine Learning, Artificial Intelligence, Data Mining, Information Retrieval. He authored 35 publications in international conferences & journals incl. 2 book chapters.

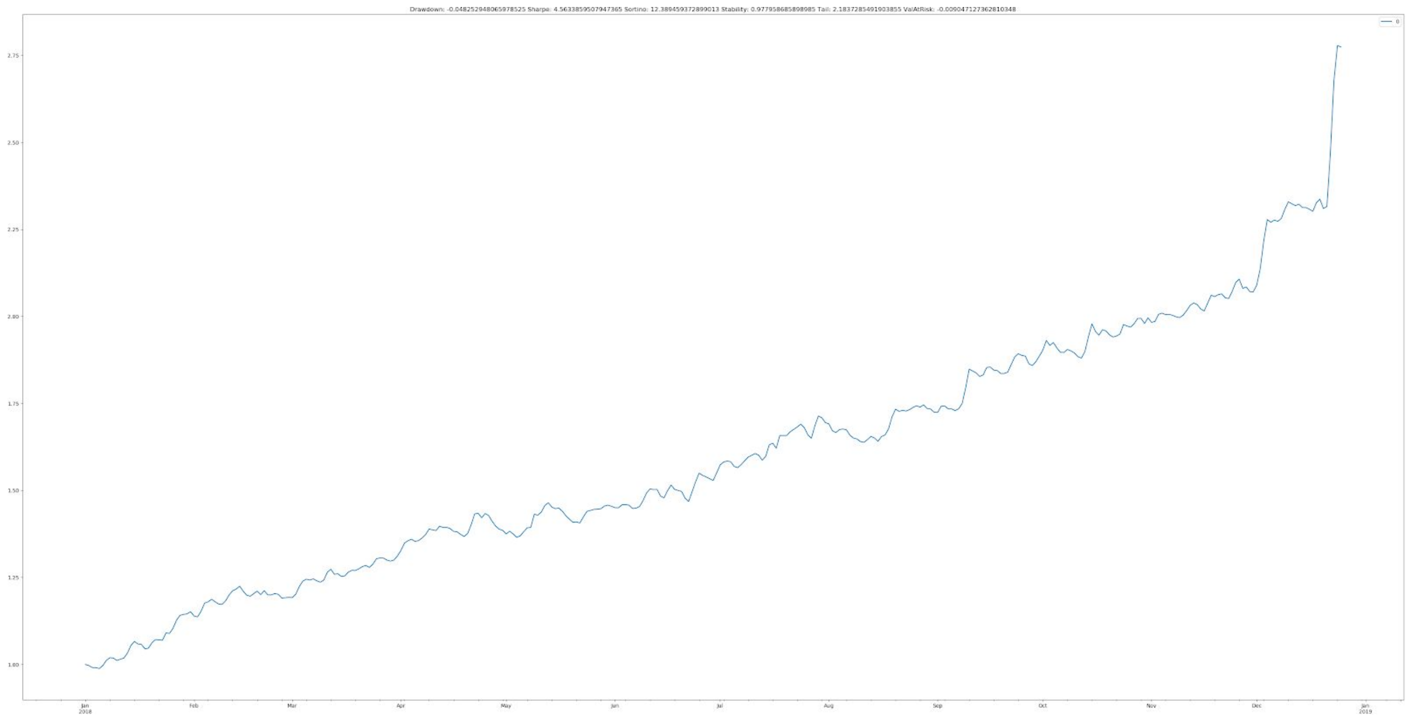
Daily Portfolio Weights of 14 Assets + USD in 2017 (The latest row shows the cash)



Daily Portfolio Transactions of 14 Assets + USD in 2017 (The latest row shows the cash)



Daily Cumulative Returns of the Portfolio in 2017



Weekly Logarithmic Returns of the Portfolio in 2017