



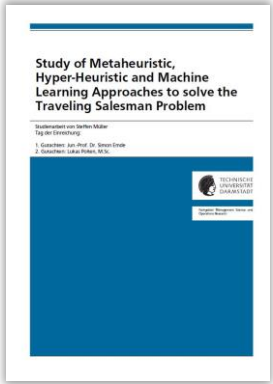
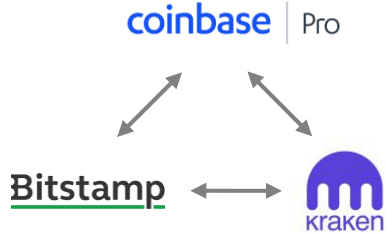
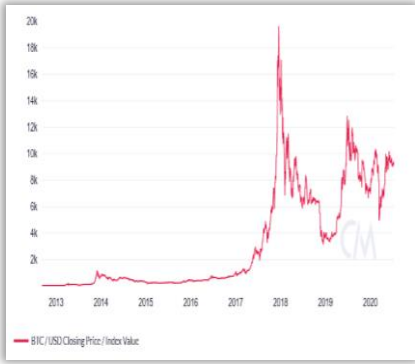
Bitcoin Trading Bot

„How to beat the market“

Steffen Müller / August 2020

www.smueller-projects.com

THE INTEREST IN BITCOIN AND MACHINE LEARNING LEADS TO THE DEVELOPMENT OF A BOT FOR ALGORITHMIC TRADING



Bitcoin Hype

The price of cryptocurrencies increased massively and mining was profitable even in Germany

Bitcoin Arbitrage Bot

Exploit Bitcoin price differences on three exchanges with an automated trading solution via API

Master Thesis

Study of machine learning algorithms and implementation of a use case in 5G mobile communications

Research Project

First get-to-know of reinforcement learning as another method of machine learning

Bitcoin Trading Bot

Go-Live of an algorithm for automated trading based on a trained neural network

2017

2018

2019

2020

THE BOT DECIDES TO BUY OR SELL BITCOIN ON THE BASIS OF A TRAINED ALGORITHM AND AUTOMATICALLY EXECUTES THE TRADES

Algorithmic Trading tries to eliminate human behavior and emotions with an automated trading approach, which is based on a quantitative rule set that can be evaluated from a computer including automated trade execution

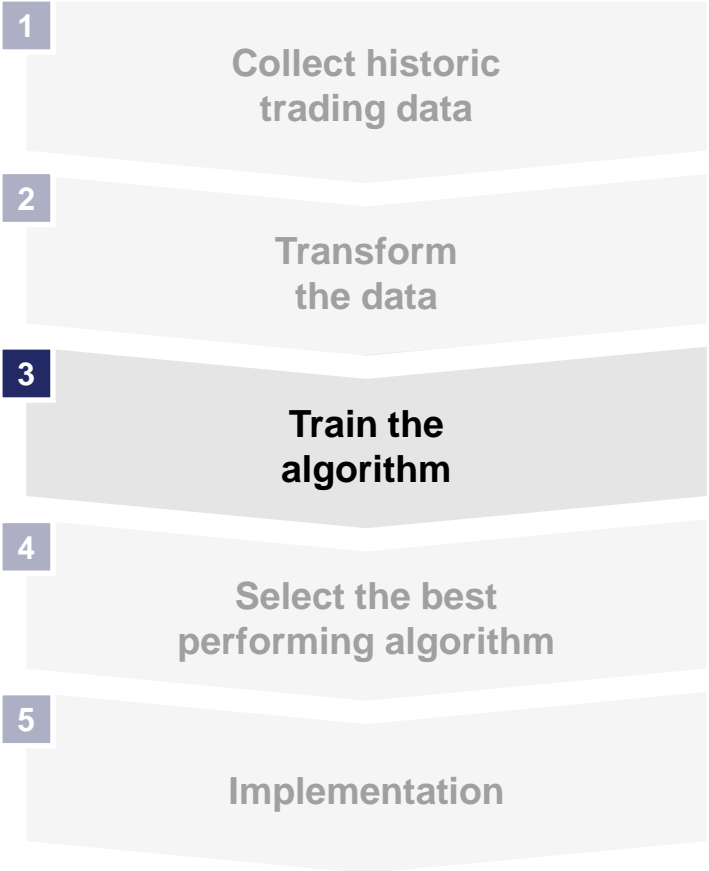


Features or the Bitcoin Trading Bot

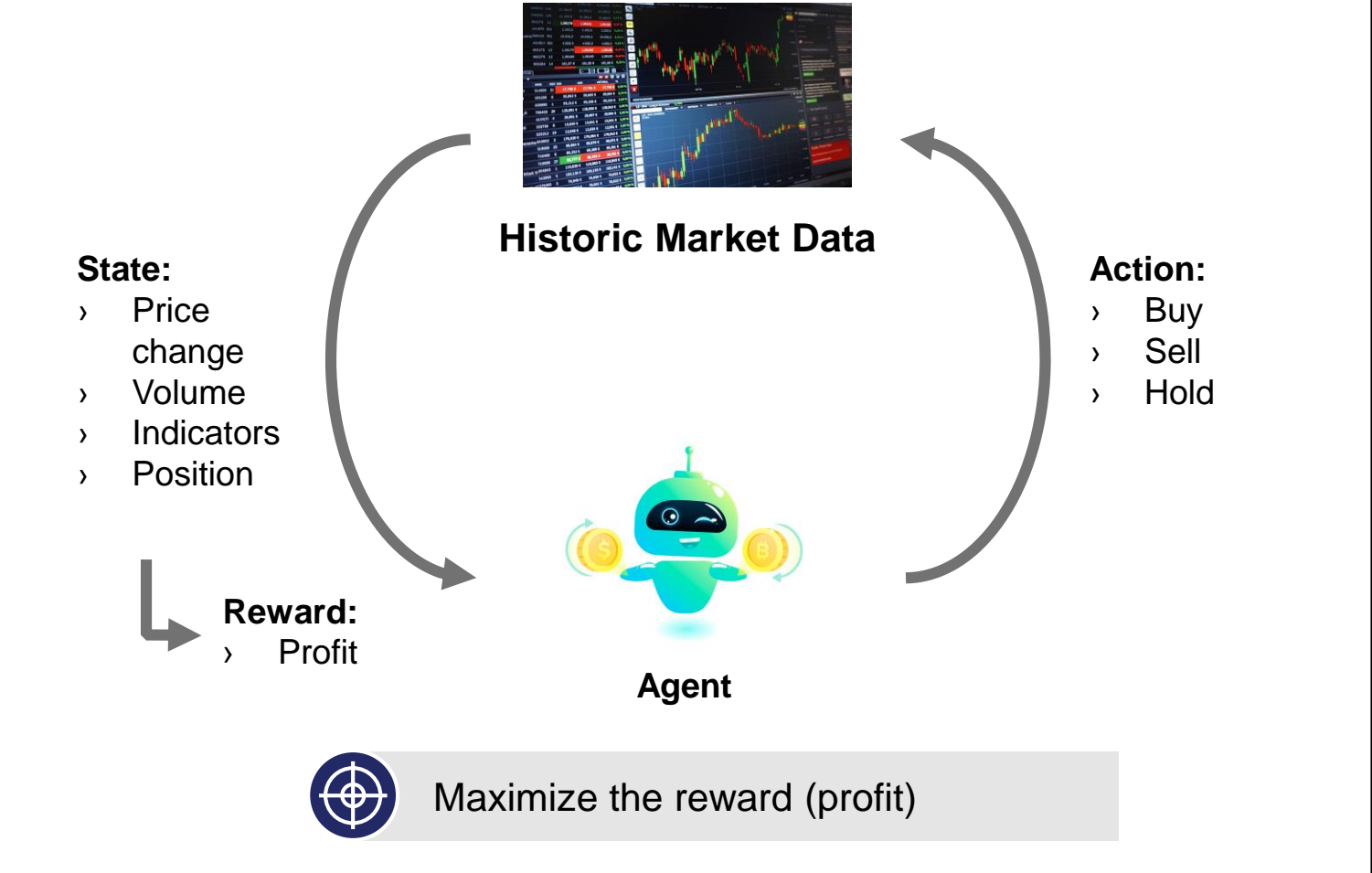
- 1 Automated buy/sell of Bitcoin using an algorithm that was trained on historic trading data
- 2 Daily review of the Bitcoin position at 12am UTC and decision if an adjustment is required
- 3 24/7 operation on a server with push notifications to the smartphone after the daily review of the Bitcoin position
- 4 Connection to the cryptocurrency exchange Bitstamp via API for real-money trades
- 5 The code is written in MATLAB; Python is used for the API integration

THE ALGORITHM IS TRAINED USING THE CONCEPT OF REINFORCEMENT LEARNING

Process to the implemented algorithm

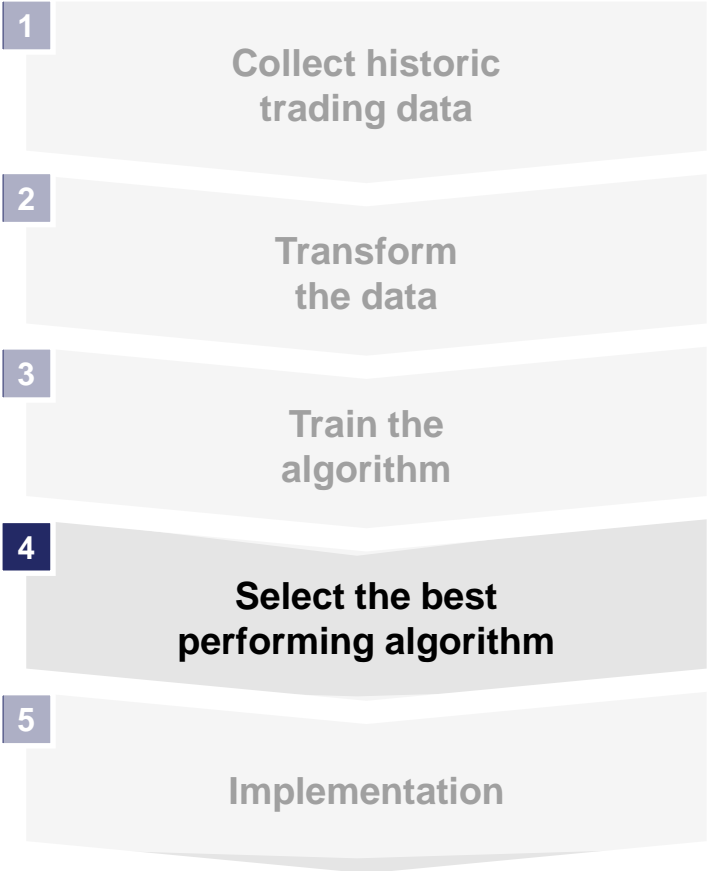


Reinforcement Learning

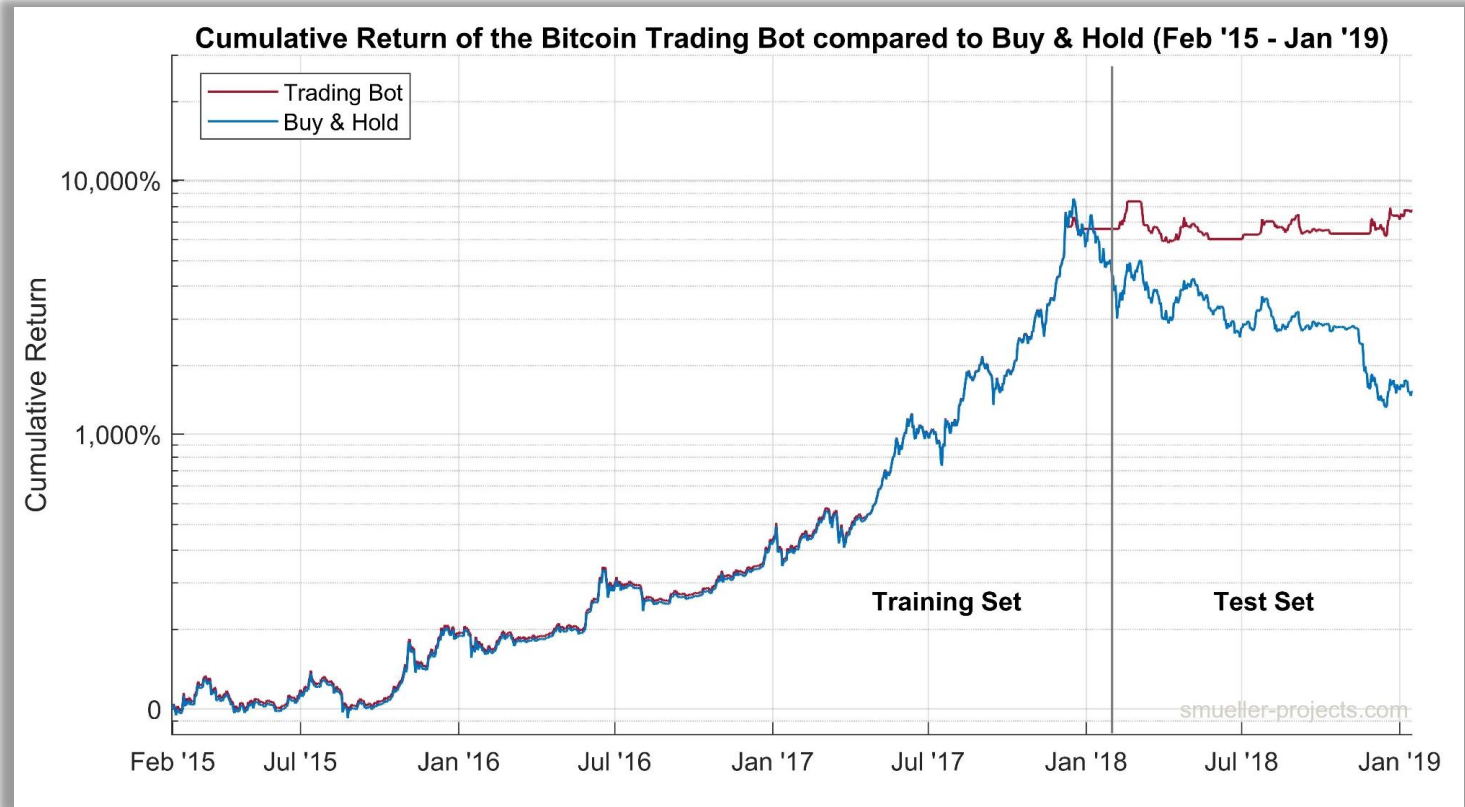


THE FINAL ALGORITHM IS THE OUTPUT OF A MANUAL EVALUATION PROCESS WHERE MANY ALGORITHMS ARE COMPARED

Process to the implemented algorithm



Performance of the finally chosen algorithm in January 2019

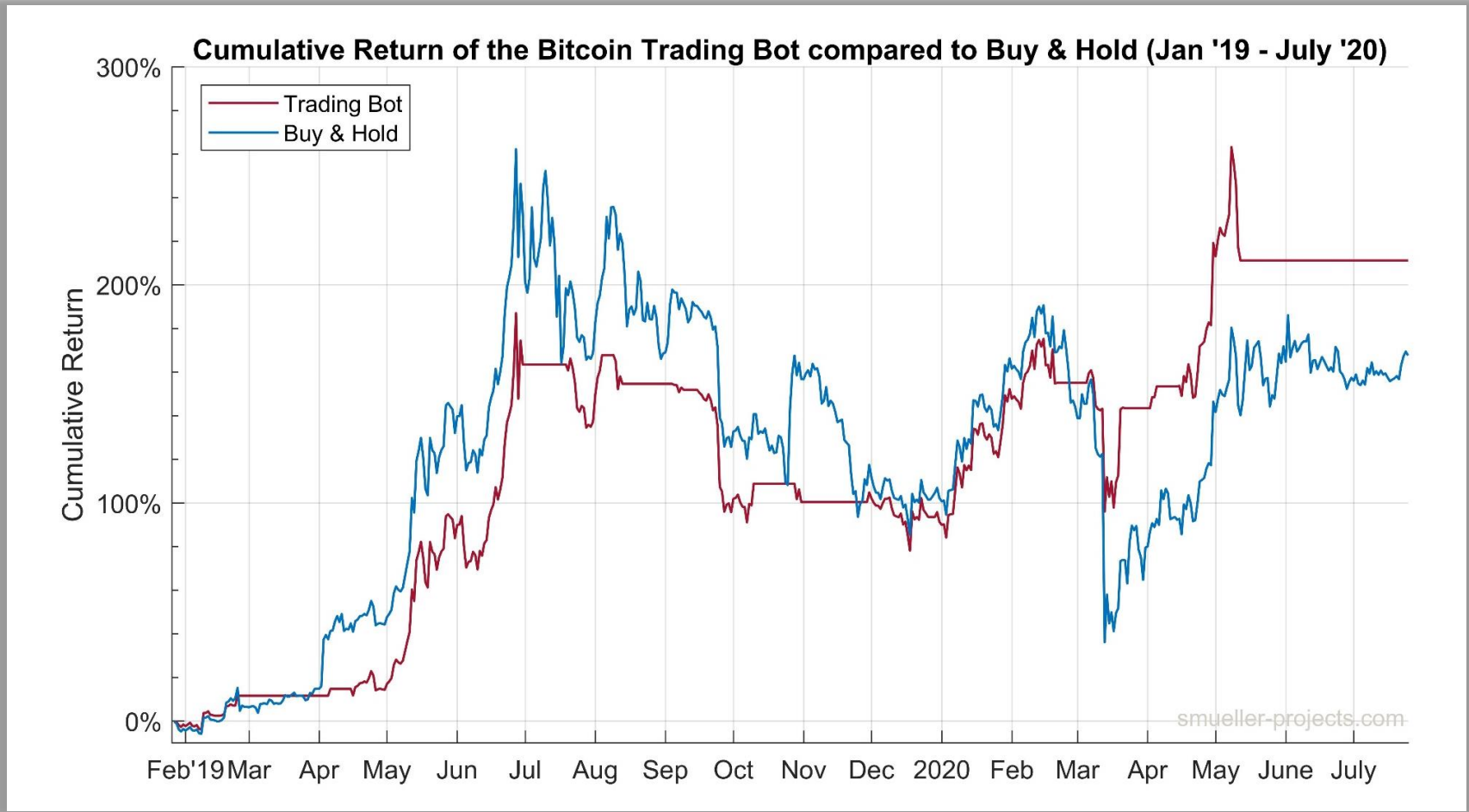


THE BOT OUTPERFORMS A BUY AND HOLD STRATEGY IN LIVE TRADING AND HAS A MUCH LOWER MAXIMUM DRAWDOWN

Performance of the finally chosen algorithm in January 2019

Result after 17 months

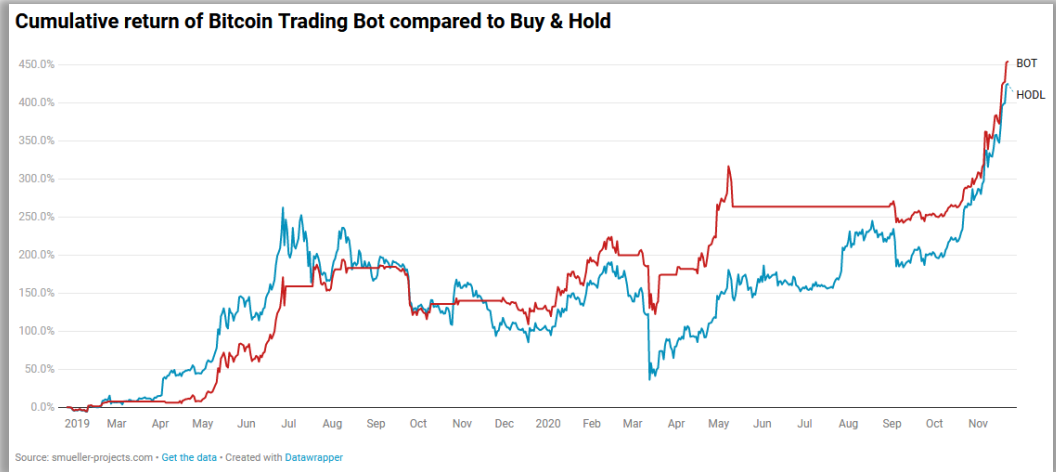
- 38 Trades
- 211% Return
- 38% Maximum Drawdown



KEY LEARNINGS

1	Until today there is no algorithm found which can outperform the presented one	Already existing frameworks can be used without knowing the details	4
2	Professional algorithmic trader have to get far better results	Do not use a complicated data structure or data model	5
3	Development of software and running a bot required higher efforts than initially thought	An own project makes a lot of fun!	6

FOR LIVE CHARTING OF THE ALGORITHM'S PERFORMANCE AND A BLOGPOST ABOUT THE BOT VISIT MY WEBSITE



Live Charting: <https://smueller-projects.com/bitcoin-trading-bot-charts/>



How to outperform the Bitcoin Market using a self-developed Deep Reinforcement Learning Trading Bot

May 23, 2020

Key Takeaways I developed my own Bitcoin Deep Reinforcement Learning Trading Bot Price, volume, trade related and market indicators are used A feedforward neural network is trained using trade data...

Blog Post: <https://smueller-projects.com/bitcoin-trading-bot/>