
Algorithmic Trading of Futures via Machine Learning

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Algorithmic trading of securities has become a staple of modern approaches to financial investment. In this project, I attempt to obtain an effective strategy for trading a collection of 27 financial futures based solely on their past trading data. All of the strategies that I consider are based on predictions of the future price and volatility of the various securities under consideration, and so the majority of the effort in this project has been directed toward using machine learning techniques to obtain predictions for future price and volatility. This project was inspired by the Quantiacs futures competition, to which I submitted a number of the trading strategies I obtained during my work on this project.

Introduction

The Contest

The goal of this project was to obtain a high-performing trading strategy for the Quantiacs futures contest [\[1\]](#). Quantiacs is a quantitative trading platform that invests in crowdsourced trading systems, and connects users trading systems with institutional investors, [sharing] a performance fee with the developer. The Quantiacs futures contest was a competition to obtain a trading strategy which invests in a collection of futures securities and attempts to maximize the Sharpe ratio (a measure of risk-adjusted return) over both a training period (Jan. 1, 2001–Nov. 30, 2014) and a live trading period (Dec. 1, 2014–Jan. 31, 2015). Trading systems are ranked using the minimum of the performance over these two intervals, and the top three performing strategies (determined January 31, 2015) will receive guaranteed minimum

investments (\$250,000 for third place, \$500,000 for second, and \$1,000,000 for first).

The Trading Model

The trading model employed by Quantiacs is somewhat simplified relative to a real-world trading scenario. In particular, the daily closing price is what is used to determine the buying/selling price when orders are placed on a given day, and orders may only be placed once per day. However, the model does include small fees meant to simulate the effects of slippage and trading commissions, and so may offer a relatively realistic trading simulation for relatively long term investment strategies (where trades are being performed on a daily basis, as opposed to high frequency approaches with many trades being performed each second).

The Data

The backtesting data for the contest consisted of approximately 3800 days of trading price and volume data (from Jan. 1, 2001 to the present day) provided by Quantiacs for 27 different futures contracts (including various currencies, precious metals, agricultural products, etc.). More specifically, the data contained the daily high, low, opening, and closing prices, and daily trading volumes over this time period. In addition, the rules of the competition specified that on any given day, the only legal input into the trading strategy was the previous 504 trading days worth of this data for each of the 27 securities under consideration.

The Objective

As mentioned above, the goal in the Quantiacs futures competition is to obtain a trading strategy with opti-

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Gupta, Manisha,Sharma, Deergha,Gupta, Himani,2022-09-07 Throughout the world artificial intelligence is reshaping businesses trade interfaces economic activities and society as a whole In recent years scholarly research on artificial intelligence has emerged from a variety of empirical and applied domains of knowledge Computer scientists have developed advanced deep learning algorithms to leverage its utility in a variety of fields such as medicine energy travel education banking and business management Although a growing body of literature is shedding light on artificial intelligence enabled difficulties there is still much to be gained by applying fresh theory driven techniques to this vital topic Revolutionizing Business Practices Through Artificial Intelligence and Data Rich Environments provides a comprehensive understanding of the business systems platforms procedures and mechanisms that underpin different stakeholders experiences with reality enhancing technologies and their transformative application in management The book also identifies areas in various business processes where artificial intelligence intervention would not only transform the business but would also make the business more sustainable Covering key topics such as blockchain business automation and manufacturing this reference work is ideal for computer scientists business owners managers industry professionals researchers academicians scholars practitioners instructors and students

AI's Transformative Impact on Finance, Auditing, and Investment

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further exploration AI s Transformative Impact on Finance Auditing and Investment examines how AI technologies are revolutionizing these critical sectors It examines foundational AI concepts including machine learning natural language processing and their applications in risk management fraud detection financial forecasting and audit automation discussing ethics regulatory considerations and future trends This book covers topics such as policymaking data analytics and financial technology and is a useful resource for business owners policymakers economists academicians researchers and data scientists

Using Statistically Implemented Neural Networks to Forecast S & P 500 Futures Contract Prices Carl Cramer Maier,1996 *Florida Law Review* ,2015 Advanced Trading Rules Stephen Satchell,Emmanuel Acar,1998 An overview of financial markets trading rules It shows the financial market professional and student how to apply econometrics computer modelling technical and quantitative analysis to financial markets trading Also explained in this text are technical indicators neural networks genetic algorithms quantitative techniques and charts Quantitative Asset Management: Factor Investing and Machine Learning for Institutional Investing Michael Robbins,2023-06-24 Augment your asset allocation strategy with machine learning and factor investing for unprecedented returns and growth Whether you re managing institutional portfolios or private wealth Quantitative Asset Management will open your eyes to a new more successful way of investing one that harnesses the power of big data and artificial intelligence This innovative guide walks you through everything you need to know to fully leverage these revolutionary tools Written from the perspective of a seasoned financial investor making use of technology it details proven investing methods striking a rare balance between providing important technical information without burdening you with overly complex investing theory Quantitative Asset Management is organized into four thematic sections Part I reveals invaluable lessons for planning and governance of investment decision making Part 2 discusses quantitative financial modeling covering important topics like overfitting mitigating unrealistic assumptions managing substitutions enhancing minority classes and missing data imputation Part 3 shows how to develop a strategy into an investment product including the alpha models risk models implementation backtesting and cost optimization Part 4 explains how to measure performance learn from mistakes manage risk and survive financial tragedies With Quantitative Asset Management you have everything you need to build your awareness of other markets ask the right questions and answer them effectively and drive steady profits even through times of great uncertainty

Bitcoin Pricing. An Empirical Analysis Andreas Bialek,2019-04-01 Master s Thesis from the year 2018 in the subject Business economics Miscellaneous grade 1 3 University of Hamburg language English abstract In this paper I analyze the relation between daily bitcoin returns and sentiment using a dataset reaching from 2013 to 2018 I find that daily bitcoin returns are not only affected contemporaneous by the bitcoin sentiment measures but also in the next three days while established stock market sentiment measures provide no explanatory power Additionally the negative emotions show return reversal patterns as often observed in sentiment induced mispricing literature resulting in higher returns the next two days after affecting returns

negatively today I further find that trading volume affects returns positively today in the next four days and that it is connected with stock market measures For what I wisdom this is also the first academic research that uses the recently introduced Thomson Reuters MarketPsych Indices on cryptocurrencies

Computational Finance and Its Applications Wessex Institute of Technology, 2004 Intelligent computational systems have become increasingly important in many financial applications such as portfolio selection proprietary trading and risk management At the same time traditional techniques are constantly being improved and developed as a result of the increased power of modern computer systems

Michigan Law Review, 2017-12 **Report of the High Powered Expert Committee on Making Mumbai an International Financial Centre**, 2007 **Progress in Neural Information Processing** Shunichi Amari, 1996 These two volumes are the papers presented at the International Conference on Neural Information Processing ICONIP 96 held in Hong Kong 24-27 September 1996 Over three hundred selected papers make up two volumes of 700 pages each Featured topics of Volume 1 are Learning Theories and Algorithms Speech and Signal Processing Pattern Recognition and Image Processing Recurrent Networks Automata and Dynamics Volume 2 focusses on Financial Engineering and Time Series Forecasting Evolutionary Computing Neurosciences and Biophysics Neural Control and Robotics Hardware Implementations Hybrid Systems and Applications plus a number of Special Sessions Other topics covered include image processing computer vision fuzzy logic pattern recognition algorithms and architectures and financial engineering These two volumes combine to cover the major topics in neural information processing and reflect the latest progress with a good balance between scientific studies and industrial applications as well as featuring neural information processing approaches on financial engineering

Information & Management Fédération internationale pour le traitement de l'information, 1997 Neural Networks in Finance and Investing Robert R. Trippi, Efraim Turban, 1996 This completely updated version of the classic first edition offers a wealth of new material reflecting the latest developments in the field For investment professionals seeking to maximize this exciting new technology this handbook is the definitive information source

KDD ..., 2003 **Enhancements to the Data Mining Process** George H. John, 1997 **Artificial Life**, 1994 Consists of the proceedings of 1987 Interdisciplinary Workshop on the Synthesis and Simulation of Living Systems 1990 1992 Artificial Life Workshop 1994 1996 International Workshop on the Synthesis and Simulation of Living Systems 1998 International Conference on Artificial Life

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