Open Platform To Investigate Investing Markets ($\mathcal{OPTIIMA}$[1])
by $\mathcal{N}+3$ – Computing worldwide access to ideas

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[1]Alternative names: PlatformM, OPIIMAK, NODAMAS, NOTOKEEPIT...

Contents

1 Summary

Investment markets are highly regulated and free access to high-resolution data to accurately track trends remains difficult. Most companies offering services to small investors show a trade-off between free individual investment decisions at high fee rates and decreasing investment cost at the expense of freedom (i.e., automated investments) when deciding individual products. Here we aim to join free individual investment decisions with automated investments in one open platform to investigate markets ($\mathcal{OPTIIMA}$). Our goal is to allow small investors to access fast and free worldwide high-resolution data to inform free-individual decisions and the use of automated algorithms to track highly diversified portfolios.

Keywords: automated investments, approximate Bayesian computation, regulatory markets, time series, informed individuals, complete information, stochastic portfolio theory,

2 Investigating and investing in highly regulatory markets

Strong resource dependence is a trade-off. One one side, obtaining all resources from one labour and employer may help to make us more specialized and efficient in completing some tasks. On the other side, it may monopolize the surplus produced by individual's well oriented ideas, risk and merit. Here we aim to facilitate informed portfolio diversification for individuals that want to diversify risk and merit. Any risk and merit fall within regulatory markets. Regulatory markets control individual decisions to investigate for low cost a worldwide connected and distributed market. Thus, it is important to know the meaning of a regulatory market when diversifying portfolios. In addition, we have to know how new ideas are being developed in a highly regulatory market to overcome the high cost of investments for small investors.

2.1 The meaning of a regulatory market

Most networks, from genomes to ecosystems and markets of any kind are highly regulated. This means most interacting agents in the market have to deal with a highly complex set of regulations before having access to the data, algorithms and the available strategies. Having "easy" access to the information in a "perfectly informed market" should be simple and efficient, but unfortunately, it is not.

The first thing to consider is to have access to the data. In order to get the data, we should know each product ID (e.g., as ID's for species), the many to one tickers underlying each ID and how these ID's apply to the products ranging from bonds to stocks[2]. There have been attempts to produce an ID following international standards [3] (Figure 1 and 2). Each ID contains a time series, how and why each ID fluctuate in a given market? How are markets connected? Which are the underlying mechanisms producing the fluctuations and the correlations between products and markets? Are highly correlated markets only occurring in severe crisis? How regulatory markets influence individual decisions to have free access to investigate and invest for low or no cost in a worldwide connected and distributed market? Does regulation mean higher cost to access the data and invest? Which is the best (e.g., lowest cost?) strategy to invest in highly regulatory markets?

We do not yet how to answer these questions. Regardless the answers, I do not know a service today offering high-resolution and free intra- and inter-day data in an integrated platform with access to all the markets, why? The services offering data access and tracking the market vary greatly. The range from the more classical which describes funds and investment products offered by a bank or firm a client decides to choose, limiting individual choices to free tracking portfolios with a reduced access to the markets and to the data but without options for investments [4]. It is important to distinguish an , on the other hand, where investors can choose to invest in other funds and vehicles offered by

[2]Link showing a full description of the available investment products

[3]http://www.isin.org/isin-process/

[4]http://jstock.org/

competitor institutions and companies from which refers to a fully documented external application programming interfaces (API) that allow using the software to function in other ways than the original programmer intended, without requiring modification of the source code. Ideally, an open platform in computing should directly be translated to an open access server where you can register for free and modify or not the embedded codes to track your own portfolio, have access to and .

Most investors are of small size and invest with a low frequency and high-fee environment [5]. Thus, returns are small and can be quickly erased by fees and highly fluctuating markets. For example, investing in stocks can be very costly if we trade constantly, especially with a minimum amount of money available to invest. Every time that we trade stock, either buying or selling, we will incur a trading fee. Trading fees range from the low end of 10 per trade, but can be as high as 30 for some brokers. Remember, a trade is an order to purchase shares in one company. If we want to purchase five different stocks at the same time, this is seen as five separate trades and we will be charged for each one. Now, let's imagine that we decide to buy the stocks of five companies with an initial 10,000USD. To do this we will incur from 50USD to 150USD in trading costs, which is equivalent to 0.5% to 1.5% of the initial 10,000USD. If we were to fully invest the 10,000, our account would be reduced to 9950USD or 9850USD after trading costs. This represents an important loss, before our investments even have a chance to earn a cent. In addition, if we were to sell these five stocks, we would once again incur the costs of the trades, which would be another 50USD or 150USD. To make the round trip (buying and selling) on these five stocks it would cost us 100USD or 300USD, or 1% or 3% of our initial deposit amount of 10,000USD. If our investments do not earn enough to cover this, we have lost money by just entering and exiting positions (the 10,000USD is far beyond what most small investors have to start with!). In addition, hidden costs are the norm and most regulations underlying investing should be explored further.

2.2 Why should we keep a balance between our ideas and worldwide distributed ideas?

There are millions of ideas fluctuating out there. Do most of them go to extinction quickly? Diversifying portfolio in science and everyday life is a simple consequence of living in fluctuating (and unpredictable) environments. The closer we are at predicting fluctuations of several time series (including your ideas) at local and regional scales the better we know the ecosystem. Unfortunately, it is not easy to predict time series of a large number of interacting (ideally independent) species (or ideas or market products from stocks to bonds). Given we can not predict most of the ideas' trends, we should build a minimum understanding on how to investigate ideas and build a diversified portfolio with a balance between risk and reward. Basic questions will always remain when discussing about predicting the future and diversifying portfolios. For example, in a complex ecosystem, which is the best strategy under complete ignorance? And under complete information?

[5] Have access to the invested-size distribution per individual investors

Should we invest following a ? Should we produce a portfolio with ? [6]

3 Current portfolio theory in economics and ecology

Portfolio theory in economics has a long tradition (**?**). The theory is rooted in the concept of . There are several pages offering codes in several languages to calculate efficient frontiers for any given portfolio [7] [8]. Most maths underlying are based in . In ecology, portfolio concept has also been used to predict the number of coexisting species in landscapes with highly fluctuating environments[9].

3.1 Developing a highly diversified portfolio in time and space

Given the basic maths underlying the portfolio theory, which are the algorithms and models out there? Which one perform the best? Which is the mixed of models to develop our investment strategy? Should we just maximize reward and minimize risk (or) regardless the frequency of trading? How to achieve it? How do frequency of trading relate to maximum reward and minimum risk strategy? How to connect a highly diversified portfolio with the knowledge of the worldwide flow distribution of basic goods?[10]

[6] https://en.wikipedia.org/wiki/ARandomWalkDownWallStreet
[7] http://www.quantcode.com/
[8] Julia finance;https://github.com/JuliaQuant/PortfolioModels.jl
[9] Check references
[10] Check Bern principles

4 Exploring de-centralized investments

4.1 Centralized investments

The meaning of a centralized investment. Which are the pros and cons? Why centralized?

4.2 Decentralized investments and virtual currency

The meaning of decentralized investment. The origin of bitcoin and refs to invest in virtual currencies.

5 Open platform to investigate markets ($\mathcal{OPTIIMA}$)

In the long term, $\mathcal{OPTIIMA}$ will be a tool to combine free access to high-resolution data for both centralized and decentralized investments, free-individual decisions in individual products, and automated investments. To achieve such a combination, we aim to develop $\mathcal{OPTIIMA}$ in two stages. The first stage will be to develop the free-access platform to have access to the high-resolution data to investigate markets (Figures 1 and 2). The second stage will be to develop the steps required to allow individuals to invest (Figure 3). There are several bottlenecks to develop such platform. Enumerating these bottlenecks to recognize our lack of expertise is a key first step. At this stage, there are at least 8 bottlenecks.

5.0.1 Bottleneck 1: Data access algorithms

Bottleneck 1 would require to develop database from raw data (Figure 2). This is not just connecting algorithms to google or yahoo to have access to interday data (this is by far a trivial problem). Data access has, at least, three steps: 1) ID or ISIN database access; 2) link ISIN or ID to the several stickers each ISIN contains with a different sticker name in each different market (ID or ISIN can be compared with the genome of each investment product and the stickers would be the different varieties of a species in space), and 3) connect the ID or ISIN to the time series at high (intraday) or low (interday) resolution with price and volume values. Today, there is no webpage offering these three elements for free.

5.0.2 Bottleneck 2: Pattern detection algorithms

Bottleneck 2, pattern detection, includes several open problems but they can mostly be reduced to one. This is to have a solid background in to build a from the most simple one investment product to several investments products. The codebase should be ready to simulate the efficient frontier for any given portfolio.

5.0.3 Bottleneck 3: Mechanistic model algorithms

Bottlenecks in step 3 are those based in model development, selection and inference. Complex models will be difficult to analyze using Approximate Bayesian computation methods to develop diversified investment strategies. Thus, combining our own (complex) decisions with the available algorithm and methods should allow to simplify the models and run ABC to compare them before developing the strategies to invest.

5.0.4 Bottleneck 4: Validation and ABC algorithms

5.0.5 Bottleneck 5: Automated decision algorithms

5.0.6 Bottleneck 6: API development, cloud access and counting metrics

5.0.7 Bottleneck 7: Open platform in a highly regulatory market

5.0.8 Bottleneck 8: Security and encryption methods

6 Acknowledgments

7 Tables

8 Figures

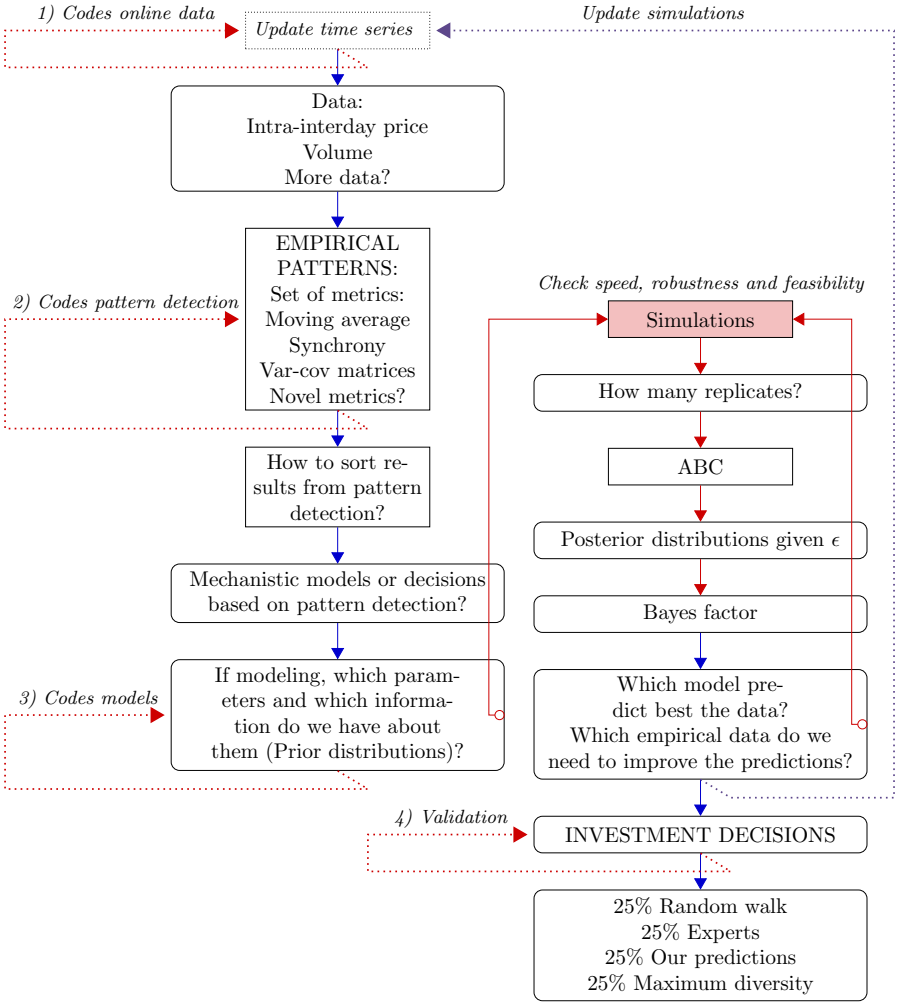

Figure 1: Flow chart summarizing the steps to develop $\mathcal{OPTIIMA}$

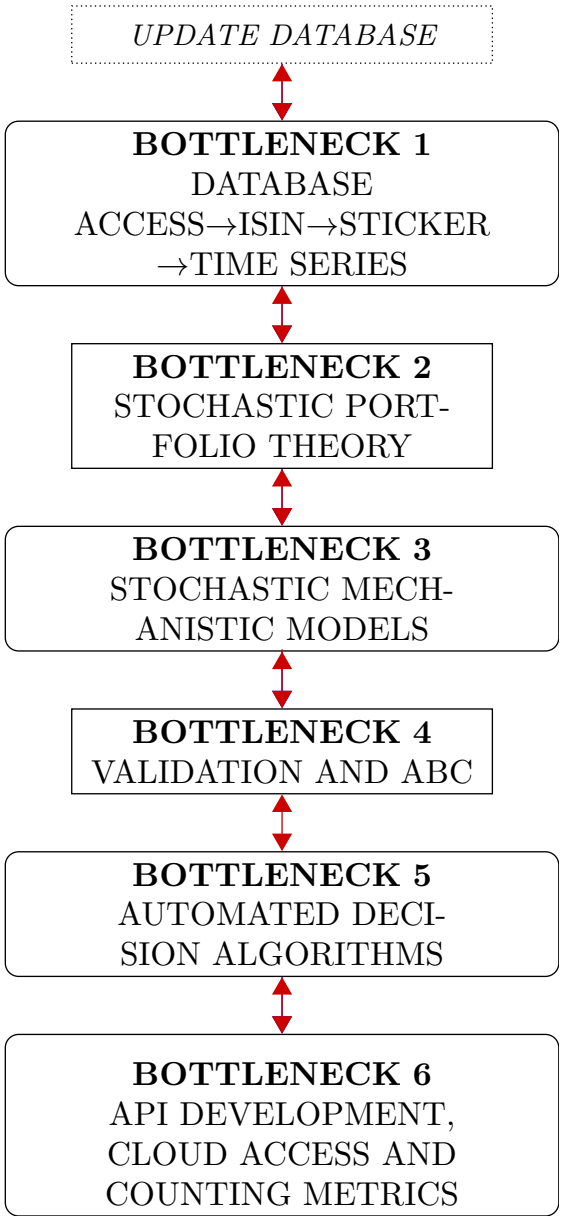

Figure 2: Bottlenecks to overcome to develop $\mathcal{OPTIIMA}$

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