**Behavioral Finance – Impact of Artificial Intelligence and Social Media Analytics on Investor and Trader Behavior.**

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**Abstract**

In this paper, we explain what artificial intelligence is and how you can use it nowadays and also explain how social media can affect the life of an investor or a trader. Artificial intelligence is the ability of a computational device, through a compilation of various sciences, such as computing and mathematics, to replicate some cognitive skills and thus process data, reason, optimize processes, correct errors, have more precision, and solve problems. This entire context has caused changes both in technology and in the way we relate to it. Literature, film, and other entertainment media tend to view artificial intelligence somewhat as a fantasy. It is usually represented in the form of a scary robot or artificial intelligence capable of responding to human desires and wills, performing its functions in a similar way to magic. The website SAS Insights says that: "**AI automates repetitive learning and discovery through data.** Instead of automating manual tasks, AI performs frequent, high-volume, computerized tasks. And it does so reliably and without fatigue. Of course, humans are still essential to set up the system and ask the right questions." Operating in stock markets, search engines, and personal assistants, among other fields, artificial intelligence is responsible for many of the amenities you enjoy in everyday life. It is important to remember and the SAS Insights also helps us to understand that: "**AI adds intelligence** to existing products. Many products you already use will be improved with AI capabilities, much like Siri was added as a feature to a new generation of Apple products. Automation, conversational platforms, bots and smart machines can be combined with large amounts of data to improve many technologies. Upgrades at home and in the workplace, range from security intelligence and smart cams to investment analysis."

Also, social networks boost the spread of information about the financial market, and many investors, especially individuals, use this support to try to leverage gains. At the same time, there are operators using the network in a dubious way, sharing unfounded news to influence the performance of stocks on the Stock Exchange.

**Keywords:** Artificial intelligence, social media, finance, behavioral finance.

**Introduction**

To understand why the things, we talk about above are important, there are some topics that we need to explain. Financial behavior is how people behave concerning their finances. The firm Kaplan Financial Education described as "the study of the effects of psychology on investors and financial markets. It focuses on explaining why investors often appear to lack self-control, act against their own best interest, and make decisions based on personal biases instead of facts". Financial behavior should be the guideline for those who want to have a good financial life. It is common to hear that taking care of your money and not spending more than you earn is the answer to having great financial stability. However, doing this is not easy. Since childhood, we are bombarded with advertisements that encourage us to desire products that we don't even need. Thanks to this, we tend to overconsume as people.

Constant developments in the financial technology industry continue to shape our outlook towards investing, trading, and the financial market. The stock market has always attracted investors. The truth is it has never been difficult for new investors to trade the stock market. After many years in which inexperienced investors had big losses, the influence of social networks has been helping a lot in this market. According to Greenwich Associates, "Almost 80% of institutional investors use social media as part of their regular workflow, and approximately 30% of them said that information they gathered on social media has influenced a recommendation or decision." Social media allows anyone, at any level, to follow and copy the investment strategies of experienced and successful traders. Steve Olenski wrote an article in Forbes magazine saying that: "Intelligent investors have discovered how social media can help identify, understand, and address clients’ needs. The goal is to be aware of what the masses are looking for from a particular company."

As we said in my introduction, it's important to be careful with these "opportunities" on social media. The US Securities and Exchange Commission warns: "While social media can provide many benefits for investors, it also presents opportunities for fraudsters. Through social media, fraudsters can spread false or misleading information about a stock to large numbers of people with minimum effort and at a relatively low cost. They can also conceal their true identities by acting anonymously or even impersonating credible sources of market information."

Very related to this advance of technology in the financial market in general, Artificial Intelligence is a technological advance that allows systems to simulate human-like intelligence, going beyond the programming of specific orders to make autonomous decisions based on patterns from huge databases.

An article written by the DaytradingZ website says that:

*Here are the five of the most popular platforms on the market nowadays:*

*1. Trade Ideas*

*2. TrendSpider*

*3. Blackboxstocks*

*4. EquBot*

*5. Kavout*

Roughly speaking, artificial intelligence is the ability of machines to think like human beings: to learn, perceive and decide which paths to follow, in a rational way, in certain situations.

**What is the nature of impact of AI & social media analytics on investor and trader behavior in the stock markets and other financial contexts?**

As we said above, these technologies are advancing and thus allowing beginners, intermediates, or even advanced investors to better their techniques and profits. Social media allows people to get inspiration from others and learn how to be more successful. It is important to understand how artificial intelligence works, how social media can help you in a positive way, and also how to have behavioral finance.

**How did COVID impact the stock market?**

The dissemination of COVID-19 has impacted the financial market. The coronavirus pandemic caused a slowdown in industry and consumption, which had almost immediate consequences for stock markets. Devin Partida stated on the website International Policy Digest that: "Public health isn’t the only area of life the COVID-19 pandemic has affected. Throughout the year, stimulus packages, lockdowns, and changing consumer trends have had various financial consequences. These changes have had a considerable impact on the U.S. stock market. The stock market and the national economy are not the same things. Positive performance in stocks doesn’t necessarily indicate economic stability for the majority of Americans. Still, investments play a crucial role in many people’s finances, so these changes are important."

**What financial jobs have been lost to AI?**

As we have observed, Artificial Intelligence already meets practical objectives, such as cost reduction and optimization of processes and tasks considered essentially repetitive. Consequently, some professions tend to be suppressed. Furthermore, with the evolution of research and investments in the area, it is already possible to find robots capable of performing highly complex tasks, considered, until then, as intellectual work.

An article from the It For All website adds that: "Technology-driven societal changes, like what we’re experiencing with AI and automation, always engendering concerns and fear—and for good reason. A two-year study from McKinsey Global Institute suggests that by 2030, intelligent agents and robots could replace as much as 30 percent of the world's current human labor."

For example, these jobs may be impacted by the increasing use of artificial intelligence:

Telemarketing operator: with increasingly intelligent bots, computers will be able to solve users' problems and service will no longer need to be performed by one person.

Realtor: With gradually smarter integrated digital platforms, the search for houses or apartments will no longer require a realtor. The construction company Rossi, for example, allows its clients to visit apartments remotely through a robot physically present in the property.

Bank teller: With the popularization and constant development of banking services, the need for a teller to carry out transactions is decreasing.

**Literature Review**

Studies have showed that investors now use social media as 80% of their workforce. This allows investors are able to find inspiration, find new relationships, and furthermore make more accurate decisions. This is the advantage investors have over artificial intelligence, yet they are still unable to compete with AI. Why? Because simply investors are real life human beings who deal with emotions, while artificial intelligence makes decisions based strictly off data and statistics. Through Eurekahedge, (an independent data provider and alternative research firm) January research of 23 hedge funds using artificial intelligence, it “showed that they had much better results than those managed by people. Over the past six years, these funds have achieved an annual yield of 8.44% compared with conventional funds, which ranged from 1.62% to 2.62%. The authors of the study associate the dominance of artificial intelligence in the industry with the fact that it constantly conducts repeat testing, and does not just accumulate data” (Andrey Sergeenkov, 2021). This data reveals how much more accurate artificial intelligence is, creating more of a challenge for even the most talented group of investors. Despite the challenges artificial intelligence can bring, financial institutions are finding ways they can utilize the benefits of AI themselves. In an article called “Smart Data for Finance” studies find “Financial institutions seeking to improve their analytics capability often begin by conducting a data inventory and then aligning that inventory with business requirements to identify opportunities where analytics can make a powerful difference for the business. Common use cases for AI in the financial sector include fraud detection, portfolio management, sentiment analysis, product recommendations, customer service and compliance” (Smart Data for Finance). AI will be able to improve fraud detection by allowing institutions to bring large quantities of statistics and data to carry on the problem and mining that data for small bits of knowledge that can confirm or refute suspicions of fraudulent activity. The use of artificial intelligence in portfolio management helps artificial advisors to be able to correctly move customer funds in and out of index funds and other investments based on the customer’s investment objectives, risk tolerance and market performance in the market. Artificial Intelligence in the field of Sentiment analysis allows firms to monitor traditional media, social media, product reviews and other online sources and analyze whether coverage is favorable or unfavorable.

Product recommendations will be powered through artificial intelligence. This will take a user’s data and statistics and compile it into a portfolio that will recommend items that may pertain to a customer. When it comes to customer service and compliance, artificial intelligence can be able to take the time and handle these services, making less need for a 24/7 on the clock human being.

Studies also show that 75% of financial institutions are either using artificial intelligence or will consider using it within the next 18 months. The importance of this is to show how these institutions are not ignoring the fact that they cannot beat artificial intelligence. Instead, they are utilizing the benefits of artificial intelligence, and incorporating them into their own usages. The trend will continue to grow, and more and more financial institutions will resolve to artificial intelligence whether it comes to preventing fraud, portfolio management, sentiment analysis, product recommendations, or customer service and compliance.

**Theory and Discussion**

My theory is that down the road, artificial intelligence will soon take over those usual human services that we have come accustomed to in the financial word. An article from science and technology states “AI can dramatically improve the efficiency of our workplaces and eliminate the necessity for humans to perform tedious tasks. When Artificial Intelligence takes over repetitive or dangerous tasks, it frees up humans, allowing them to perform tasks that involve creativity, and leaves enough room and time for the interpersonal aspects of their lives” (Batok, N. 2020). The use of artificial intelligence will make it more possible for firms to be efficient and accurate. This will free up the ability and time for humans to be more creative and focus on aspects a robot could not solve. Not only will firms have those abilities, but they will be able to save money because there is less need for a human being to be on payroll performing tedious tasks. The possibility is that there will be less jobs in finance that are tedious, creating more complex jobs that only humans can operate.

**Data and Data Analysis**

Many firms have begun to use this artificial Intelligence in order to help make better decisions. Artificial intelligence allows firms to make better decisions on investments, trades, and even decisions within the company. This allows firms to be faster in decision making and save a boat load of money in the process. One good example came from a website I found while researching this topic. According to the data provider, Preqin (7), more than 40% of new hedge funds were ‘systematic’, which means they were using computer models (or Artificial Intelligence) for the majority of their trades in 2014. The algorithm used in trading is designed to react extremely quickly to market changes. This algorithm is provided by Artificial Intelligence, showing that the majority of trades in 2014 were based of computer analyzed Artificial Intelligence algorithms. These algorithms seek out the best trading opportunities in fractions of a second. This is the reason that many orders on the US stock market are now being placed by automated algorithms and this has enforced the Securities and Exchange Commission (USA) to look for ways to regulate them. The market today is also heavily dependent on information and with the rise of technology, this information comes faster and more accurate. “An NVP (2016) survey of Fortune 1000 companies shows that big data analytics is now an important and established part of business strategy: Less than 6% of responding companies, in their 2014 survey, aimed to invest more than $50MM into big data projects. That number has grown from under 6% to over 26% of companies who intend to invest more than $ 50 million into big data analytics by 2017. Leading big data and analytics services companies such as Splunk, Talend, Hortonworks & New Relic have reported around 40% growth for 2016. The financial services sector has been one of the leading consumers of big data services” (Samuel, 2020). This quote shows the importance of big data and how much it has risen in just recent years. It is now an unavoidable part of business and will just continue to get bigger. The resources of big data become more and more accessible. As for social media analytics, the same can be said for investing and trading. Social medias like Facebook, Twitter, and Instagram all have some sort of stock investment. Using social media analytics, investors can make informed decisions on what and when to invest in. Also, social media analytics can be used to sway investor and trader behavior based on what they see in social media. One example I found was from JP Morgan, “The increased use of social media and shift toward a digital lifestyle have played a key role in facilitating the flow of information influencing investor decisions. Social media platforms like Twitter, LinkedIn, Reddit and Instagram, among others, have created a digitalized investing environment that provides investors with a quicker, more efficient way to access a variety of online information sources. In fact, almost 80% of institutional investors use social media as part of their regular workflow, and approximately 30% of them said that information they gathered on social media has influenced an investment recommendation or decision. Meanwhile, 34% of retail investors have made at least one change to their investments as a result of announcements seen on social media.” (Duré). This shows just how much investors are swayed by social media platforms. Because all of this information is just a tap away and can be seen within seconds, most investors can use these platforms to make better decisions. This is also applicable to firms. Most firms have a social media department that scans over platforms to make informed decisions for the company. This being so easy to find saves firms money, time, and effort. This is changing the game. “80% of institutional investors use social media as a part of their regular workflow...” That is a truly unbelievable stat. Social media is so well known and so easy to find, why not use it to invest or trade? Artificial intelligence takes no effort on your side and is extremely quick. It also uses human based intelligence to make decisions. These features are very helpful when people are making informed decisions.

**Implications**

Artificial Intelligence already exists among us, this is no utopia. The concept of Artificial Intelligence has undergone changes as its applications develop. But, in summary, as I explained above, we can say that it is the technology that allows more autonomy to machines through computing: they can learn, think and make decisions intelligently, based on their programming. Some examples that make artificial intelligence present in our daily lives without us realizing that we are using it are:

Artificial Intelligence has been increasingly used in applications of various types, but we highlight route applications such as Google Maps and Waze. They are able to cross data from numerous places to find the best routes, optimizing time, and avoiding traffic problems.

Did you know that Google search results are different for each person? This is Artificial Intelligence: various parameters are analyzed, based on data collected from the user. Thus, the most suitable answers for you are shown based on the websites you visited, your surveys, your profile, and publications you liked, commented on, or shared. A case of the almost frequent presence of Artificial Intelligence in our daily lives, whether at work or anywhere else.

Artificial Intelligence is also increasingly useful in e-commerce. The stores basically work with cost and deadline, focused on logistics. Through Artificial Intelligence, it is possible to achieve better deadlines for customers with more attractive costs, as sales forecasts are made to organize the logistics. For example, fewer trucks, containing more loads.

In relation to finance, which is the focus of our research, Artificial Intelligence has also been of great help. Investors can count on numerous applications and software, for example, that help them organize their finances and even investments. Furthermore, even the investment operations on the stock exchange are made possible thanks to Artificial Intelligence and the advancement of technology. Humanly, it would be impossible to keep track of every movement in the financial market, so smart robots do that.

Have you noticed Netflix and YouTube's recommendation system? The first indicates movies and series, while the second suggests videos. All these suggestions are based on intelligent robots, which track user behavior.

**Weaknesses and Future Research**

Currently, we are living in the information age. With the development and wide use of the internet around the world, it has become our main means of communication, connecting us globally through mainly social networks. Networks have become very popular, and are currently the main stage for several discussions. Within these digital environments, everything is talked about, and, thanks to the algorithms of these networks, we are increasingly in contact with the contents of our interest.

One truth you can tell is that claims and other forms of information never disappear from the Internet. If Google searches any topic, you'll find information sources that are years old. That's okay, though, because responsible sites ​​put dates on your information, putting it in the proper context.

Social media, on the other hand, doesn't always have a date stamp for people to see how relevant the information is. Even when there's a date stamp, people rarely bother to look for the date on social media before sharing or commenting on content that could be 5 years old. Some people even change date stamps when searching for old information, instead of just leaving the originally date be.

Information taken out of context can be used to prove or disprove anything. You see it all the time: someone says something and the media focuses on a fragment of a sentence that makes the person sound crazy.

Social media does this constantly. The worst part about social media is that the statements you read could have been edited and distorted multiple times, to the point where the original author doesn't even recognize them anymore. Another little trick social media likes to do is assign statements to people who never made them.

The relationship between the subjects of social networks and investments happens mainly on Twitter. Thus, in this digital environment, influencers, experts, investors, and laypeople discuss the market, stock prices, and often their own beliefs in relation to the stock market. The problem involving the power of social media in the stock market happens right there. This last point, when presented by an influencer within this network, ends up reaching a very large volume of people, who may or may not feel influenced to make decisions about their own investments based on the ideas of others.

As we quoted above, The US Securities and Exchange Commission warns: "While social media can provide many benefits for investors, it also offers opportunities for fraudsters. Through social media, fraudsters can spread false or misleading information about a stock to large numbers of people with minimum effort and at a relatively low cost. They can also conceal their true identities by acting anonymously or even impersonating credible sources of market information."

**Conclusion**

In conclusion, the functioning of Artificial Intelligence is based on the combination of large amounts of digital data and intelligent algorithms. They allow the system to read and interpret patterns and information to learn automatically. The great advantage of artificial intelligence is that it allows you to perform tasks much faster and with a degree of accuracy thousands of times greater than humans. Some activities would not even be possible without it.

Another important point in our research is social networks. “Social media has become hugely important in stock trading,” says Mihir Dange, a former gold trader at the New York Mercantile Exchange, who now works with a company that integrates social media and markets. Twitter, in particular, he says, “was a game-changer for both institutional investors and small-time traders alike.” In these social networks, it is possible to follow the stock and currency quotes in the financial market, ask questions and also share knowledge. Interacting with other investors is one of the great advantages of being part of this community.

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