2021 Annual Letter

Yiqiao Yin

Abstract

This is the 2021 annual letter to shareholders. This year our after-tax return was 48% after financing activity and 26% of net gain from equity market. The benchmark index S&P 500 Index Fund (SPY) returned 27%. Unexpectedly, we lost to S&P 500 by 1%.

1 Performance

	Returns (0.01 means 1%):		Simulations (from $1 USD):	
Date	WYN	S&P 500	WYN	S&P 500
			$1	$1
1/3/2011	(0.35)	0.02	0.65	1.02
2/1/2011	0.24	0.03	0.81	1.06
3/1/2011	(0.02)	(0.00)	0.79	1.05
4/1/2011	0.10	0.03	0.88	1.08
5/2/2011	0.06	(0.01)	0.93	1.07
6/1/2011	(0.04)	(0.02)	0.89	1.05
7/1/2011	(0.04)	(0.02)	0.85	1.03
8/1/2011	0.05	(0.05)	0.89	0.97
9/1/2011	0.05	(0.07)	0.93	0.90
10/3/2011	0.06	0.11	0.99	1.00
11/1/2011	0.49	(0.00)	1.47	0.99
12/1/2011	(0.27)	0.00	1.08	1.00
1/3/2012	0.10	0.05	1.18	1.04
2/1/2012	0.09	0.04	1.28	1.09
3/1/2012	0.10	0.03	1.41	1.12
4/2/2012	(0.03)	(0.01)	1.36	1.11
5/1/2012	(0.01)	(0.06)	1.35	1.05
6/1/2012	0.54	0.04	2.08	1.08
7/2/2012	0.06	0.01	2.19	1.10
8/1/2012	(0.12)	0.03	1.92	1.12
9/4/2012	(0.07)	0.02	1.78	1.14
10/1/2012	0.90	(0.02)	3.39	1.12
11/1/2012	0.04	0.01	3.51	1.13
12/3/2012	(0.01)	0.00	3.49	1.13
1/2/2013	0.02	0.05	3.55	1.19
2/1/2013	0.11	0.01	3.95	1.21
3/1/2013	0.03	0.03	4.07	1.25
4/1/2013	0.02	0.02	4.17	1.27
5/1/2013	0.20	0.02	5.00	1.30
6/3/2013	0.19	(0.02)	5.96	1.28
7/1/2013	(0.04)	0.05	5.72	1.34
8/1/2013	0.06	(0.03)	6.07	1.30
9/3/2013	0.06	0.03	6.43	1.34
10/1/2013	0.06	0.05	6.82	1.40
11/1/2013	0.06	0.03	7.23	1.44
12/2/2013	0.06	0.02	7.66	1.47
1/2/2014	0.06	(0.04)	8.12	1.42
2/3/2014	0.06	0.05	8.61	1.48
3/3/2014	0.01	0.00	8.70	1.49
4/1/2014	(0.67)	0.01	2.83	1.50
5/1/2014	(0.75)	0.02	0.71	1.53
6/2/2014	4.96	0.02	4.23	1.56

	Returns (0.01 means 1%):		**Simulations (from $1 USD):**	
Date	WYN	S&P 500	WYN	S&P 500
7/1/2014	0.14	(0.01)	4.81	1.54
8/1/2014	0.04	0.04	4.98	1.60
9/2/2014	0.28	(0.02)	6.38	1.57
10/1/2014	0.01	0.02	6.47	1.60
11/3/2014	(0.20)	0.03	5.16	1.65
12/1/2014	(0.12)	(0.01)	4.52	1.63
1/2/2015	(0.34)	(0.03)	2.98	1.59
2/2/2015	(0.37)	0.06	1.88	1.68
3/2/2015	0.37	(0.02)	2.57	1.64
4/1/2015	0.27	0.01	3.26	1.66
5/1/2015	0.74	0.01	5.66	1.68
6/1/2015	(0.27)	(0.03)	4.13	1.64
7/1/2015	0.00	0.02	4.15	1.67
8/3/2015	0.12	(0.06)	4.66	1.57
9/1/2015	(0.09)	(0.03)	4.24	1.52
10/1/2015	(0.04)	0.09	4.07	1.65
11/2/2015	(0.06)	0.00	3.84	1.66
12/1/2015	(0.01)	(0.02)	3.82	1.62
1/4/2016	0.08	(0.05)	4.12	1.54
2/1/2016	(0.28)	(0.03)	2.95	1.49
3/1/2016	1.14	0.07	6.32	1.59
4/1/2016	0.23	0.03	7.76	1.65
5/1/2016	0.21	(0.00)	9.41	1.64
6/1/2016	(0.07)	0.01	8.79	1.66
7/1/2016	(0.04)	0.00	8.48	1.67
8/1/2016	0.02	0.04	8.69	1.73
9/1/2016	0.08	0.00	9.39	1.73
10/1/2016	0.06	(0.01)	9.93	1.72
11/1/2016	(0.00)	0.00	9.92	1.72
12/1/2016	(0.22)	0.02	7.72	1.75
1/1/2017	0.15	0.02	8.84	1.78
2/1/2017	(0.06)	0.02	8.33	1.82
3/1/2017	0.40	0.05	11.67	1.91
4/1/2017	(0.34)	(0.02)	7.69	1.87
5/1/2017	(0.02)	0.01	7.56	1.90
6/1/2017	(0.20)	0.01	6.07	1.92
7/1/2017	0.17	0.00	7.12	1.93
8/1/2017	0.05	0.02	7.47	1.97
9/1/2017	(0.18)	0.00	6.16	1.97
10/1/2017	(0.10)	0.01	5.53	2.00
11/1/2017	0.36	0.02	7.54	2.05
12/1/2017	0.10	0.02	8.27	2.09

	Returns (0.01 means 1%):		**Simulations (from $1 USD):**	
Date	WYN	S&P 500	WYN	S&P 500
1/1/2018	0.25	0.02	10.34	2.13
2/1/2018	0.34	0.05	13.90	2.24
3/1/2018	(0.12)	(0.04)	12.28	2.14
4/1/2018	(0.13)	(0.04)	10.74	2.05
5/1/2018	0.04	0.02	11.14	2.10
6/1/2018	0.09	0.03	12.15	2.17
7/1/2018	0.01	0.00	12.26	2.17
8/1/2018	0.02	0.03	12.54	2.24
9/1/2018	0.31	0.04	16.39	2.32
10/1/2018	0.04	(0.01)	17.11	2.30
11/1/2018	(0.08)	(0.06)	15.73	2.16
12/1/2018	0.05	0.03	16.55	2.23
1/1/2019	(0.02)	(0.11)	16.19	1.97
2/1/2019	0.16	0.09	18.80	2.15
3/1/2019	0.03	0.04	19.31	2.23
4/1/2019	0.02	0.02	19.74	2.26
5/1/2019	0.10	0.04	21.64	2.34
6/1/2019	(0.06)	(0.07)	20.32	2.19
7/1/2019	0.08	0.08	21.85	2.35
8/1/2018	0.03	(0.00)	22.59	2.34
9/1/2019	(0.02)	(0.01)	22.11	2.31
10/1/2019	(0.00)	0.01	22.02	2.33
11/1/2019	0.00	0.04	22.03	2.43
12/1/2019	0.02	0.01	22.52	2.46
1/1/2020	0.03	0.05	23.11	2.58
2/1/2020	0.02	0.01	23.56	2.62
3/1/2020	(0.00)	(0.06)	23.55	2.46
4/1/2020	0.03	(0.20)	24.24	1.96
5/1/2020	0.07	0.15	25.96	2.25
6/1/2020	0.07	0.08	27.88	2.43
7/1/2020	0.07	0.02	29.79	2.47
8/1/2020	0.06	0.06	31.56	2.61
9/1/2020	0.18	0.07	37.09	2.80
10/1/2020	(0.03)	(0.04)	36.02	2.68
11/1/2020	(0.05)	(0.03)	34.29	2.60
12/1/2020	0.14	0.12	39.16	2.91
1/1/2021	0.12	0.02	43.77	2.97

	Returns (0.01 means 1%):		**Simulations (from $1 USD):**	
Date	WYN	S&P 500	WYN	S&P 500
2/1/2021	0.08	0.01	47.27	2.99
3/1/2021	(0.02)	0.04	46.44	3.10
4/1/2021	(0.01)	0.03	46.05	3.19
5/1/2021	0.02	0.05	47.06	3.34
6/1/2021	0.04	0.01	48.82	3.36
7/1/2021	0.13	0.01	55.08	3.41
8/1/2021	(0.05)	0.03	52.55	3.50
9/1/2021	0.16	0.03	61.12	3.60
10/1/2021	(0.05)	(0.05)	58.17	3.43
11/1/2021	0.13	0.07	65.56	3.67
12/1/2021	(0.02)	(0.02)	64.15	3.58
1/1/2022	0.01	0.05	64.71	3.78

2 Annual Summary

This section debriefs the audience and our investors on the milestones of the year 2021 throughout each quarter.

2.1 Change of Company

The company name has been changed to WYN Associates, LLC. For the rest of the letter, we will refer to the legal entity of this company, WYN Associates, LLC, as "the company", "W.Y.N.", or "WYN".

The name "WYN" comes from my three family names: Whatley, Yin, and Nunn. The name "WYN" and "win" are homophones (sounds the same but have different meanings), which summarizes the founding spirit of my own winning personality and non-singular investment style. In Chinese culture, we say "Of all virtues, filial piety is the first". This virtue, respect for one's parents, initially came from Confucius (551 BC to 479 BC) and has been repeatedly taught throughout thousands of years of history. I myself was raised with this virtue and I have personally gained a lot of benefits by honoring it. I intend to keep this virtue and it is something I believe valuable to pass through the future generations and future employees of WYN.

The virtue of filial piety translates to respecting one's parents, elders, and ancestors. In the modern understanding, this virtue can be translated into respect of all scholars before us. This belief includes the respect of reading one of your favorite books that inspired your entrepreneurial spirit, the respect of watching a great movie that changes your perspective, the respect of reading textbooks or books for leisure, the respect of reading formally scholarly writing such as papers on asset pricing or machine learning, and so on. It can even simply be respect of a role model that you have a poster of in your bedroom. The inspiration of all that came before us contributes to my understanding of filial piety. We must give these role models the credit they deserve, because they inspired us to become who we are today.

The reason I emphasize this founding principle is that for me, filial piety is the direct cause of my adherence to the "water principle". Everyone I've talked to on Wall Street likes to ask me what investment strategies I follow. My answer is I do not have a single style. There is no magical formula that miraculously works in all market conditions or environments. This conclusion will always be reached if every person embraces the concept of "filial piety". A simple example is the following. In the years 2015 to 2016, I was working for a team at AQR. It was a great honor and I absolutely respected everyone on my team. My leaving AQR was not an indication that AQR's methodology of factor-based trading is a failure. On the contrary, I still run factor-based trading algorithms today. I just do not use it 100% of the time. Later in 2018, I shifted my focus away from factor-based trading and I moved towards machine learning or AI-based algorithmic trading. This year, in 2021, I've moved my focus away from AI-based algorithmic trading and shifted my focus to real estate. It is not an indication that AI-based trading does not work. I just no longer manage all my money according to AI-based strategy. With my belief in filial piety, it is not a leap to say that I respect all who developed these trading strategies before me. I respect the economists who developed factor-based trading. I also respect the scholars who developed machine learning models that can be used in sequential data (stock data is a type of sequential data). I do not see any conflict whatsoever. This is the power of the water principle.

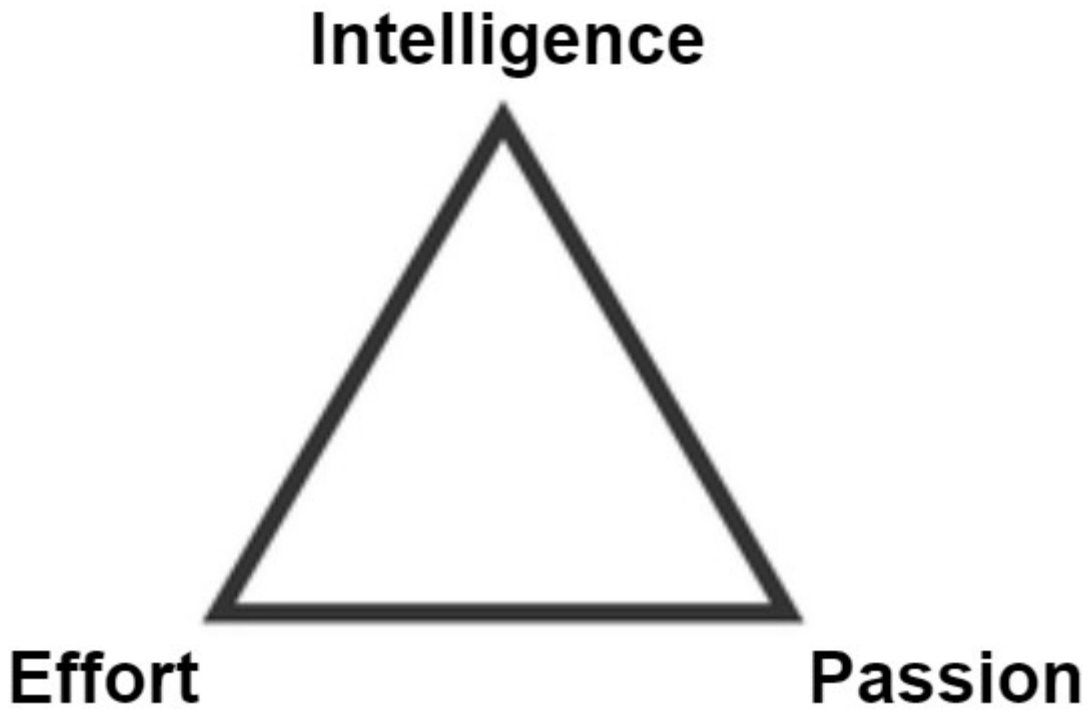


Figure 1: The structure of evaluation of competency level under the meritocracy managerial style at WYN Associates.

The future of this company is going to not only focus on the stock market but expand into the real estate market. I do not want to say for certain, but perhaps a combination of Berkshire Hathaway and Blackstone will eventually be a good model for us.

2.2 Managerial Style

WYN Associates adopts a managerial style of meritocracy. The word meritocracy is constructed using "merit" (which is Latin for "win" or "deserve") and "cracy" (which is Ancient Greek for "strength" or "power"). The literal translation is "those who deserve to be in power". In the modern day economic and political environment, the word "meritocracy" means a political or managerial system in which economic goods and/or political power are vested in the individual on the basis of talent, effort, and achievement, rather than wealth or social class.

The concept of a meritocracy was originally proposed by Plato. While the most common measure of merit in terms of competency and ability uses IQ or standardized tests, I disagree on only using tests to evaluate a manager's performance.

I am not the only one that disagrees with this measurement. Michael Young argued in his work *The Rise of the Meritocracy* that in contrast to the original concept of meritocracy, merit can be measured with intelligence plus effort, which I believe is a much more appropriate measurement for evaluating an employee or manager's success.

In addition, passion is another important metric, so I propose we update Michael Young's equation to be intelligence+effort+passion, which creates a triangular formula to measure competence. This structure is illustrated in Figure 1.

2.3 Proposed Asset Allocation

The proposed asset allocation for the next decade at WYN is to allocate our resources to: **cryptocurrency**, **equity**, and **real estate**.

Cryptocurrency. Cryptocurrency, such as Bitcoin, is fundamentally another form of cash. Unlike other currencies such as dollars, bitcoins do not have a central bank or a single administration office. The transactions are verified by a network through cryptography and publically distributed ledger called blockchain. I am not a cryptocurrency miner or developer, but I do know supply and demand. In addition, I am well trained in machine learning. This combination of microeconomics and machine learning gave me a small edge in this field. This holding is about 6% of the entire AUM (short for Assets Under Management) of WYN.

Equities. WYN started as a simple investment company or holding company run by myself in the year 2010. That was the first year I came to the United States. I started this company by opening up a Scottrade brokerage account. I still remember the day that I went to open the brokerage account. I did not bring my passport. The branch manager had to wait in the office for 2 hours just so I could take a taxi to my college dorm to get my passport. I am very grateful for his patience. Throughout the years, I have employed many trading strategies. The most basic one is reading stock charts. I was always fascinated with stock charts. I still do a daily stock chart review to keep my brain sharp. My favorite patterns are the u-bottom and downtrend wedge patterns. I am not saying these are the best patterns, but these are the patterns that I have made the most money from. However, at the end of the day the chart pattern is just one layer of probability. It helps, and it is another way of writing supply and demand, but it is not a causality argument. The next step up from chart analysis is to use some basic linear regression models. This can simply be standard college level econometric principles. Perhaps there is an association with a country's GDP per capita and its equity price movements, which we can figure out by using the Pearson correlation or even a simple linear regression. For readers with a basic statistics background, linear regression is a model but it only measures linear associations. Hence, the amount of variance explained by a linear model in stock data is usually very low (or in statistical terminologies: a low R^2). How do we further capture the variance in stock data? This is where I moved away from conventional statistics and started to investigate asset pricing models and cross-sectional asset pricing models. Any finance PhD trained in this country will tell you that asset pricing is essentially founded by the leading scholars Eugene Fama and Ken French (both are Nobel laureates and had leading roles in the founding of AQR Capital Management, the company I was involved with in my early career). Factor-based trading algorithms are great. However, when you get to the 50th factor, the marginal costs of crafting an additional factor begin to wash away the marginal benefits of the alpha (a performance metric that says how much a proposed strategy beats the benchmark) gained from the model. It is not a stretch to say that if I did not think outside of the box and relied only on factor-based trading strategies, I would very soon get myself into negative infinity marginal gains. This is the major reason why I left the industry and moved on to machine learning and Artificial Intelligence (AI). When I talk to people, many think of AI as the scary terminator that will eventually end mankind, or as the ultimate robot that can replace every job in this country. Neither of these two views is accurate. Machines will always become more automated and help doing certain tasks faster. This can not be labeled "good" or "bad". It is not that simple. A car moves from one place to another

faster than a horse. This statement says nothing about whether the destination is correct or not. It certainly does not say whether the destination is beneficial or harmful. AI is like a fast moving car. It will help us get from one place to another much faster. Whether you want to go help others or drive into a wall is completely up to whoever sits in the driver's seat. In other words, it is a double-edge sword. At WYN, we use AI to the highest degree possible. For any single detail of our decision making process, as long as it can be written down in algorithmic form, we code it out and create a small machine to execute that decision. I have personally been doing it and I will continue to do it for as long as I can move my fingers. The equity holdings at WYN takes about 25% of our AUM.

Real Estate WYN has most recently created a real estate branch. We aim to become a real estate investment/property management group focused on purchasing and improving residential and recreational properties in New York State. We will work with foreign investors to buy, sell, and improve properties. We are still in the progress of R&D to determine the percentage of holdings for this branch. However, to ensure a safe transition and sufficient liquidity, we will only use private funding for our real estate investments for now. This way, our continuous learning and expansion can carry on without hurting investors' positions.

2.4 Q1 Summary

The S&P 500 started the fiscal year of 2021 at 3,764.61 and ended the first quarter at 3992.78 which is approximately a 6% gain, a relatively large gain considering that we were just wrapping things up from the COVID-19 hot mess. In any case, disregarding the horrible situation most major news channels have been selling us, WYN Associates holds the strong belief that the U.S. market remains the strongest market in the world (at least from the perspective of S&P 500) which is the major market where we hold our portfolio.

The strategy that we adopted for the first quarter is a simple hold and wait approach. The smart move for WYN Associates really started in March of 2020 during the peak of COVID-19, when we initiated most of our portfolio. The first quarter was really about holding on to that faith and keeping cash coming in to the account.

There were a handful of positions that popped up on our radar.

First, cryptocurrency started to see some overbuying behavior, and we received a lot of sell signals from Yin's Timer algorithm. In other words, a somewhat deeper drop was about to happen in cryptocurrency led by Bitcoin. This is actually the time when we started to collect some cash from our portfolio and wait for the so called cryptocurrency bubble to burst. We anticipated in the first quarter that this would eventually happen in the summer of 2021.

2.5 Q2 Summary

We were right. In the second quarter, all eyes were on cryptocurrency. On May 12th, Bitcoin dropped 12% in a single trading day, washing away all its net gains in the fiscal year of 2021. It was precisely at this time when Yin's Timer algorithm started to see some buy signals.

The figure below is a simple visualization of the outcome of the Yin's Timer algorithm. The plot below is a visualization of the ETF that track cryptocurrency market named

"BLOK". This ETF is highly correlated with the movement of Bitcoin. We have positions in both BLOK and Bitcoin. In the graph below, we started to see a level 3 buy signal as early as late March and the beginning of May. The real buy signal, level 6, occurred on the day of May 12 and we started grabbing cryptos on a weekly basis on May 13th. About every one or two weeks there was a drop in cryptocurrency and we acquired shares every time this drop happened.

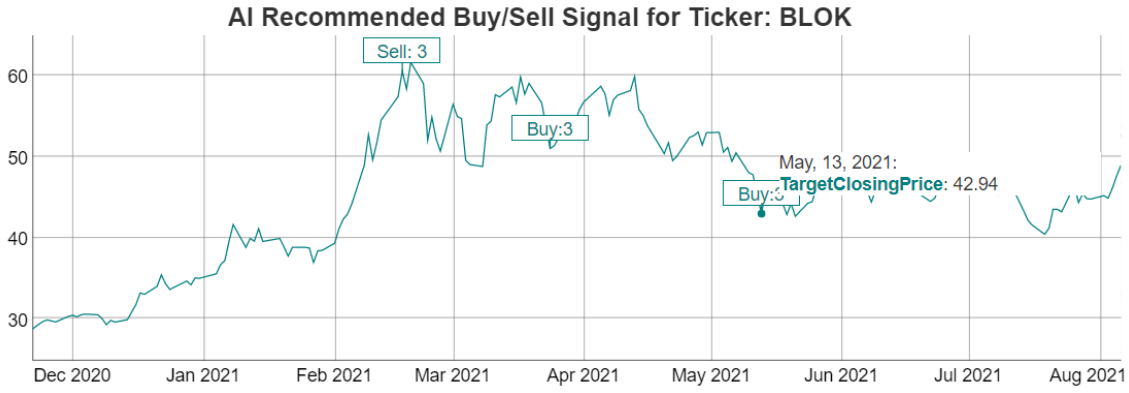


Figure 2: Blockchain ETF (BLOK)

The actual shares acquisition and buy activities can be seen in the following graph.

Figure 3: Location of WYN's Bitcoin Entry

Other than the above, we actually did not put up any other major positions and nor do we believe it was the right time to initiate any heavy positions.

2.6 Q3 Summary

One interesting thing to disclose in this quarter is our investigation into the potential of applying Neural Machine Translation to the stock market. What does this mean?

In the field of representation learning, AI scientists often like to hand craft features to design the ideal input for machines to learn to extract and eventually predict the patterns in the data. In other words, we have sophisticated AI tools to study a sequence of data and predict the ideal sequence needed. In layman's terms, I can train a machine to translate "thank you" from English to Portuguese "obrigado".

This is actually very applicable to stock market data sets. The reason is we cannot directly use the English letters in the word "thank you". Instead, we have to implement at sequence level or sometimes even at character-level by using tokens to represent texts. Tokens are just numbers. I may very well just skip the linguistic part and plug in stock data. This is completely operational. The rest of the work is just to make sure that we have a deck of code that actually works, which is my job (and since it's my code, it's safe to say there are no bugs).

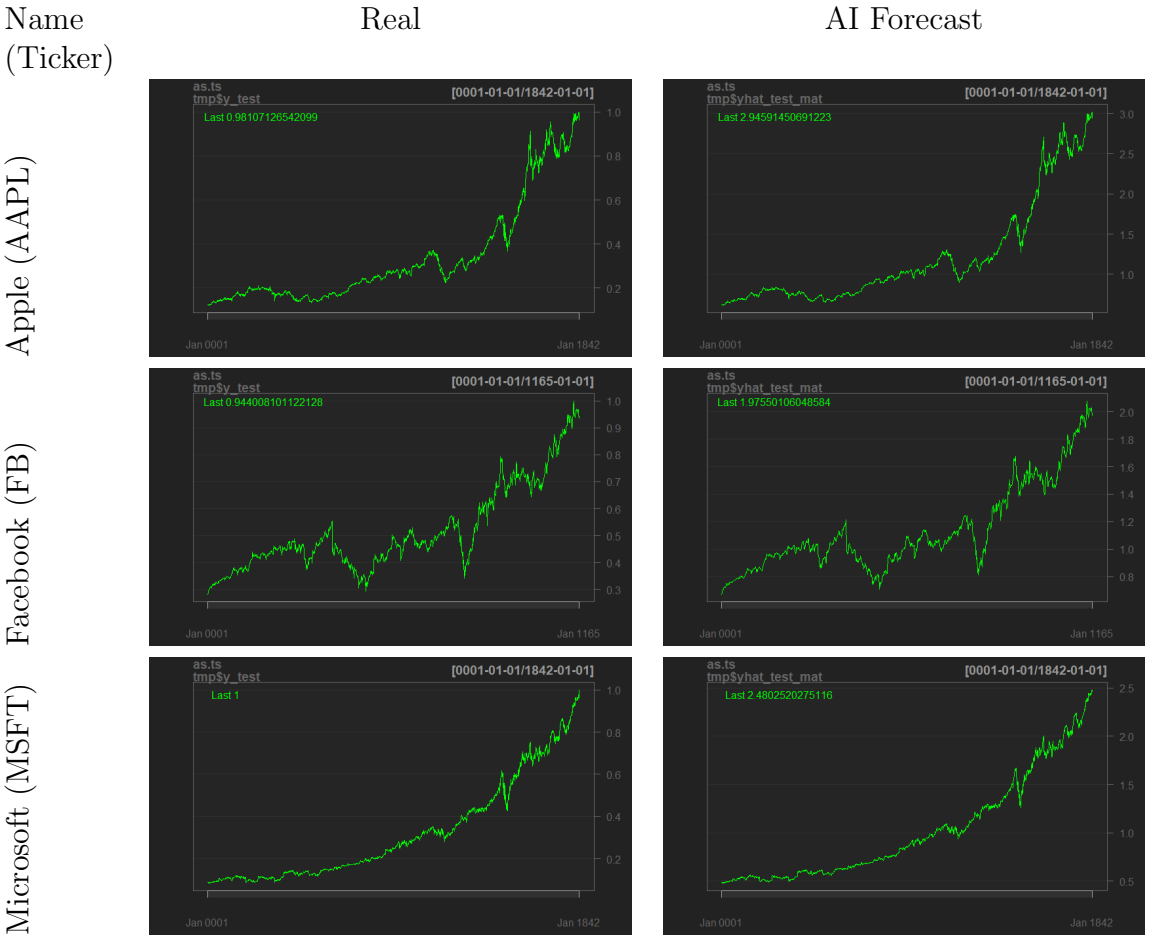
Amongst those that investigate this field, Bahdanau, Cho, and Bengio (2014)[1] and Luong, Pham, and Manning (2015)[2] are definitely at the frontier of the field of neural machine translation. Other areas are incorporating this system as sell such as Xu et al. (2015)[3]. Bahdanau, Cho, and Bengio (2015)[1] is probably the most prestigious amongst all the research I have read. Unlike the traditional statistical machine translation, neural machine translation aims at building a single neural network that can be jointly tuned to maximize the translation performance. Bengio and his team conjecture that the use of a fixed-length vector is a bottleneck in improving the performance of this basic encoder-decoder architecture and propose to extend this idea by allowing a model to automatically soft-search for parts of a source sentence that are relevant to predicting a target word, without having to form these parts as a hard segment explicitly.

An adaptation of the above idea in stock market is a softly designed sequential translation machine that somehow realizes an arbitrary length of historical stock data to read in and produce an accurate segment of future window as prediction. This completely breaks the reality of current predict-tomorrow-stock-price doctrine.

Fortunately, my experience in machine learning can be put to use, and we already have a prototype here: YinsRLab, a page function called "KerasNeuralSequenceTranslation". The function takes input of any explanatory data matrix X and response data matrix Y and it produce a machine that learns from the patterns in X and predict the data matrix of Y. A simple test can be done and results of the test is presented in Figure 4. In Figure 4, we can pick a few famous stocks such as Apple (AAPL), Facebook (FB), and Microsoft (MSFT). We can take the last 2 years of data as test data and every thing 2 years ago as training data. A neural machine can be trained to learn to predict future stock price movements. The real stock price movement and the predicted stock price movement for all three companies are presented in Figure 4 and their paths are almost identical.

Despite the small success in Figure 4, I am not saying that everyone should dump all their money to trade this strategy. Instead, I am saying that with a profile such as Apple, Facebook, or Microsoft, advanced machines can be trained to predict future stock prices to a certain degree of confidence level. Can this be adapted to each and every stock now and also for potential future IPOs? Of course not. My guess is we can consider ourselves pretty lucky if this machine can successfully predict 1% of the publicly traded stocks now accurate a week in the future. Even if we are given that premise, I would then want to know position size, investors' risk profile, liquidity, exit strategies and many other things that could jeopardize net gains.

Figure 4: This figure presents comparisons of three stocks: Apple, Facebook, and Microsoft as an example of prediction performance. The left column are real data while the right column are forecasts by "Neural Sequence Translation". The AI forecasts have near-perfect match of the real data.



2.7 Q4 Summary

The investment activities in Q4 were very quiet. There was almost no investment activity during Q4. The reason is that we came a long way in 2021 and probability told me that the odds of going up an additional percentage were against me. The reasoning is actually very simple. On Jan. 8th (the first trading day of 2021), the ETF index for S&P 500 is traded at $381 per share. On the Oct. 1st, the same index is traded at $434 per share. This is a 14% gain within the first three quarters. The odds that in Q4 there is an additional 5% gain is not that high, but the volatility could easily shoot up to 10%. The risk-reward ratio did not make a whole lot of sense to me. Therefore, no additional investment activities occurred. This reasoning was accompanied by the beginning of Omicron (a COVID variant), which reinforced our decisions and our convictions to not do "too much" during Q4. On the real estate side of things, at the beginning of Q4 I personally invested in a recreational property in upstate New York. This was not under WYN, but I hope that te acquisition and future development of this land will give us valuable data for WYN's own real estate investments.

3 Education

This year, we offered an online education program. We value the importance of good education, though believe that education from a good institution is not the only way to learn and advance.

Artificial Intelligence is transforming our world, and our online AI program enables business leaders across industries to be pioneers of this transformation. The certificates of our affiliated online education program provide high quality statistical machine learning education to ensure your success of becoming a Data Scientist or Lead Data Scientist of your dream company. We partnered with the Udemy platform, and the company courses are listed below. Earning the company affiliated courses that are listed below will also gain you an advantage in applying to our Analysts and Data Scientists program (see Career).

All of WYN family members, associates, and investors get free access to the course materials.

3.1 Intro to FinTech Using R

This course provides basic introductory guidance to FinTech. We cover three sections: (i) basic statistics in money management, (ii) stock market timing, and (iii) asset pricing. This course is for financial and technology enthusiasts. For more information, one can refer to here.

3.2 Fundamentals in Neural Networks

Deep learning (also known as deep structured learning) is part of a broader family of machine learning methods based on artificial neural networks with representation learning.

This course covers the following three sections: (1) Neural Networks, (2) Convolutional Neural Networks, and (3) Recurrent Neural Networks. You will be receiving around 4 hours of materials on detailed discussion, mathematical description, and code walk through of the three common families of neural networks. The descriptions of each section is summarized below.

Section 1 - Neural Network

- 1.1 Linear Regression
- 1.2 Logistic Regression
- 1.3 Purpose of Neural Network
- 1.4 Forward Propagation
- 1.5 Backward Propagation
- 1.6 Activation Function (Relu, Sigmoid, Softmax)
- 1.7 Cross-entropy Loss Function
- 1.8 Gradient Descent

Section 2 - Convolutional Neural Network

- 2.1 Image Data
- 2.2 Tensor and Matrix
- 2.3 Convolutional Operation
- 2.4 Padding
- 2.5 Stride
- 2.6 Convolution in 2D and 3D
- 2.7 VGG16
- 2.8 Residual Network

Section 3 - Recurrent Neural Network

- 3.1 Welcome
- 3.2 Why use RNN
- 3.3 Language Processing
- 3.4 Forward Propagation in RNN
- 3.5 Backpropagation through Time
- 3.6 Gated Recurrent Unit (GRU)
- 3.7 Long Short Term Memory (LSTM)
- 3.8 Bidirectional RNN (bi-RNN)

For more information, one can refer to here.

4 Conclusion

2021 was a challenging year in many respects. But we believe that it is the first stepping stone in many new areas of development. First and foremost, the formation of our new LLC and the designation of Yiqiao Yin and Frances Nunn as co-presidents was a huge step we took to ensure continued growth. Over the next year, we look forward to growing our knowledge of the real estate market and honing all our investment strategies. We know great things await the future of WYN Associates. We want to thank all our investors and supporters for their vote of confidence. Here's to 2022 and beyond.

5 Appendix

5.1 Software

All of the functions and software required for reproducing the results are published online. Please feel free to access our software using personal site Yin Software or Github page YinsRLab. The original Yin's Capital software is publicly available here at YinsCapital. A more advanced development in neural-based sequential learning is here at YinPortfolioManagement.

References

[1] Dzmitry Bahdanau, Kyunghyun Cho, and Yoshua Bengio. Neural machine translation by jointly learning to align and translate. *arXiv preprint arXiv:1409.0473*, 2014.

[2] Minh-Thang Luong, Hieu Pham, and Christopher D Manning. Effective approaches to attention-based neural machine translation. *arXiv preprint arXiv:1508.04025*, 2015.

[3] Kelvin Xu, Jimmy Ba, Ryan Kiros, Kyunghyun Cho, Aaron Courville, Ruslan Salakhudinov, Rich Zemel, and Yoshua Bengio. Show, attend and tell: Neural image caption generation with visual attention. In *International conference on machine learning*, pages 2048–2057. PMLR, 2015.