Annotated Bibliography

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Technical Research Paper Annotated Bibliography

Bahrammirzaee, Arash(2010) A comparative survey of artificial intelligence applications in finance: artificial neural networks, expert system and hybrid intelligent systems. *Neural Computing and Applications* 19: 1165-1195. DOI 10.1007/s00521-010-0362-z

Bahrammirzaee claims that neural networks are the superior AI model when it comes to financial calculations. In order to prove this, Bahrammirzaee does comparative research on the impact of different AI models on three different domains in finance. The three types of AI models that he researches are expert systems, artificial neural networks, and hybrid intelligence systems. He explores the impact of these models in the domains of credit evaluation, portfolio management, and financial prediction, three dominant domains in the financial industry that require AI to solve non-linear complex problems. He judges the performance of these AI models by comparing the accuracy of these models to that of more traditional statistical methods. Overall these AI models outperform the traditional methods but there are certain cases where they don’t.

Credentials:

Arash Bahrammirzaee

* Studied at University of Tehran with expertise in Computer Science
* Published over 50 Journals in reference to AI models
* Writer for various publications such as Neural Computing and Applications, Computational Statistics and Data Analytics, and many more.

Bahrammirzaee’s research is relevant to my own research because it too explores the impact of various types of AI models in finance. This journal goes more in depth on the differences between AI and traditional statistical methods than my research paper will; however, it offers a great comparison between the expert system, hybrid intelligent systems, and neural networks, and their applications in finance. Furthermore, it overlaps with Burrell’s research because both explore AI’s impact in the domains of portfolio management and credit assessment meaning there could be several comparisons that could be drawn between these two sources.

Burrell, P.R.(1997) The Impact of Neural Networks in Finance. *Neural Computing and Applications* 6: 193. DOI 10.1007/BF01501506

Burrell claims that the application of neural networks in various areas of finance is resulting in more overall productivity and success. Burrell conducts research on the new applications of neural networks, to operations like large scale portfolio management and routine credit assessment, in order to understand the overall impact of this new technology. Burrell combines the research done by various other sources and examines them in order to come to the conclusion that this technology is deeply impacting the financial industry and will lead to large scale changes in the near future. Furthermore, he concludes that these changes will be beneficial to the entire financial industry by using statistics from various financial sectors.

Credentials:

P. R. Burrell

* Works at Knowledge Based System Center in London
* Studied at South Bank University

Springer London Publishing

* Has published over 250,000 books and journals
* Partnered with other publishers like Nature Research, BMC and Palgrave Macmillan to support researchers

This source is relevant to my claim of neural networks being more impactful than other types of AI models. While it doesn’t cover the impact of other AI models it does explore the role that neural networks are currently play in the financial industry and how it is changing the industry. It gives us some insight on the different sectors of the financial industry and how AI is improving the overall quality of their services, similar to what Bahrammirzaee researched.

Coakley, James R.(2000) Artificial Neural Networks in Accounting and Finance: Modeling Issues. *International Journal of Accounting and Finance* 9: 119-144. DOI 10.1002/1099-1174(200006)9:2<119::AID-ISAF182>3.0.CO;2-Y

Rather than evaluate the impact of artificial neural networks, Coakley decides to go in depth into the literature about artificial neural networks to see the conclusions that others have come to, in regard to this technology. Additionally, he describes the uses of neural networks in finance and the specific circumstances necessary in order to use neural networks for statistical calculations. Rather than have his own claims about neural networks, Coakley evaluates the validity of other people’s claims to see if the literature about neural networks is true. Finally, Coakley discusses the development of these neural networks and the learning phase that they must go through in order to properly evaluate the statistical data that it will later be fed.

Credentials:

James R. Coakley

* Ph.D. University of Utah, August 1982 Accounting Information Systems
* MBA University of Utah, June 1976
* BS Oregon State University, June 1970 Mathematics/Computer Science
* Dean of School of Business at Oregon State University
* Recognized as OSU’s Outstanding Research Contributions in 1999

This journal is relevant because it provides valuable information of the implementation of neural networks in finance. Additionally, it speaks about various big companies using neural networks and why it is they implemented neural networks rather than utilizing traditional statistical methods. Furthermore, it helps to get a broader understanding on the literature about neural networks and some of previous research done about these AI models.

Lin, T. C. (2013). The New Investor. *UCLA Law Review* 60(3): 678-735. Retrieved from https://scholarship.law.ufl.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1245&context=facultypub

This article offers a broad look at a recent shift in the financial industry, more specifically a shift in financial investment, where computerized analysis is making faster and bigger financial moves possible. This journal examines this increased reliance on machines and addresses the possible dangers of a financial industry dictated by computerized analysis rather than human intuition. Finally, Lin makes a claim that smarter humans with smarter machines are the best solution for better investments and a bright future for the financial industry. Lin does this by drawing from various articles discussing law’s capacity to regulate this evolving financial landscape and the possible ramifications of these changes. Additionally, he draws from recent events that may bring doubt to whether interconnectivity and speed are truly the best variables to measure the success of AI models.

Credentials:

Tom C. Lin

* J.D., University of Pennsylvania Law School
* B.A. (magna cum laude), New York University
* Assistant Professor of Law at the University of Florida
* His research has been published and cited by numerous leading law journals, and featured in *The Wall Street Journal*, *The Washington Post, Bloomberg News*, and *The Financial Times,* among other media outlets.
* practiced law at the New York State Office of the Attorney General

This source offers a different view of this development by not simply looking at it from a financial point of view, but rather by viewing it from a legal point of view. It also has an opposite claim from the one I pose, which is that AI is not necessarily good for the financial industry. This source will be a useful for presenting the opposing point of view and will also offer insight on the possible regulations that could be put in place to ensure that these financial companies invest safely and morally. Finally, it presents various possible societal issues that could ensue from these changes, which I will present in my paper.

Hawkins, Jeff(2007). Learn Like a Human. *IEEE Spectrum*. Retrieved from https://spectrum.ieee.org/computing/hardware/learn-like-a-human

This article talks in depth about the differences between AI models today and the human brain and why it is AI can’t possibly replace humans. It mostly focuses on the anatomy of the brain and the configuration of AI models. The main argument of the article is that if we further examine the human brain then we can better refine these models and make them more human-like than they currently are. One of the ideas Hawkins purposes is the hierarchical temporal memory, which would allow the AI model to learn in more than one field and organize the information that it takes in. Hawkins later explains how this approach differs from the other approaches and how it could help revolutionize the way AI functions and its applications in our society.

Credentials:

Jeff Hawkins

* Founder of Palm Computing and Handspring
* Member of National Academy of Engineers
* Published On Intelligence laying out the plans for a “memory prediction framework” of how the brain works
* Founded Redwood Center for Theoretical Neuroscience

Despite the fact that this article doesn’t talk about neural networks specifically or finance it does help us the difference between the human brain and AI models. Furthermore, by addressing this difference in my article I can explain why it is that AI models can play such a crucial role in an industry currently dominated by human thinking. By addressing the difference I can also talk about changes that may be implemented in current AI models in order to make them more human like making humans obsolete in this industry.

Additional Sources:

Ristolainen, Kim(2017) Predicting Banking Crises with Artificial Neural Networks: The Role of Nonlinearity and Heterogeneity. *The Scandinavian Journal of Economics* 120: 31-62. DOI 10.1111/sjoe.12216

Ristolainen creates an Early Warning System for banking crises, using artificial neural networks. This journal explains the reasoning for using neural networks rather than using linear regression models in the creation of this EWS. This source explains the reasoning for using one model, rather than the other. By comparing the calculations of the neural network model of the EWS and the linear regression model of the EWS, it explains that the differences between the two indicate that the neural network model is superior to the linear regression model. The assumptions that this paper makes is that the inputted data from regional databases is accurate and that if the AI model predicts the outcome to be similar to that of the regional databases then that AI is in fact accurate.

Credentials:

Kim Ristolainen

* Ph.D in Economics from University of Turku, Finland
* Project researcher for the Bank of Finland
* Conducted research at University of Turku in econometrics and financial economics

This source helps to explain how neural networks, in finance, can help contribute to the overall wellbeing of nations by averting disasters like banking crises. This helps to display the difference between linear regression and neural networks as well, helping to support my claim that neural networks will be more beneficial in the long run due to the fact that it accounts for non-linear relations between the inputs to the AI model.