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How A.I is impacting society?

Introduction

The impact of Artificial Intelligence (A.I.) in society has grown exponentially. This impact dates to Sir Alan Turing creating the first computer which created foundations for the modern era today. Through the years, A.I. has made ground-breaking achievements from IBM's "Deep Blue" beating the world's best chess player in 1997 to creating the first Neural Network, a revolutionary technology, created in 1951 with the 'SNARC', by Marvin Minsky and Dean Edmonds (O'Malley, 2019). However, A.I. continues to innovate society in many areas. It is changing the way companies and public services operate; shaping how they use their data but also the change of workforce and jobs that could be totally replaced by A.I. in the nearby future. The areas that will be discussed are medicine: how A.I. has helped make unimaginable discoveries and is aiding in more to come, finance: how A.I. is being used to analyse data which has lead to the creation of prediction models which have become vital to finance professionals, manufacturing: what innovating ways that companies are using A.I. aside from manufacturing but also taking into consideration the question of how the work force overall in in the sector will be effected?

Impacts in Medicine

A.I. has aided in many advancements in medicine. It has been used by medical professionals to improve the healthcare of patients and has revolutionised medical treatment over the years. An example of it being used in medicine is in radiotherapy treatment. A.I. had been used by medical professionals to "identify patients who are susceptible to be concerned with parotid shrinkage" (Peek et al., 2015, p.64). Parotid shrinkage is a disorder which can occur during radiotherapy treatment (Sanguineti et al., 2015, p.2). Thus, A.I. was used "with various results, by modelling data extracted from Computed Tomography (CT) images of patients, acquired during the treatment, in order to learn about the evolution of the shrinkage process" (Peek et al., 2015, p.64). Through this, medical professionals discovered the shrinkage process and could track the evolution of the process; identifying its early stages. Medical professionals were then able to drastically increase the safety of radiotherapy treatment. Furthermore, this was also used by medical professionals for identifying and tracking other disorders; aiding the improvement of other medical treatments. Another part of A.I. being used in medicine is Artificial Neural Networks (ANN), these are computational analytical tools which are fundamentally inspired by the biological nervous system (Simon Haykin, 2009), as shown in Figure 1. From ANNs having the ability to learn form historical examples and analyse non-linear data, it has become a valuable analytical tool for medical professions as it can increase the efficiency of the analysis of large sets of data, helping to predict the outcomes of treatment; being used in medical fields such as: clinical diagnosis, image analysis in radiology and histopathology and data interpretation in intensive care setting; researchers have also utilised it by solving many clinical problems which they face through the ANN's "ability to classify and recognise patterns accurately" (Ramesh et al, 2004 p. 335).

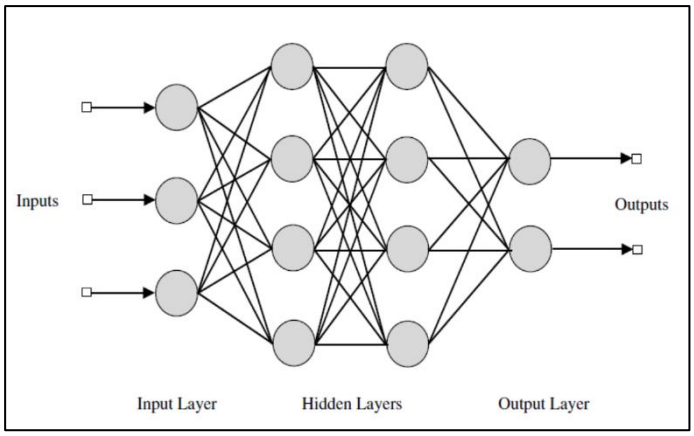

Figure 1 Multi-layered feedforward artificial neural networks, (Cse22-iiith.vlabs.ac.in, 2019)

Impacts in Finance

With the rise of A.I. in the finance industry, it is quickly changing the business landscape and in areas which are traditionally conservative (Medium, 2019). One aspect in finance where A.I. is being utilised is in models of insolvency prediction, these models aid in identifying future business failures or provide early warnings of impending financial distress (Chung et al., 2008, p. 20). This is a crucial tool for financial advisors; thus, it is beneficial to implement A.I. within this tool. The technique in A.I. being used for this are ANNs, this has been used in recent times to predict insolvency "as they remove the need for identifying appropriate ratios before a model is constructed" (Chung et al., 2008, p .20), increasing the efficiency. Furthermore, ANNs have brought many advantages when compared to other techniques; a main one being adaptability, this is vital to the financial world as a core aspect of finance is unpredictability and so models are required to adapt to new, random data. ANNs have the ability to "work well with missing or incomplete data" (Shachmurove., 2002), imprecise variables and with changes in models over time (Chung et al., 2008, p. 22), meaning that financial professionals can use A.I. when dealing with substantial changes in models and the analysis of complex data. Additionally, ANNs make no assumptions about the nature of the distribution of data; making them not biased in their analysis (Shachmurove., 2002, p24). Furthermore, ANNs can adapt to the appearance of new cases that represent changes in the situation (Chung et al., 2008, p. 22, thus ANNs can be effective in unpredictable situations that occur in the financial world. Moreover, ANNs can analyse complex patterns quickly and do so with a high degree of accuracy (Shachmurove., 2002), meaning financial professionals receive extremely accurate models in the least amount of time. Ultimately, due to the complexity of economic systems, financial professionals naturally turn to models that can emulate and simulate the economy and a neural network can deliver this (Shachmurove., 2002).

Impacts in Manufacturing

Within manufacturing, A.I. is innovating automation and many manufacturers rely on A.I. to complete important components of their production cycle (Majenta Solutions, 2019). However, aside from the manufacturing aspects, A.I. has been used in other ways; an example of a this is BMW's Smart Transport Robot as seen in Figure 2; the robot travels across the manufacturing floor sending out

communication signals on critical situations that it observes. Furthermore, manufacturers are using advanced machine learning: A type of A.I. which provides computers with the ability to learn without being explicitly programmed (Christopher M Bishop, (2006)). This has been used by allowing their platform to capture inefficiencies within the manufacturing process to improve manufacturing production. However, whilst there are many advancements within A.I. in the manufacturing industry being made, it appears that the effect on workforce could be detrimental as it could put millions of people out of work. Though, it is not inevitable that technology and automation will result in widespread unemployment. It is crucial that improvements in the methods of production should be encouraged; if exploited properly, the advancement of technology and automation could improve the standard of living and quality of everyone (Frank R. Breul, 1966, pp. 242). An effective way in overcoming this issue is by re-training; it is important because there shouldn't be an assumption that a labour worker can become a computer scientist or programmer when their present job disappears (Nilsson, N. J, (1984), pp. 5). Thus, enabling individuals to learn new skills through their lifetime, companies should be encouraged to start midcareer training as the skills mix for a successful career is constantly changing (Majenta Solutions, 2019). Furthermore, it is crucial for there to be financial and other forms of assistance during transition to help displaced workers' development continue in employment; policies such as: unemployment insurance and portable benefits that follow workers between jobs; alongside workers being encouraged to take charge of their career, make their own decisions to re-skill and take on new challenges, and not remain in the same position for too long (Majenta Solutions, 2019). Thus, making sure workers don't go straight into unemployment but instead, adapt; opening doors to new opportunities.

Figure 2 BMW Smart Transport Robot, (Nica, 2019)

Conclusion

To conclude, it was evident that A.I. is changing society in a multitude of ways and changing the infrastructures of businesses. From the research, it had been discovered that A.I. will at one point be a necessity for all companies; without it, companies will be at a disadvantage; not having the foundations for the everlasting, technological revolution that is happening today. With the areas previously discussed, it was common that ANNs were being used within them; allowing professionals within those areas to analyse large amounts of complex, non-linear sets of data; substantially increasing the

efficiency of the way in which they handle their data. In addition, healthcare has been able to make ground-breaking discoveries using A.I. and will continue to as the technology keeps being integrated; with finance, professionals have been able to create crucial models that aid them with economic changes; the manufacturing industry is being changed every day by A.I. and manufacturing companies are putting a big emphasis on implementing it. However, with the implementation of A.I. workers mainly in labour roles are facing unemployment and the threat of being replaced by machines. Though, with this, it is vital to recognise that A.I. is a part of the new industrial revolution and so as a society, we must adapt to this rapid change; workers in positions that are threatened by the implementation of A.I. should be equipped with the essential skills that will allow them to adapt but make them versatile at the same time. Alongside this, employers in all areas should support those who struggle during the transition. Thus, people in society won't be disadvantaged by the revolution today but a part of it.

Bibliography

- O'Malley, J. (2019). *The 10 most important breakthroughs in Artificial Intelligence*. [online] TechRadar. Available at: https://www.techradar.com/uk/news/the-10-most-important-breakthroughs-in-artificial-intelligence [Accessed 14 Aug. 2019].
- Peek, N., Combi, C., Marin, R. and Bellazzi, (2015). Thirty years of artificial intelligence in medicine (AIME) conferences: A review of research themes. *Artificial Intelligence in Medicine*, 65(1), pp.61-73.
- Giuseppe Sanguineti, Francesco Ricchetti, Binbin Wu, Todd McNutt and Claudio Fiorino, (2015). Parotid gland shrinkage during IMRT predicts the time to Xerostomia resolution. *Radiation Oncology*, 10(19).
- Simon Haykin, (2009) *Neural Networks and Learning Machines Third Edition*, Pearson.
- A. N. Ramesh, C. Kambhampati, J. R. T. Monson, and P. J. Drew, (2004). Artificial intelligence in medicine. *Ann R Coll Surg Engl.*, 86(5), pp. 334–338.
- Cse22-iiith.vlabs.ac.in. (2019). *Virtual Labs*. [online] Available at: http://cse22-iiith.vlabs.ac.in/exp4/index.html [Accessed 14 Aug. 2019].
- Medium. (2019). *The Growing Impact of AI in Financial Services: Six Examples*. [online] Available at: https://towardsdatascience.com/the-growing-impact-of-ai-in-financial-services-six-examples-da386c0301b2 [Accessed 14 Aug. 2019].
- Kim Choy Chung, Shin Shin Tan, David K. Holdsworth, (2008). Insolvency Prediction Model Using Multivariate Discriminant Analysis and Artificial Neural Network for the Finance Industry in New Zealand. *International Journal of Business and Management*. 39(1), pp. 19-28.
- Dr Yochanan Shachmurove (2002). *Applying artificial neural networks to business, economics and finance*, Citeseer.
- Nica, G. (2019). *BMW Logistics Now Use Autonomous Transport Robots*. [online] BMW BLOG. Available at: https://www.bmwblog.com/2016/11/18/bmw-logistics-now-use-autonomous-transport-robots/ [Accessed 14 Aug. 2019].
- Majenta Solutions. (2019). *The Impact of AI on our Manufacturing Workforce*. [online] Available at: https://www.majentasolutions.com/blog/the-impact-of-ai-on-our-manufacturing-workforce/#_edn4 [Accessed 17 Aug. 2019].
- Christopher M Bishop, (2006). *Pattern recognition and machine learning*, Softcover.
- Frank R. Breul, (1966). Technology and the American Economy: Report of the National Commission on Technology, Automation, and Economic Progress. *Social Service Review*, 40(2), pp. 240-243.
- Nilsson, N. J, (1984). Artificial Intelligence, Employment, and Income*. AI Magazine*, 5(2), pp. 5