ISSN:0976-0172

Journal of Bioscience And Technology
www.jbstonline.com

Computational Intelligence

N. Saritha[1], N. Kamala Vikasini[2], N. Savitha[3]

[1]Associate Professor, CSE(DS), Swarna Bharathi institute of science and technology, Khammam, TG, India. Email: sarithanune@gmail.com

[2]Assistant Professor, CSE(DS), Swarna Bharathi institute of science and technology, Khammam, TG, India. Email: vikasini574@gmail.com

[3]Assistant Professor, CSE(DS), Swarna Bharathi institute of science and technology, Khammam, TG, India. Email: savitha.natuva@gmail.com

Abstract

A computer system is said to have computational intelligence (CI) if it can mimic human intellect. Machine learning is a collection of computer systems that can learn and adapt to new environments in a way that makes them seem smart.When applied to real-world situations requiring reasoning and decision-making, it yields efficient results. It outperforms the conventional methods by producing answers that are simpler, more resilient, and tractable.Computational intelligence is introduced briefly in this work.Soft computing, computational intelligence,and artificial intelligence

Introduction

The field devoted to researching and developing intelligent systems is known as computational intelligence (CI). The only way to call a system "intelligent" is if it can learn and make decisions. The most well-known example of intelligence is, of course, human intelligence. The term "intelligence" is often associated with people, leading many to believe that CI is just a method for computers to mimic human behavior and thinking by making use of approximate and nebulous data. Therefore, artificial intelligence's end objective is to make machines that can think and act like humans.John McCarthy first used the phrase "computational intelligence" in 1956. Researchers now have more chances than ever before thanks to the continuous computerization of the globe. From computational biology and physics to computational chemistry and ecology, computational linguistics and electromagnetics, computational mechanics and finance, computational social science and epistemology, computational intelligence and so on—every branch of science and art has become computational. CI employs a synergistic blend of five primary methods: (1)fuzzy logic, which gives computers the ability to comprehend human speech, (2)"artificial neural networks" that mimic the way the brain functions, "evolutionary computing" that uses natural selection as its foundation, "learning theory" to explain how systems learn, and "probabilistic methods" to handle unknowns (Wikipedia, 2017). It was in biological systems that several of these CI methods were first developed. Figure 1 depicts the taxonomy of artificial intelligence approaches (Abbas, Zhang & Khan, 2015).

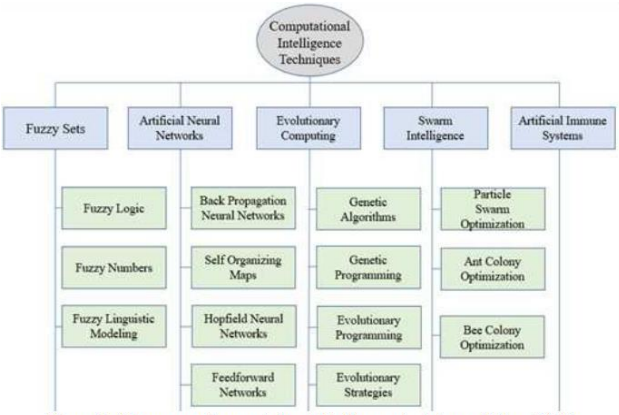

Figure 1 –Taxonomy of computational intelligence techniques (Abbas, 2015)

The fields of Artificial Intelligence (AI) and Computational Intelligence (CI) are distinct, however they have the same objective of creating intelligent machines. Contrasted with CI's emphasis on soft computing approaches, AI relies on hard computing techniques. Comparatively, CI works from the ground up, while AI is more top-down. A subset or branch of AI is how some see CI.

Use case

In order to combine the aforementioned properties, researchers have used CI approaches to develop clever and context-aware algorithms. The fields of biomedicine, data analysis, computer science, engineering, and business are some of CI's most important uses. Financial market issues and the development of business intelligence have both been addressed via the use of computational intelligence approaches in the business world. Some of the numerous commercial domains that have made use of these approaches include optimization,categorization,marketing,e-commerce, financial management,decision making, and time series forecasting (Hernández-Julio et al., 2017). Predicting future events becomes much easier using

ISSN:0976-0172

Journal of Bioscience And Technology
www.jbstonline.com

CI.CI methods like neural networks and fuzzy logic are used in financial markets and music composition. optimization, learning, and system modeling are greatly enhanced by evolutionary computation and related systems. Timbre, pitch, rhythm, motive, phrase, and chord are all musical components that have been effectively used in musical creation. The three primary activities of musical composition are form discussion, melody creation, and accompaniment arrangement (Liu & Ting, 2017). Use of CI may be used to take advantage of social creativity. In contrast to more conventional understandings of creativity, which place the emphasis on the role of the individual, collaborative problem-solving is where companies find the innovative solutions they need to tackle their most pressing challenges. According to Apostololou et al. (2016), CI has the potential to increase group involvement by bridging groups with social networks. It can also help with inspiration and diverse thinking by connecting users to vast quantities of online knowledge and social media.According to Jabbar, Deekshatulu, and Chandra (2015), researchers in the field of medicine have used several CI methods to enhance the accuracy of cardiac disease diagnoses and to detect the illness at an early stage. Both diagnostic and therapeutic uses of CI are possible. According to Wiwanitki (2016), it has the potential to aid in both the diagnosis and prevention of illnesses. Better management, quicker performance, and a greater degree of accuracy may be achieved by applying CI approaches to complicated medical data. Games, information systems, biology, control systems, smart grid power, economics, air pollution monitoring, manufacturing, sports, coral reef ecosystems, corrosion damage assessments, air pollution, and environmental planning are some of the other areas of application.

Hybrid Computational Intelligence Systems

Hybrid CI systems combine two or more CI techniques to exploit their complementary strengths.Examples include neuro-fuzzy systems, evolutionary neural networks,and hybrid optimization frameworks. These systems improve accuracy,adaptability,andreal-world applicability. 5.1 Engineering and Control SystemsCI enhances adaptive control, fault detection, robotics, and intelligent manufacturing.5.2 Data Mining and Pattern Recognition.Techniques such as ANNs and fuzzy classifiers are used for classification, clustering, anomaly detection, and predictive analytics**.**5.3.Healthcare and Biomedical Engineering :CI supports medical diagnosis, bio-signal processing, personalized treatment planning, and disease prediction.5.4 Natural Language Processing and Speech Systems:Neural models help machines understand and generate human language with contextual awareness.5.5 Financial and Business Intelligence:CI optimizes investment strategies, fraud detection, risk management, and marketforecasting**.**5.6Autonomous Systems:Swarm intelligence and deep neural networks contribute to autonomous vehicles, drones, and intelligent robots.

Challenges: Some people think that artificial intelligence (AI) is a hopeless endeavor that will never succeed in making computers smarter. The idea is rooted in the incoherent and conflicting goals of computational intelligence (CI)—the term "intelligence" refers to the capacity to comprehend information, while "computational" suggests the ability to process data (Diamant, 2016).

Every one of the several CI methods has its own set of benefits and drawbacks. Consequently, there is no one best approach to solving problems. It is possible that hybrid methods outperform single methods.Data analysis of some sensitive information, such that used in medical applications, has been plagued by problems with privacy and security. Complex healthcare data sources can provide difficulties when dealing with big data (Kalantari et al., 2017).

Future Trends in Computational Intelligence

- Development of explainable and transparent CI systems
- Integration with cognitive computing and neuromorphic hardware
- Growth of hybrid and ensemble intelligence frameworks
- Advances in biologically-inspired learning models
- Increased use in autonomous systems, smart environments, and personalized services

Conclusion:A very young area of study, computational intelligence (CI) is rapidly developing.The field of artificial intelligence (AI) includes it. The following methodologies are utilized: hybrid approaches, deep learning, swarm intelligence, fuzzy systems, support vector machines, artificial neutral networks, and evolutionary computing. There is a growing demand to educate students in CI methods because to the increasing number of engineering applications that utilize them (Zhang, 2011). Andries Engelbrecht's 2007 introduction book is a good resource.

References:

ISSN:0976-0172

Journal of Bioscience And Technology
www.jbstonline.com

1. Computational intelligence, Wikipedia, the free encyclopedia, https://en.wikipedia.org/wiki/Computational_intelligence.
2. Abbas, A., Zhang, L. & Khan, S.U. (2015). A survey on context-aware recommender systems based on computational intelligence techniques. Computing, 97, 667–690.
3. Apostolou, D. et al. (2016, May). F acilitating creativityin collaborative work with computational intelligence software. IEEE Computational Intelligence Magazine, 29-40.
4. Diamant, E. (2016). Computational intelligence: are you crazy? Since when has intelligence become computational?Proceedings of IEEE Symposium Series on Computational Intelligence (SSCI). Engelbrecht, A.P. (2007). Computational Intelligence: An Introduction. Chichester, UK: John Wiley & Sons, 2nd edition.
5. Hernandez-Julio, Y.F., et al. (2017). Framework for the development of business intelligence using computational intelligence and service- oriented architecture. Proceedings of the 12th Iberian Conference on Information Systems and Technologies (CISTI), 1–7.
6. Jabbar, M.A., Deekshatulu, B.L. & Chandra, P. (2015). Computational intelligence technique for early diagnosis of heart disease. Proceedings of IEEE International Conference on Engineering and Technology (ICETECH).
7. Kalantari, A., et al. (2017). Computational intelligence approaches for classification of medical data: State-of-the-art, future challenges and research directions. Neurocomputing,1-21.
8. Liu, C.H., & Ting, C.K. (2017). Computational intelligence in music composition: a survey. IEEE Transactions on Emerging Topics in Computational Intelligence,1, no. 1, 2017, 2-15.