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# ACICE Monthly Digest

A monthly roundup of significant news around the world



ADMM Cybersecurity and  
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# Artificial Intelligence

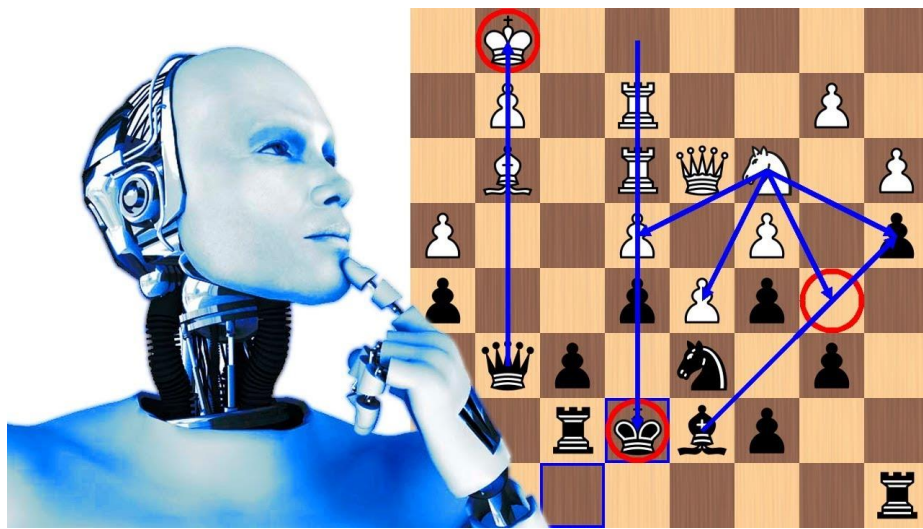
## The Taxonomy of Machine Learning

- Artificial Intelligence (AI) is the development of computer systems capable of executing tasks that typically demand human intelligence. Machine Learning is a subfield of AI. Unlike traditional programming, which requires explicit programming to guide computers, Machine Learning empowers computers to learn from data and make predictions or decisions autonomously. Machine Learning has been ubiquitously used in a variety of industries, including defence, financial services and healthcare.
- Machine Learning can be categorised into four distinct types - Supervised Learning, Unsupervised Learning, Reinforcement Learning, and Deep Learning.
- Supervised learning uses past labelled data<sup>1</sup> to predict future outcomes. An algorithm processes the data, compares the predicted outcomes to target values from a training dataset, and iteratively adjusts itself for higher accuracy. This approach is used mainly for regression to predict numerical values, and classification to assign inputs to predefined categories. For example, it can predict house prices based on historical data, or classify emails as spam or non-spam.
- Meanwhile, unsupervised learning uses unlabelled data to discover patterns and structure, and aids in clustering and dimensionality reduction (i.e. simplifying complex datasets for visualisation). Unsupervised learning has been used in the tourism industry to analyse traveller behaviour. A 2016 study from the University of Massachusetts Amherst used association rule mining<sup>2</sup> to analyse travellers' data, and found that British tourists were inclined towards diverse activities, including sports and outdoor activities, whilst US travellers generally preferred cultural experiences like museums, festivals and art galleries.

<sup>1</sup> Labelled data refers to a dataset where each data point is accompanied by a corresponding label or target value, while unlabelled data is not tagged with labels or target values.

<sup>2</sup> Association rule mining generally involves the use of machine learning models to analyse datasets for patterns, correlations, associations, or causal structures.

- Reinforcement learning is the third form of Machine Learning, and it simulates the learning process in a manner reminiscent of human trial and error. In reinforcement learning, an agent interacts with an environment, performing actions to attain a reward or avoid a penalty. Over time, the agent learns optimal strategies through a process of experimentation. This concept is exemplified by AlphaZero, an AI system that mastered the complex game of chess. Starting off with no knowledge of the game apart from its rules, AlphaZero was trained to play against itself 44 million times over the span of nine hours. Eventually, AlphaZero reached an Elo<sup>3</sup>, or skill level, far higher than the top human chess players.



*Deepmind's AlphaZero achieved the highest Elo rating of any chess engine in history when it was unveiled in 2018*

- Reinforcement learning holds significant promise for various technological advancements, services, and product innovations. A clear application lies in the development of Autonomous Vehicles (AVs). Alex Kendall, founder and CEO of Wayve, a UK-based driverless car company, adeptly harnessed this approach by melding traditional self-driving car elements, such as live mapping, planning, and sense-making, with reinforcement learning techniques. Kendall's key innovation was providing the AV system with a straightforward and universally measurable reward: the distance the vehicle travels without the safety driver needing to intervene. By training the AVs in the demanding environment of rush-hour London, Kendall successfully

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<sup>3</sup> The Elo rating system is a method for calculating the relative skill levels of players in zero-sum games such as chess. It is named after its creator Arpad Elo, a Hungarian-American physics professor.

enabled the AVs to travel without needing human intervention in five different cities - Cambridge, Coventry, Leeds, Liverpool, and Manchester.

- These AV developments have positive spill-over effects for the defence sector. The push for unmanned military land vehicles has gained traction in recent years, with the US Department of Defense currently seeking bids for the ATLAS programme – a sophisticated automated programme which is designed to potentially control tanks in the future, albeit with some degree of human oversight.
- Lastly, Deep Learning leverages Artificial Neural Networks (ANNs) to process intricate patterns within data. Inspired by the human brain, ANNs consist of nodes, or neurons, interconnected in layers. The network iteratively adjusts the weights between neurons as it learns from new text, images and other multimedia content, allowing it to identify complex relationships in the data.
- The groundbreaking development of Generative AI, such as ChatGPT and Claude, takes advantage of Deep Learning. Generative AI is a type of AI that creates new content based on what it has learnt from existing content. It utilises a special duo of ANNs called a Generative Adversarial Network. Consisting of both a ‘Generator’ and a ‘Discriminator’, the Generator creates new data similar to what it is trained on, while the Discriminator examines the data and sieves out fake or illogical content. Both Generator and Discriminator iteratively train themselves to improve their accuracy and produce more human-like content.
- Beyond Generative AI, Deep Learning possesses tremendous value in the field of Computer Vision (CV). CV relies on the use of Convolutional Neural Networks (CNNs), a type of ANN that excels at processing grid-like data like images. Instead of content production, CV zones in on interpreting and understanding visual information, much like humans do with their eyes and brains. The goal of computer vision is to enable machines to recognise objects, patterns, shapes, colours, movements, and other visual elements in the real world, allowing them to make decisions or take actions based on visual data.

- An article from UK-based Nature Journal, which was published in April 2021, illustrated the utility of Computer Vision in pollinator conservation. Species-level identification has hitherto been an integral part of pollinator conservation and ecological research, but training humans in such a skill is costly, time-consuming and highly inefficient. Instead, four CNN models were used to classify 36 North American bumble bee species across 89,000 pictures of bumble bees. Three of the models produced accuracy rates of over 91%, highlighting the potential of these models to be refined and eventually perform on par or better than experts in these fields.



*Harnessing Computer Vision to distinguish between pollinator species*

- Within the defence sector, CV has also been used to develop fully autonomous drones. CV-equipped drones are able to capture large amounts of visual data using high-definition cameras, interpret visual data quickly to extract important information, and harness this information to make on-the-spot decisions, essentially allowing the drones to run autonomously without the need for human operators.
- The four Machine Learning types offer industry players different tools for improving services and solving problems. Therefore, understanding the taxonomy of Machine Learning and their respective applications is critical in discerning the most suitable algorithm for any business model or problem, avoiding unnecessary trial and error. The right choice of Machine Learning can significantly enhance efficiency, accuracy, and success in applications across various sectors including military/defence.



# Terrorism

## Regional Pledges to New ISIS Caliph

- On 3 August 2023, the official spokesperson of the Islamic State of Iraq and Syria (ISIS), Abu Hudhayfah al-Ansari, announced that its leader Abu Husayn al-Husayni al-Qurashi had died and that his successor was Abu Hafiz al-Hashemi al-Qurayshi.
- Turkish President Tayyip Erdogan had previously announced on 30 November 2022 that Turkish Intelligence had killed Abu Husayn al-Husayni al-Qurashi during a raid, but there had been no confirmation from ISIS until recently.
- Prominent ISIS-aligned media groups from the Philippines and Indonesia, such as Al Fursan Media, al-Buruwy Media, Share News OK, Ahlusunnah Waljamaah and Tamkin Media put up posters and videos announcing their oaths of allegiance to the new ISIS leader.
- Individuals on social media, including from Thailand, also declared their oaths of allegiance.

## Regional Pro-ISIS Charity Claims Transfer of Funds to Al-Hol Camp

- On 2 August 2023, Indonesian pro-ISIS charity Anshar Peduli Muhajir announced that it had transferred approximately US\$732 to migrants in Syrian Defence Forces-administered Al Hol Internally Displaced Persons (IDP) Camp.
- More than 1,250 Southeast Asians are estimated to remain in Syria and Iraq after travelling to the conflict zone to join ISIS. Majority of the wives and children of ISIS fighters are located in IDP camps in Syria, including Al Hol Camp.
- On 9 May 2022, five ISIS-linked Indonesians were designated by the US Office of Foreign Assets Control (OFAC) for operating a financial facilitation network across Syria, Indonesia and Turkey. The individuals made transfers to support ISIS operations in IDP camps in Syria, some of

which was used to pay to smuggle children out of these camps and deliver them to ISIS foreign fighters as potential recruits.

# Annex

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### Artificial Intelligence

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