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UNDERSTANDING THE EVERYDAY INTELLIGENCE BEHIND SMART MACHINES, AI AND LIFE

РОЗУМІННЯ ПОВСЯКДЕННОГО ІНТЕЛЕКТУ, ЩО СТОЇТЬ ЗА РОЗУМНИМИ МАШИНАМИ, ШТУЧНИМ ІНТЕЛЕКТОМ ТА ЖИТТЯМ

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Abstract. *Artificial Intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think, learn, and make decisions. Basic AI encompasses systems designed to perform simple tasks using predefined rules and data processing techniques. These systems, often called "narrow AI" or "weak AI," are specialized in single tasks such as language translation, image recognition, or predictive text. Unlike advanced AI, basic AI lacks consciousness, general reasoning, and self-awareness. The core components of basic AI include data input, algorithms for processing information, and output generation based on programmed logic. Machine learning, a subset of AI, allows basic systems to improve their performance through experience without being explicitly programmed for every scenario. Applications of basic AI are widespread, including personal digital assistants, spam filters, recommendation engines, and autonomous customer support systems. Basic AI has transformed industries by enhancing efficiency, reducing human error, and enabling automation. However, it also raises concerns about data privacy, job displacement, and ethical use. As AI continues to evolve, understanding the fundamental concepts of basic AI is essential for navigating its growing presence in everyday life. This abstract provides an overview of basic AI, highlighting its functions, applications, and implications for society.*

Анотація. *Штучний інтелект (ШІ) позначає симуляцію людського інтелекту в машинах, які запрограмовані думати, навчатися та приймати рішення. Базовий ШІ охоплює системи, розроблені для виконання простих завдань із використанням заздалегідь визначених правил і методів обробки даних. Ці системи, які часто називають «вузьким ШІ» або «слабким ШІ», спеціалізуються на виконанні єдиних завдань, як-от переклад мови, розпізнавання зображень або предиктивний (прогнозний) текст. На відміну від просунутого ШІ, базовому ШІ бракує свідомості, загального мислення та самоусвідомлення.*

Основні компоненти базового ШІ включають вхідні дані, алгоритми для обробки інформації та генерування результатів на основі запрограмованої логіки. Машинне навчання, підмножина ШІ, дозволяє базовим системам покращувати свою продуктивність через досвід без явного програмування для кожного сценарію.

Застосування базового ШІ є широко поширеним, включаючи персональних цифрових помічників, спам-фільтри, рекомендаційні системи та автономні системи підтримки клієнтів. Базовий ШІ трансформував галузі, підвищуючи ефективність, зменшуючи людські помилки та уможливлюючи автоматизацію. Однак він також викликає занепокоєння щодо конфіденційності даних, витіснення робочих місць та етичного використання. Оскільки ШІ продовжує розвиватися, розуміння фундаментальних концепцій базового ШІ є важливим для орієнтування в його зростаючій присутності в повсякденному житті. Ця анотація надає огляд базового ШІ, висвітлюючи його функції, застосування та наслідки для суспільства.

Ключові слова: Штучний інтелект; Машинне навчання; Автоматизація; Алгоритми; Обробка даних
Key words: Artificial Intelligence; Machine Learning; Automation; Algorithms; Data Processing

Introduction. Assume you are an automobile lover, and you enjoy watching lots of automobile-related video content on YouTube. The amazing result you would experience is your YouTube account will be flooded with increasingly new suggestions about new vehicles and automobile-related applications in the forthcoming days when you access YouTube. But how is this happening? How does your computer and web browser know that you are a vehicle lover and progressively related content keeps on being suggested on the landing page of your YouTube account? All this magic is happening

because of Artificial Intelligence strategies operational in the background. Technically, this mechanism is referred to as a "Recommendation Engine" (Awan et al., 2021). This technique can analyze users' frequent interactions with the internet and can understand their likes and dislikes. Accordingly, this technique will work in the background and promote increasingly related content which matches your passion. This technique is widely used in streaming services like Netflix as well.

Additionally, you might have heard of driverless cars which are driven on public roads. These cars can make their own decisions, assuring the safety of the passengers, pedestrians and other vehicles driven on the road. How fascinating is it? All these are fantastic applications gifted for humans, thanks to the advancements in Artificial Intelligence (AI) techniques (Masood and Ahmad, 2021). Ethical and appropriate usage of AI can be recognized as a good friend of the human, capable of increasing the quality of the life they experience. Artificial intelligence is a heterogeneous composition of different technologies. Machine Learning, Deep Learning, Expert Systems, Ontological Modelling, Evolutionary Algorithms, and Fuzzy systems are a few of the widely used technologies packed inside Artificial Intelligence.

As you might have heard, Machine Learning has become an extremely popular buzzword presently. Many people speak about it, developers use it to create marvelous software applications. Deep Learning is a specialized sub-discipline associated with Machine Learning. Deep Learning has been strongly influenced by the anatomical structures of the human brain (Khalil et al., 2022). As we are all aware, the human brain is a complex organ composed of billions of neurons linked with synapses that are talking to each other. Each of these synapses connectivity's compile different neuronal pathways leading into information highways. Neural networks can be recognized as a remarkable creation introduced by computer scientists after analyzing the wonders that take place inside the brain with neuronal activities. Neural networks can be identified as an extraordinarily strong component capable of yielding powerful intelligence associated with modern smart applications.

There are diverse types of neural networks like Convolutional Neural Networks, popularly called CNN and Recurrent Neural Networks as RNN (Priyadarshini and Cotton, 2021). These different architectures are fine-tuned for different operational requirements. For instance, CNN architecture has been influenced by the anatomical structure of the visual cortex of the human brain. This has a strong capability of vision and picture related intelligent decision-making. Likewise, RNN is specially tuned for sequence and pattern generations. For instance, assume you are delivering a speech. There must be a flow and sequence. RNN can mimic similar requirements to accomplish intelligent behaviors in applications developed for business use cases (Shiri et al., 2023). This is just a surface level reflection of the armor of Artificial Intelligence.

Artificial Intelligence (AI) has become a widely used term presently. It has numerous applications across various domains. In fact, it`s impossible to locate a domain, where the advantages of AI cannot be applied into. Banking, Education, Healthcare, Transpiration, Manufacturing likewise a lengthy list can be continued. Obtaining a solid comprehension of the theoretical and practical underpinnings associated with AI will be beneficial in rationalising its impactful usage. The right balance of technological influences can enrich the efficiency and improve the quality of life of a human being (Padhan et al., 2023). As too much in everything is not good, vigilant measures must be taken to ensure an appropriate and correct mix of AI advancements to routine tasks.

The application of AI for every task is not an intelligent remedy. AI is a computationally advanced, resource-intensive mechanism, which needs to be utilized only if it`s the most eligible solution among the alternatives available (Bishop, 2021). Activities associated with less complexity and variability do not require AI-enabled interventions. Traditional programming techniques could be much suited for the automation of such tasks. Therefore, it`s vital to decide the complexity and varying nature of the task to be automated. Subsequently, a decision can be yielded on whether to use AI or not.

The evolution of AI has been greatly influenced by a variety of domains. Fundamental sciences like Mathematics, Physics, and Biology have greatly contributed to the expansion of AI to become a strong science with a philosophical foundation. Theories originating from nature like, insects' communication, the transferring of parental characteristics to children, immune system fighting against a foreign object entering into the bloodstream have contributed immensely to algorithm differentiations as numerous subfields reside inside AI. This packaging of numerous techniques under the main concept of AI is referred to as the concept of "AI umbrella" (Abd-Alrazaq et al., 2022). AI Umbrella comprises different flavours of technologies to achieve the intended end goals with a smart outfit. Different types of problems to be resolved will have different resources and constraints. Hence, considering on those requirements, eligible AI techniques listed under the AI umbrella need to be selected. This strategy of selecting the ideal technique from a pool of technologies, depending on the nature of the problem to be resolved is a prominent factor in promoting the usage of AI in providing smart solutions to numerous business problems.

What is Artificial Intelligence? Almost all living beings depict several unique features, such as responding to stimuli, forecasting, decision marking, adaptations and etc. Humans, animals, insects, plants, and microorganisms portray such characteristics. Mimicking these intelligent characteristics to a reasonable level in non-living dumb machinery can be identified as a primary outcome of Artificial Intelligence (Jones et al., 2022). Still, the level of AI has not evolved to a state where it could replicate intelligent behaviors as it`s done by a living creature. However, realistic and reasonable attempts have been made and they have become successful.

One strong example to convince the aforementioned ideology is the functionality of autonomous vehicles. AI applications have evolved to a level where it can make self-decisions on driving a car on a public road, adhering to all legal requirements without the involvement of a human being. AI applications operational in an autonomous car like Tesla is capable of making swift decisions to drive a car in a public road along with other cars, pedestrians, road signs and unexpected obstacles. In this example, the autonomous car uses numerous types of sensors and technologies like radars, lidar, cameras, motion and object detection strategies to quickly and accurately detect what`s happening in the surroundings of the car. Then all these sensory inputs captured will be provided to complex AI software to quickly and accurately make decisions on what to do to ensure the safe movement of the vehicle (Chinamanagonda, 2021). According to the decisions provided by the intelligent software, applying breaks, pressing the accelerator, left / right turn of the steering wheel would occur with zero involvement of a human being.

Ideology of AI Umbrella. AI Umbrella is a special terminology reflecting an unique feature associated with AI related application development. Let`s take a real world example to get this concept comprehended effectively. Assume you have been suffered with sore through and when you visit your family doctor, your prescribed with some antibiotics. Let`s say it`s amoxicillin. Few days after you got to know, that your friend has also been infected with sore throught. Because both of you were experiencing the same symptoms. Therefore, you might recommend your friend to take some amoxicillin, which is usually not a recommended strategy. However, after a day or two your friends situation is getting aggravated. Seems like amoxicillin has not answered for your friend. Consequently, hence there is no reliable remedy to try, your friend is also visiting the doctor. Then the doctor might prescribe another antibiotic. Let`s say it`s erythromycin. After a day or two, your friend is experiencing recovery. If this scenario is assessed, thought it`s almost the same disease, but two different antibiotics have been prespectibed. The underlying root cause could be your friend might be allergic to amoxicillin, where as you are not. So the take home lesson from this simple example is though it`s the same disease, when there is atmospheric variations, same solution might not be feasible. Metabolistic chemistry of your body and your freinds could not be the same. That`s why doctor had to prescribe two different medications, even for the same disease.

Likewise, when applying AI solutions to real-world business usecases as well, same strategy will not be the ideal for all the usecases, even if it seems identical from the surface level (Rahmaniar et al., 2023). This is due to the course of the operational dynamics could be scenario specific. In order to comprehend this technological setup let`s try examine another real-world application.

Assume a skin cancer detection application has been developed using deep learning (an advanced version of machine learning) via referring to a large dataset of US citizens. This application is providing 98% accuracy for the US citizens. However, when the same application is deployed with the same architecture, it`s providing almost 50% accuracy, which is merely like guessing. If we assess this application's role, despite the country it`s doing the same task. But what is causing for a such a low accuracy in Sri Lanka ? The root cause is, US is having a cold climate compared to Sri Lanka and it`s impacting the population`s skin composition. The application has been trained on the US citizen`s data and once the same data is used for the Sri Lankan population, reasoning taking place inside the application will not be realistic. Because, Sri Lanka is a country with a warm climate and it causes the Sri Lankan population to have a different skin composisioin, where the application developed for the US context does not include that flavor.

Therefore, when the application to be customized as per the Sri Lankan requirement, the initial point is to collect a large sample of skin cancer images of Sri Lankan population. In data repository platforms like Kaggle, there are very large datasets of skin cancer associated with western countries. However, no datasets appropriate for Sri Lankan setup (Quaranta et al., 2021). Acquisition and compilation of a new dataset is also not going to be a simple operation, as we are taking about several thousand of images maybe. In such instances, if you are a qualified AI engineer equipped with other alternative technologies listed in the AI umbrella, you can shift for an alternative technological strategy which performs better outcomes with less complexity, time and cost.

When we analyze the above scenario of AI application for the skin cancer detection, though the application`s role is same, due to the variation in operational setup application under performed (Takiddin et al., 2021). Therefore, as a remedy we are forced to look for an effective alternative which provides satisfactory results for the same problem. Notice the resemblance of this scenario and the sore throught example we discussed earlier. Both depicts the same orchestration.

AI umbrella is a representation of numerous AI techniques listed as a one connected package. As visible in below Figure is`s apparent in an umbrella, there are multiple metal stripts linked to a one central node. It`s possible to reach to the central node via any metal strip attached (Tan et al., 2022). Likewise, you will be in a position to accomplish your end goal, via numerous alternative AI strategies. Therefore, as a qualified AI engineer, it`s your responsibility to select the best alternative technique which is capable of providing satisfactory return over the investments made, depending on the nature of the problem addressed. For instance, if the problem explored is not comprising with adequately sized annotated datasets, machine learning or deep learning techniques would not be the best fit. Instead you can attempt another alternative listed under the AI umbrella to achieve the same end goal. It could be maybe an expert system based strategy or an ontological modelling based strategy. However, it should be feasible to achieve the end goal and the expectations. This is one fascinating feature associated with AI based application development. There are ample of alternative strategies available to accomplish a given end goal. In the upcoming sections of this article, each of these techniques will be discussed with more details and practical examples.

Machine Learning. This has become a buzz word presently and many people use this in various contexts. As the term "Machine Learning" implies it`s focused on providing some cognitive intusions to non-living machines (Greener et al., 2022). An essential key ingredient for effective machine learning oriented solution articulation is an enriched dataset. This has to be a significantly sized dataset with sample counts ranging from several hundreds maybe up to millions. The size and the nature of the dataset varies depending on the type and the gravity of the problem anticipated to resolve. This data could be in a form of text maybe in a spreadsheet, video samples, audio samples or images. For the development of a roboust machine learning model, just having a dataset only is not adequate. There are several steps to be carried out for the purpose of arranging the respective dataset to be used for the intended purpose. Articulation of the required datasets for the Machine Learning solution development is technically referred as "Data Engineering". There are several steps associated with this complex procedure.

Data Engineering

The sole purpose of this process is compilation of the required dataset for the intended machine learning solution to be developed. The stages associated with data engineering pipeline is as elaborated below.

Requirement Gethering and Planing

Depending on the nature of the problem to be resolved, type of data to be acquired has to be determined. It could be text, video, audio or image data. The volume of the data to be collected, it`s quality needs to be planned with the involvement of both technical and domain specialists. For an instance, if the goal is to develop a Machine Learning model for brain tumor classification, it need to be determine, whether to collect CT images or MRI images. Further the clearity and contrast of the images. These aspects needs to be resolved at the commencement of the project with the inviolvement of medical consultants and machine learning consultants collaboratively.

Data Collection

Once the prerequisites have been resolved, data collection pipeline needs to be planned. Usually the stakeholders operating at the data sources need to be educated in advance about the nature, type and the quality of the data to be acquired. Unless the effort utilized to collect the data could be invain if there is too much noise accompanied with the data.

Planing of the ETL (Extract, Transform, Load) procfedure is also a vital step residing inside the data collection phase. This is about planing the pipeline of how data is collected from it`s originating source until it`s stored for the purpose of dataset construction. Proper manual or technological procedures need to be planned in advance to accomplish this requirement with less amount of efforts without sacrificing the data quality. Because the requirement is not about collecting and storing one or few samples, but several hundreds or thousands of data elements.

Data Processing

Once the data have been accquired and stored, data processing needs to be done. This is one of the most crucial step in data engineering, closely impacting the outcomes of the machine learning modelst to be developed. In this step, the widely used steps as :-

Data Clensing

Removing duplicates, handling missing values, addressing outliers are some of the key activities take place in this step. In machine learning, domain oriented patterns are extracted and learnt via traversing across the datasets provided. Therefore, precautionary steps need to be acquired to preserve the dataset to reflect the realistic patterns without being flodded with noises and outliers.

Data Transformation

This step focuses on converiting raw data into their usable forms. It could be aggregations, averages, normalizations etc. Data need to be organized in a manner facilitating decision making. Sometimes, there could be sensitive information associated with the data we have collected. In such instances, data annonimization need to be done with introduction of flags accordingly. Additionally, in some usecases, multiple data sources needs to be merged to make it realistic. Therefore, data integration has to be carried out to derive a uniformal dataset.

Data Visulization

It`s important to visualize the data collected to recognize outliers and unforeseen patterns. This aids to locate independent variables and dependent variables as well as to identify correlations available in the data fields.

Data processing is a crucial step in data engineering. It`s not a must to apply all aforementioned techniques for a given dataset. Depending on the requirement only the necessary stategies need to be utilized. For instance, sometimes application of all aforementioned techniques might not be feasible, depending on the type of the data collected (Reis and Housley, 2022). For an example outlier removal of an audio or image data is going to be a relay complex task, which might not be required. The ultimate goal of data processing step is to organize the dataset in the best possible way for the machine learning algorithms to learn patterns. Hence, using of all the data elements, technically referred to as features are not required. We need to get the best and most relevant elements only. Unless, additional unwanted data could act as a noise jepordizing the machine learning task. Therefore, conducting a correlation analysis for the applicable dataset types could be significant.

All these activities are referred as feature engineering tasks as well. It`s a sole responsibility of a data science engineer. Data enginnering is a vast segment linked with statistics and data science concepts, which is going out of the scope of

artificial intelligence. Therefore, interested readers are encouraged to follow up on a suitable data science course produced by universities which can be freely accessed in most cases (Joshi, 2025). Data Engineering is an in dept topic associated with data science discipline, which is also an inter-related topic coming under machine learning. However, the main focus of this article will be on provision of conceptual understanding on main AI techniques.

Let`s shift back to the main topic of machine learning again. As discussed up to now, a proper dataset is a solid requirement for machine learning. Unless, machine learning will not be effective. Acquisition of adeuqatly sized dataset and carrying out the data engineering procedures are costly and effort consuming. These can be pointed as few of the drawbacks associated with the machine learning techniques.

Machine Learning, comprises of different flavours depending on the nature of the problem to be resolved. The widely used flavours of the machine learning can be listed as Supervised Learning, Unsupervised Learning, and Re-enforcement Learning.

Supervised Learning

In simple terms, this is like your are teaching a small kid to distinguish between apples from bananas. Initially, you will show some pictures of bananas and apples. We do aware, there are bananas in yellow, green and red colours. Yet they have some similar characteristics, associated with their shape. Same is associated with apples as well. We have green and red apples. But despite the color, basic shape is almost the same. By showing each of these pictures one by one, as an adult, we can teach the child that "this is a banana" and "this is an apple," (Verma et al., 2021). After some time, when kid notices a banana or an apple, perhaps in a supermarket or on the dining table at home, the child will simply recognize it and convey that it is a banana or an apple individually.

This is a rudimentary ideology associated with supervised learning as well. Let`s say we take blood sugar reports of several hunderds of patients annonymously. Then with the involvement of a medical consultant we can classify them as without diabetics and with diabetics. This human initiated classification procedure is the supervisory part. With the involvement of a medical expert we lable some reports as “with diabetics” and others “without diabetics”. This classification is technically referred to as “data annotation”. In supervised learning data annotation is a critical segment. After deriving the cleansed dataset upon completion of the major steps in data engineering as conversed above, we can commence the “data annotation”task. This requires domain expert involvement and it`s a costly and time consuming procedure. The “data annotation” procedure is crucial in learning the patterns through the data. Once this segmentation of entire dataset is done into two categories as “with diabetics” and “without diabetics”, it`s ready to commence the suprvised learning process. The two categories we defined as per this examples are technically referred to as “classes”. We can have different segmentation strategies incorporated depending on the nature of the problem to be resolved. Most widely used two segmentation strategies are “binary class classification” and multiclass classification”. Already discussed diabetics exaple represents “binary class classification”, as there can be two possible outcomes only. Political party which you wish to vote could be a “multiclass classification”, as it`s possible to find more political parties and options than just two. Therefore, the machine learning engineer and the data scientist needs to understand the business requirement to be automated and dataset segmentation and annotation need to be accomplished accordingly.

Identification of the eligible dependent and independent variables in your dataset is also a critical requirement. For example, let assume we are creating a custom dataset based on some historical data with the intension of predicting, whther a student will pass the exam or not. In this case attributes collected like, hours allocated for studying, previous semester marks, gender, psycological stability could be some hypothetical attributes we could assume as independent variable. The composition of all these attributes together will determine, weather the student will pass the exam or not. Therefore, passing or failling in this example is dependent on the attributes we explore earlier. Hence, pass / fail possibility in this example can be recognized as a dependent variable. Usually the dependent variable becomes the class in supervised learning strategy. As per this example, either a student can pass or fail. Therefore, this is a “binary classification problem” (Santoso et al., 2021).

Selecting only the most suitable attributes as the independent variable is crucial in determining the overall success of the machine learning process. As already discussed, a statistical technique like correlation analysis can be utilized to select the mostly impacting attributes, while we can ignore the rest. This will reduce the data to be processed improving the speed of the learning cycle as well as avoid the possibilities of injecting noise for the predictions provided by the machine learning models. Once the dataset is organized, next important step is to select the appropriate machine learning algorithm best suited for the purpose. This requires sound technical knowledge and experience. There are so many supervised learning algorithms such as Naive Bayers, Support Vector Machines, Decision Trees, Nearest neighbour, Logistic Regression and the list continues. In depth technical knowledge associated with the operational dynamics associated with the respective algorithm and how much is it suited for the dataset we have, it a crucial decision machine learning engineer has to make. The recommended practice is to visualize the dataset to get a strong insight about the distribution and then select the matching algorithm suited for the purpose.

The discussion of each of these algorithms is too technical to be included in this article, as it requires strong knowledge in statistics, computer programming. The main empasize of this article is to lay a solid foundation on the conceptual perspective. Strong conceptual perspective will act as a strong back-bone in technically absorbing each of these algorithms operational dynamics with the skill on implementing them practically.

Deep Learning

This is a more robust and advanced flavour of supervised learning. Deep Learning contains strong neural network backbone influenced by the anatomical structure of the human brain. There are different types of neural networks such as Multilayer Perceptron (MLP), Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN), LSTM networks and etc. Apart from that, different neural network architectures are also in use as they are fine-tuned for numerous purposes. For instance Transformer architecture of neural networks are operational inside intelligent softwares like ChatGPT. Generative Adverserial Networks (GAN) uses a special architecture of two CNNs working in collaboration (Durgadevi, 2021). These two CNNs operate synchronously and perform two different operations. They are referred to as Generator and Discriminator.

Likewise, AutoEncorders is another powerful architecture comprising on Encoder and Decoder neutral networks. Inside Large Language Models (LLM) also numerous neutral network architectures operate. They are capable of more robust and intelligent applications associated with text, audio, video and images. Deep Learning is a complex and advanced topic which requires a strong foundation to understand the concept. Majority of aforementioned architectures are fine-tuned for numerous purposes. In dept discussion of those topics are out of the scope of this article, as it requires solid understanding of machine learning and other basic concepts. However, it`s important to highlight for the successful operation of the Deep Leaning applications also, a large and properly annotated dataset is vital. The training process almost resembles with the training of supervised machine learning algorithmes. But, there are more advanced tunning that can be done to get more robust and solid outcomes.

Regression Vs. Classification

Supervised learning can be implemented in both of aforementioned forms. Classification aspect has been already discussed. As conversed earlier, rudimentary classification techniques available are binary and multi class classifications. Basically, classification does categorization of input data into different segments. It`s ideal for business use cases like deciding “with ot without diabetics”, “passing or failing of a student”, “predicting the political party to be voted” and etc. In all such cases it`s a discrete output which can be categorized.

The other form of the supercised learning is “Regression”. This is used for continuous type of numeroical predictions. For an example, prediction of car prices, house prices, marks, revenue forecasting and etc. In each of such cases, it`s not a discrete categorical value where the segmentation is feasible. But it`s a continuous numerical value output as a price, mark, coordinate or etc. Under supervised learning via using machine learning or deep learning techniques both regression and classification outcomes can be derived. However, it`s the sole responsibility of the relevant business stakeholders to decide whether they require a numerical continuous output or a discrete categorical output. Depending on that requirement, classification or regression solutions can be implemented.

Unsupervised Learning

This is the second type of machine learning flavour widely in use. As the name implies, in this mechanism, data annotation is not done with an involvement of a human expert. The reason for that is, unsupervised learning technique is mainly dealt with very large data volumes technically referred to as “Big Data”. Hence, the volume of data is excessive manual intervenstion and annotation is not practically feasible (Durgadevi, 2021). Therefore, in unsupervised learning we can use large data volumes that are not being annotated. Consequently, unsupervised algorithms utilises a special techniques to conduct the data annotation in an automated manner. This is technically referred to clustering. Therefore, unsupervised learning algorithms often referred to as clustering algorithms as well. Unsupervised learning arlgorutms are mainly divided in to few segments such as Clustering algorithms Widely used segment. As the name implies data is categorized into several clusters via these algorithms. Popular clustering algorithms are K-means clustering, hierarchical clustering and DBSCAN algorithms.

Reinforcement Learning

Reinforcement Learning (RL) is a type of machine learning where an agent learns how to make decisions by interacting with an environment. Unlike supervised learning, where the model learns from labeled data, RL works through a trial-and-error approach (Shakya et al., 2023). The agent performs actions, receives feedback in the form of rewards or penalties, and uses this feedback to improve its future behavior. This method is inspired by how humans and animals learn from their surroundings through experience.

The main components of a reinforcement learning system are the agent (the decision-maker), the environment (everything the agent interacts with), actions (choices the agent can make), states (the current situation of the environment), and rewards (feedback from the environment). The agent's goal is to maximize the total reward it receives over time. It does this by learning a strategy, known as a policy, which tells it what action to take in each state to achieve the best long-term outcome.

Reinforcement learning is widely used in areas where decision-making is complex and dynamic. Some popular applications include training robots to walk, teaching software to play games like chess or Go, and optimizing recommendations in online platforms. Despite its successes, RL can be challenging to implement because it often requires a lot of time and data to learn effectively. However, as computing power increases and algorithms improve, reinforcement learning continues to play a growing role in making machines more intelligent and adaptive.

Conclusion. Artificial Intelligence is no longer a concept of the distant future it is a present reality shaping our daily lives in subtle yet powerful ways. From virtual assistants and personalized recommendations to automated services and smart devices, AI demonstrates a form of everyday intelligence that enhances convenience, efficiency, and decision-making. Understanding how AI works, especially at a basic level, helps us appreciate the logic behind the technologies we interact with and builds awareness of both their potential and limitations. As AI continues to evolve, it becomes increasingly important for individuals and societies to engage with its development thoughtfully. While it offers immense benefits across fields like healthcare, education, and transportation, it also brings challenges related to ethics, job displacement, and data security. A foundational understanding of AI empowers us to navigate these changes responsibly and participate in shaping its future use. Ultimately, AI is not just about machines becoming smarter it is about how we, as humans, choose to design, apply, and live alongside this intelligence. Embracing this understanding helps ensure that AI serves humanity in meaningful and ethical ways, enhancing life without compromising human values.

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