This study conducted a content analysis of research studies that have examined the application of artificial intelligence (AI) in the education sector. The study also aimed to identify possible research trends and difficulties related to the use of AI in education. A total of 100 papers, comprising 63 empirical papers (consisting of 74 studies) and 37 analytic papers, were chosen from the education and educational research category of the Social Sciences Citation Index database for the period of 2010 to 2020. The content analysis revealed that the research questions could be categorized into three layers: the development layer, which includes classification, matching, recommendation, and deep learning; the application layer, which encompasses feedback, reasoning, and adaptive learning; and the integration layer, which involves affection computing, role-playing, immersive learning, and gamification. Furthermore, it was recommended to conduct further research on four emerging areas of study: Internet of Things, swarm intelligence, deep learning, and neuroscience. Additionally, an evaluation of the application of artificial intelligence in education was proposed. However, we have also suggested that the obstacles in education may arise from the improper application of AI techniques, the shifting roles of instructors and students, and the presence of social and ethical concerns. The results offer valuable insights into the application of artificial intelligence (AI) in the field of education. This research strengthens the theoretical basis of AI in education and presents a promising opportunity for educators and AI engineers to engage in additional collaborative research.

The development and proliferation of artificial intelligence (AI) is occurring rapidly, and AI has become integrated into our everyday lives. Indeed, artificial intelligence has revolutionized the methods by which individuals acquire knowledge. Nevertheless, the implementation of AI in the educational field has encountered difficulties and ethical concerns. This study aims to examine the potential, advantages, and obstacles of artificial intelligence in the field of education. A systematic review technique was employed to examine the existing and pertinent literature in order to identify the current research emphasis and gain a comprehensive comprehension of AI technology in education for educators. Additionally, this review aims to suggest future research areas. The findings indicate that the use of AI in education has progressed significantly in industrialized countries, particularly during the Industry 4.0 period. The report addresses further difficulties and provides recommendations.

As of 2021, around 30 countries have published their national strategy for artificial intelligence (AI). These documents outline strategies and predictions addressing the influence of AI on policy sectors, such as education, and usually address the societal and moral consequences of AI. This article conducts a thematic analysis of 24 country AI policy strategies, examining the significance of education in the global AI policy discussion. The study reveals that discussions on policy mostly overlook the integration of AI in education (AIED), despite the significant importance placed on education's role in preparing a workforce for AI and cultivating more AI professionals. In addition, the ethical ramifications of AIED are given little consideration, despite the prevalence of AI ethics discourse in these texts. This indicates that AIED and its wider policy and ethical consequences have not been widely recognized by the general public and influential decision-makers. This is concerning because effective policy-making and thoughtful ethical deliberation are closely interconnected, as argued in this article. Based on these discoveries, the article utilizes a set of five AI ethics principles to explore how policymakers might more effectively integrate the consequences of AIED. Ultimately, the paper provides suggestions to AIED scholars on how to effectively interact with the policymaking process and conduct ethics and policy-oriented AIED research. The goal is to influence policy discussions in order to benefit the public.

Approach: This review study employed a narrative synthesis and a systematic literature review. The literature and information were sourced from a range of publications and research articles accessed through academic databases such as EBSCO, Google Scholar, Scopus, Web of Science, and ScienceDirect. The inclusion criteria encompassed research that provided a clear definition of artificial intelligence in the education sector, were published and written in English, and underwent peer review. Five autonomous reviewers evaluated the search results, retrieved data, and determined the quality of the research in order to summarize and publish the findings. Conclusion: Artificial intelligence has already made its way into the education industry. Integrating artificial intelligence is a crucial and essential element in the advancement of education. Moreover, artificial intelligence is progressively employed as a digital assistant. They provide support to teachers and students in multiple ways, such as granting pupils access to a diverse array of educational resources tailored to their individual learning requirements and academic disciplines. Nevertheless, artificial intelligence breakthroughs carry certain hazards, including those related to safety, security, and privacy. Artificial intelligence technologies have both beneficial and bad impacts on the education sector. Therefore, it is imperative to give top priority to integrating artificial intelligence into education and devising suitable strategies to fulfill the demands and expectations of teachers and students through the use of AI technology. Consequently, academic performance will be outstanding. Recommendation & Implication: In the future, qualitative research methods like interviews or quantitative analytic methods like online questionnaires could be utilized to offer more comprehensive explanations and clear-cut conclusions. The consequences of this research can be utilized by school administrators, teachers, and students to have a deeper understanding and effectively apply suitable ways for enhancing educational performance using artificial intelligence.

Artificial Intelligence (AI) is significantly transforming the world, with both positive and negative consequences. The incorporation of AI into different facets of human existence is currently in progress, and the intricate moral issues arising from the creation, implementation, and utilization of this technology serve as a prompt to reevaluate the educational curriculum for future AI developers, designers, and professionals. Training future members of the AI community, as well as other stakeholders, to consider the possible influence of AI on people's lives and to accept responsibility for maximizing its advantages while minimizing its potential downsides is extremely important. One way to achieve this is by including AI ethics more comprehensively and methodically into the curriculum. This study provides a concise overview of several approaches to AI ethics and presents a series of recommendations for the teaching of AI ethics.

In his keynote session at ICCE 2019, Stephen Yang discussed the emerging challenge of precision education in the context of utilizing artificial intelligence (AI), machine learning, and learning analytics to enhance teaching quality and learning performance. The objective of precision education is to promptly identify students who are at risk and offer appropriate assistance based on their teaching and learning experiences (Lu et al., 2018). Based on the central concept of precision education, this special issue promotes a thorough discussion between impersonal technology and compassionate humanity, resulting in a deeper comprehension of precision education. Thirteen research papers focusing on precision education, AI, machine learning, and learning analytics were exchanged for this special issue. These papers aimed to provide a comprehensive understanding of how AI can be applied in education, covering various applications, methods, pedagogical models, and environments.

The utilization of Artificial Intelligence (AI) technology in education has led to a rise in the quantity of published studies in this domain. Nevertheless, there have been no extensive evaluations carried out to thoroughly examine all the different facets of this domain. Using topic-based bibliometrics, we analyze 4,519 publications from 2000 to 2019 to uncover trends and subjects related to the application of artificial intelligence (AI) in education (AIEd). The review findings indicate a growing inclination within the academic community towards utilizing AI for educational objectives. The primary areas of research encompass intelligent tutoring systems designed for special education, natural language processing applied to language education, educational robots utilized for AI education, educational data mining focused on performance prediction, discourse analysis in computer-supported collaborative learning, neural networks employed for teaching evaluation, affective computing employed for learner emotion detection, and recommender systems used for personalized learning. In addition, we explore the difficulties and potential future paths of Artificial Intelligence in Education (AIEd).

This article highlights five major areas of disagreement that deserve careful consideration in future discussions and decision-making, given the rapid growth of interest and debate surrounding AI in education. The following actions should be taken: (1) Concentrate on discussing AI technologies that currently exist, rather than exaggerating the potential of speculative AI technologies; (2) Clearly emphasize the limitations of AI in terms of modeling social contexts and simulating human intelligence, reasoning, autonomy, and emotions; (3) Highlight the negative social consequences of using AI; (4) Recognize that claims about AI are influenced by personal values; and (5) Give more consideration to the environmental and ecological sustainability of ongoing AI development and implementation. Therefore, contrary to common beliefs that AI is an impartial instrument, it is argued that the utilization of AI in education should be seen as a political act that affects different groups of individuals in different educational settings.

The field of engineering education is continuously adapting to stay abreast of the most recent technical advancements and fulfill the expanding demands of the engineering sector. An encouraging advancement in this domain is the utilization of generative artificial intelligence technologies, shown by the ChatGPT conversational bot. ChatGPT has the capacity to provide tailored and efficient learning experiences by offering students individualized feedback and explanations, along with generating lifelike virtual simulations for practical learning. Nevertheless, it is crucial to take into account the constraints of this technology. Generative AI systems like ChatGPT are reliant on the quality of their training data and have the potential to perpetuate biases or even produce and disseminate falsehoods. In addition, the utilization of generative AI in education gives rise to ethical apprehensions, including the possibility of students engaging in unethical or deceitful practices, as well as the potential displacement of human workers due to technological redundancy. Although the current status of generative AI technology, exemplified by ChatGPT, is remarkable, it is not without its limitations. However, it serves as a mere glimpse into the future potential of this field. Engineering educators must comprehend the ramifications of this technology and investigate how to modify the engineering education system to enable future engineers to utilize the advantages of generative AI while mitigating any adverse effects.

Artificial intelligence (AI) is swiftly revolutionizing diverse sectors, including education. Artificial intelligence (AI) is employed in school management to optimize the learning process, enhance student results, and streamline administrative operations. The objective of this research is to investigate the utilization of artificial intelligence in the field of educational management, encompassing its advantages and difficulties. The study effort utilizes a systematic review methodology to analyze the literature on artificial intelligence in educational management. The study reveals that AI offers numerous benefits, such as enhancing student engagement, customizing learning experiences, and achieving cost-effectiveness. Nevertheless, artificial intelligence (AI) presents other obstacles, including ethical dilemmas, possible prejudices, and the necessity to retrain the workforce. The research findings indicate that AI possesses a substantial potential to enhance educational management. However, it is imperative to exercise prudence and caution when implementing it.

The utilization of artificial intelligence (AI) in the smart vision effort brings about a significant change in how diabetic retinopathy is diagnosed and treated, resulting in revolutionary benefits. The main objective of this program is to tackle all types of diabetic retinopathy by employing advanced AI techniques such as deep neural networks and machine learning. These sophisticated algorithms are specifically created to quickly and accurately diagnose conditions, allowing for prompt interventions to prevent vision loss by detecting complex patterns that cannot be seen by the human eye. By detecting intricate patterns that are imperceptible to the human eye, these algorithms ensure prompt and precise diagnosis. Early detection is essential since it enables prompt medical attention, thereby greatly diminishing the likelihood of permanent vision impairment. The smart vision program paves the way for a future in which diabetic retinopathy no longer causes blindness, providing a more promising, distinct, and secure optical future for individuals impacted by the condition.

The utilization of artificial intelligence (AI) and computer vision (CV) has the potential to completely revolutionize the delivery of healthcare. AI-powered computer vision can be utilized for medical image analysis, disease identification, patient health tracking, surgical support, speeding up drug development, and developing personalized treatment plans. The utilization of AI-assisted computer vision in healthcare offers several benefits, including enhanced diagnosis, reduced expenses, customized treatment, improved patient outcomes, and expedited drug discovery. Nevertheless, the utilization of these technologies also poses challenges in regards to data privacy, bias, and legal issues. This chapter explores several applications of computer vision in healthcare systems, such as medical picture analysis, disease diagnosis, movement and gait analysis, surgical support, behavioral analysis, and medicine development. The chapter also addresses the challenges associated with implementing computer vision in healthcare, such as data privacy issues, bias, legal considerations, limited accessibility, and the intricacies of biological systems. In summary, the utilization of AI-assisted computer vision in healthcare systems has the potential to greatly transform the industry by facilitating faster and more precise diagnosis, improving patient results, and reducing expenses. In order to ensure the ethical and responsible use of these technologies, it is imperative to tackle the associated concerns.

Agriculture is of utmost importance and serves as the principal source of income for many countries. The presence of pathogens such as viruses, fungus, and bacteria in plants leads to a disease that results in significant financial losses for agricultural companies worldwide. Monitoring disease in plants is essential for ensuring the security of harvests in terms of both quality and quantity. Therefore, it is crucial to identify plant diseases. The plant disease condition is evident in specific plant organs. However, it is typically seen that the infection is found in specific leaves of plants. Researchers employ computer vision, deep learning, few-shot learning, and soft computing techniques to automatically detect plant diseases using leaf images. These strategies also help farmers take prompt and suitable actions to prevent a decrease in the quality and quantity of crops. By applying these techniques in illness recognition, it is possible to avoid the drawback of biased selection of disease features, extract relevant features, and enhance the speed and efficiency of technology and research. Furthermore, specific molecular approaches have been developed to proactively address and reduce the risk posed by pathogens. Therefore, this review assists the researcher in utilizing machine learning, deep learning, and few-shot learning to automatically identify diseases in plants. It also offers specific diagnostic strategies to prevent the occurrence of these diseases. Furthermore, this paper also addresses some of the forthcoming research endeavors in the field of disease classification.

The domain of artificial intelligence (AI) technologies is extensive. There is a wide array of both individual and collaborative AI-based solutions that are currently accessible. One example of such technology is computer vision. Computer vision is closely connected to various other technologies such as machine learning (ML), deep learning (DL), and artificial neural networks. Computer vision is utilized in various domains. Healthcare has seen widespread application in recent decades. Healthcare utilizes algorithms in the aforementioned technologies to extract relevant information from medical photos. This chapter provides an overview of computer vision, including its various applications and its specific use in the healthcare industry. Furthermore, we will examine the case of tumor identification using computer vision in a MATLAB environment.

Inverse gas chromatography (IGC) is a method that has become exceedingly sensitive, versatile, and efficient for material analysis. By utilizing thermochemical methods, IGC offers valuable understanding of the physicochemical properties of materials, including dispersive surface free energy, Gibbs surface energy components, and Guttamann Lewis acid-base parameters. This extensive overview explores the historical context, equipment, and wide-ranging uses of IGC. Valuable material regarding the selection and description of various models utilized in IGC experiments is available for researchers and practitioners. IGC has diverse applications in sectors such as polymers, pharmaceuticals, minerals, surfactants, and nanomaterials. In addition, IGC enables the quantification of significant factors such as sorption enthalpy and entropy, dispersive and specific surface energy components, co/adhesion work, glass transition temperature, surface heterogeneity, miscibility, solubility parameters, and specific surface area. These insights enhance comprehension of material behavior and assist in the design and optimization of innovative materials. Furthermore, the incorporation of computer vision and image processing methods into IGC has improved our comprehension of the complex surface texture, roughness, and associated characteristics of materials. The combination of IGC, computer vision, and AI offers promising prospects for further investigation into chemical materials, creating fresh pathways for research and exploration. This study presents a thorough examination of IGC, including its methodology and applications. Additionally, it emphasizes the potential benefits of merging IGC with AI and computer vision. The valuable information and profound insights provided in this text will be advantageous for researchers, scientists, and professionals working in the advanced materials sector. It will empower them to utilize IGC and AI techniques to find and produce unique materials.

Currently, the utilization of Artificial Intelligence (AI) in industrial control, smart home, and other domains has garnered positive feedback. Nevertheless, AI technology necessitates specific computer performance criteria and also confronts challenges in network security, data analysis, human-computer interaction, and other areas. Currently, the visual platform of embedded systems has made significant progress in practical applications. However, its development has been greatly hindered by issues such as low overall development efficiency and unsteady system performance. This paper developed an AI-based EP Vision System (VS). The platform integrated embedded hardware design with the Support Vector Machine (SVM) algorithm to achieve intelligent robot interaction and target detection capabilities. According to the test results, under identical conditions, students and experts had positive ratings of System X at rates of 83.5% and 90% respectively, whereas negative evaluations were reported at rates of 16.5% and 10% respectively. Nevertheless, their favorable assessment of System Y only represented 19% and 4%, whereas the unfavorable assessment accounted for 81% and 96%. The percentage of favorable assessment for System X was much more than that for System Y, suggesting that System X is capable of meeting the practical application needs and enhancing the efficiency of system recognition to some degree. The study demonstrated a direct correlation between artificial intelligence (AI) technology and emotional intelligence (EP) vs (VS).

Implemented on contemporary smart automobiles. Several Artificial Intelligence foundation models have been suggested for intelligent sensing to identify familiar item categories in novel yet similar situations. Nevertheless, the basic models of smart sensing still face difficulties in accurately identifying all item types in both familiar and unfamiliar situations. This letter seeks to expand the scope of smart sensing research for intelligent cars. We begin by providing an overview of the existing foundation models that are commonly employed, as well as the fundamental intelligence required for the intelligent sensing of vehicles. Next, we elucidate the concept of Sora-based Parallel Vision, which aims to upgrade the underlying models of intelligent sensing from a basic level (1.0) to an advanced one (2.0) and ultimately to a comprehensive level (3.0). The text presents a number of illustrative case studies that demonstrate the possible applications of Sora-based Parallel Vision. It also outlines the future research path of this technology.

Utilizing AI and machine learning, namely the vision transformer technique, for bacterial detection shows great potential in addressing the shortcomings of conventional methods. This approach offers improved speed and accuracy in identifying disease-causing bacteria such as E. coli. Research is currently being conducted to evaluate the usefulness of water in microbiology, specifically in relation to the presence of coli and salmonella, which are important for human survival. This study presents a groundbreaking positional self-attention transformer model for categorizing bacterial colonies. By incorporating a positional self-attention mechanism, we improved the performance of the model, building upon the established success of transformer architectures in several fields. We introduced an innovative method for categorizing bacterial colonies by employing a positional self-attention transformer model. This enables the model to efficiently capture spatial linkages and patterns within bacterial colonies, hence leading to exceptionally precise categorization outcomes. The model was trained on a large collection of bacterial pictures, guaranteeing its resilience and ability to adapt to various colony kinds. The suggested approach effectively captured the spatial linkages and sequential patterns inherent in bacterial colony images, enabling more precise and resilient categorization. The suggested model exhibited exceptional performance, with a classification accuracy of 98.50% in identifying bacterial colonies. This innovative methodology outperforms conventional methods by successfully capturing complex spatial interactions within microbial structures, providing unparalleled precision in detecting small morphological differences. The model's capacity to adjust to various colony shapes and arrangements is a notable progress, with the potential to revolutionize the field of bacterial colony categorization using cutting-edge deep learning methods. The model's high classification accuracy indicates its potential for practical applications in early detection of infectious diseases and focused treatment development. This study's results highlight the efficacy of integrating positional self-attention into transformer models for image-based classification tasks, namely in the field of bacterial colony analysis.

An autonomous vehicle is a sophisticated and all-encompassing application of advanced technology. It incorporates functions such as scene perception, optimization calculation, multi-level assisted driving, and more. This is achieved through the use of computer vision, sensors, information fusion, information communication, high-performance computing, artificial intelligence, and automatic control technologies. Computer vision is a crucial component of autonomous driving, serving as a primary means of data processing. Furthermore, it introduces groundbreaking transformations to the forthcoming transportation system. Image processing and computer vision are crucial in autonomous driving as they allow vehicles to observe and comprehend their surroundings, leading to intelligent decision-making and control. This paper discusses the application of computer vision and artificial intelligence in automatic driving. It focuses on image processing technology, including camera and sensor technology, image acquisition and preprocessing, feature extraction, and object detection. The goal is to explore the use of computer vision algorithms in automatic driving. The study of lane keeping and recognition, obstacle detection and avoidance, and traffic signal and sign recognition holds immense practical importance.

Medical picture segmentation is an essential problem in computer vision, serving as a vital function in applications such as diagnostics, treatment planning, and medical research. This study investigates various techniques utilized in medical research to accomplish image segmentation. The techniques encompass a spectrum of methodologies, including conventional methods such as thresholding, edge detection, region-based and clustering, as well as contemporary artificial intelligence techniques, specifically deep learning methods. An in-depth analysis is conducted to assess the advantages and constraints of each approach. This research aims to analyze several architectures employed in medical picture segmentation, with a specific focus on evaluating their performance. The objective is to thoroughly examine various segmentation methods, providing a comparative analysis of their efficacy. This document explores the latest advancements in segmentation technology, focusing on significant advances that have the potential to greatly enhance the accuracy and efficiency of interpreting medical images. The study presents the outcomes of multiple approaches to medical image segmentation, along with an in-depth analysis of the strengths and weaknesses of the different techniques used. This is achieved through a thorough compilation and detailed critique of the results obtained from employing various segmentation strategies. This study improves our understanding of how these techniques can be utilized in the medical field, particularly in the domain of computer vision.

This paper presents a study that uses artificial intelligence (AI) to apply computer vision algorithms for identifying human emotions in video recordings while users interact with various visual stimuli. The research seeks to reveal the development of software that can detect emotions by utilizing AI algorithms and image processing pipelines to recognize users' facial expressions. The procedure entails evaluating users using visual stimuli and facilitating the application of computer vision algorithms that are in line with psychology theories that define emotions and their discernible characteristics. The study showcases the viability of using convolutional neural networks (CNN) and software development and training based on facial expressions to accurately identify emotions. The results demonstrate successful emotion detection. However, in order to enhance precision, further training is required for settings that involve a wider range of images and the implementation of additional algorithms to differentiate closely related emotional patterns. The discussion and conclusions highlight the inherent capabilities of artificial intelligence. The utilization of computer vision algorithms in emotion detection offers valuable insights into software development, continuous training, and the dynamic nature of emotion identification technologies. Additional training is required for situations involving a wider range of photos, coupled with the development of more advanced algorithms that can accurately differentiate between facial expressions that closely resemble each other in terms of emotional patterns. This will improve the level of certainty and accuracy.

The face is the primary and indispensable component of the human body, and due to its unique characteristics, it plays a vital role in the identification of individuals. Facial recognition technology (FRT) is a highly successful and captivating technology of the contemporary day. Following the COVID-19 epidemic, there is a global shift towards the adoption of contactless Facial Recognition Technology (FRT). Thanks to its non-contact biometric features, Facial Recognition Technology (FRT) is gaining significant popularity on a global scale. Companies are substituting traditional fingerprint scanners with artificial intelligence-powered facial recognition technology (FRT), which is creating significant opportunities in the business sector. Security and surveillance, authentication/access control systems, digital healthcare, and photo retrieval are among the domains where its utilization has become indispensable. In this communication, we discussed the worldwide implementation of Facial Recognition Technology (FRT), its increasing popularity in the market, its application in different industries, as well as the obstacles and growing concerns associated with it, with a particular focus on India and globally.

Advancements in technology have allowed computers to accurately detect and classify facial expressions in order to ascertain an individual's emotional state in a still image or a video. Facial Expression Recognition (FER) has emerged as a highly prominent study field in computer vision. Lately, deep facial expression recognition (FER) systems have mainly focused on tackling two major obstacles: the issue of overfitting caused by a lack of sufficient training data, and the existence of expression-unrelated changes such as lighting conditions, head position, image quality, and biases related to individual identities. This work presents a thorough examination of deep facial expression recognition (FER), including an analysis of techniques and datasets that provide valuable information about these inherent challenges. This study begins by providing a comprehensive chronology that illustrates the development of techniques and datasets in the field of deep facial expression recognition (FER). This timeline depicts the advancement and evolution of the methodologies and data sources employed in Facial Expression Recognition (FER). Next, a thorough examination of Facial Expression Recognition (FER) methods is presented, encompassing the fundamental principles of FER (such as preprocessing, feature extraction, classification, etc.) spanning from the era of traditional methods utilizing manually designed features (e.g., SVM and HOG) to the era of deep learning. Additionally, a concise overview is given about the benchmark datasets, which are divided into two categories: controlled environments (lab) and uncontrolled environments (in the wild). These datasets are utilized to assess various facial expression recognition (FER) approaches, and a comparison of different FER models is also shown. The paper discusses the current deep neural networks and training methods used for Facial Expression Recognition (FER), focusing on both static photos and dynamic image sequences. The text identifies the remaining obstacles and the related possibilities in Facial Expression Recognition (FER), as well as the future paths for creating strong and reliable deep FER systems.

Advancements in technology have allowed computers to analyze and classify facial expressions in order to ascertain an individual's emotional state in a still image or a video. Facial Expression Recognition (FER) is a widely studied topic in computer vision. Lately, deep facial expression recognition (FER) systems have mainly focused on tackling two major obstacles: the issue of overfitting caused by a lack of sufficient training data, and the existence of expression-unrelated changes, such as lighting conditions, head position, image quality, and bias towards specific individuals. This study presents a thorough examination of deep Facial Expression Recognition (FER), covering the techniques and datasets that provide valuable information about these inherent challenges. This work begins by providing a comprehensive timeline that illustrates the progression of techniques and datasets used in deep facial expression recognition (FER). This timeline demonstrates the evolution and advancement of the methodologies and data sources employed in Facial Expression Recognition (FER). Next, this paper presents a thorough examination of Facial Expression Recognition (FER) methods, encompassing the fundamental principles of FER such as preprocessing, feature extraction, classification, and various techniques. The review spans from the traditional era of FER, which relied on manually crafted features like SVM and HOG, to the current era of deep learning. Furthermore, a concise overview is given about the benchmark datasets, which may be classified into two categories: controlled environments (lab) and uncontrolled environments (in the wild). These datasets are utilized to assess various facial expression recognition (FER) approaches, as well as to compare different FER models. The paper discusses the current deep neural networks and training methodologies used for Facial Expression Recognition (FER), focusing on both static photos and dynamic image sequences. The text identifies the remaining obstacles and the related possibilities in Facial Expression Recognition (FER), as well as the future paths for creating resilient deep FER systems.

Facial recognition is a widely recognized and highly regarded area of study within the subject of Computer Vision, particularly due to the progress made in deep learning and the availability of extensive datasets. Facial recognition technology has made substantial advancements and is extensively utilized in practical situations. A comprehensive facial recognition system comprises three primary components: facial recognition, orientation, and representation. This method use deep convolutional neural networks to identify and align faces to a standard perspective, as well as extract information for recognition. This article offers a comprehensive summary of the most recent progress in various domains, demonstrating how deep learning has significantly improved their capabilities. The field of object detection in machine vision is a complex topic that necessitates substantial enhancements. Although picture classification accuracy has reached approximately 2.25%, surpassing human performance, object identification algorithms are still in their initial development phases. Presently, algorithms are able to attain a maximum of 40.8 Mean Average Precision Scores (MAPS) when applied to contemporary items. Therefore, it is of utmost importance to meticulously choose the dataset in order to obtain the most favorable outcomes.

Facial recognition technology (FRT) is an artificial intelligence (AI)-based technology employed during the COVID-19 pandemic to manage the transmission of the virus. As preparations for future pandemics are now in progress, this technology is seen as an effective tool for monitoring affected persons and gathering real-time surveillance data. When used correctly, Facial Recognition Technology (FRT) can assist governments in implementing public health surveillance. This refers to the organized gathering, storage, utilization, and distribution of personal information to identify and control the spread of diseases. However, FRT also poses ethical and legal dilemmas. These include the potential use of FRT without obtaining consent from the individuals being monitored, the safeguarding of biometric data collected during surveillance, and the possibility of this information being utilized for purposes other than public health. Although widely implemented in nations like Russia and China, western jurisdictions are significantly more hesitant to embrace it, both for pandemic-related objectives and in other contexts.

Amidst the COVID-19 outbreak, Delhi, India, encountered a critical problem when almost 1,500 people who tested positive for COVID-19 disappeared. During public health emergencies, such as pandemics, natural disasters, or other calamities, hospitals and medical centers encounter a sudden surge of patients. Hospital management encounters challenges in effectively managing patient flow, particularly when patients need to be transferred between facilities or when new temporary healthcare facilities are established. These issues can lead to a rise in missing person situations. Patients may unintentionally be isolated from their family. The human face possesses a distinctive biometric system capable of ascertaining an individual's age, gender, mood, and even verifying their identity. Utilizing the capabilities of deep learning and artificial intelligence, computer vision plays a crucial role in Patient Identification. This study introduces an advanced patient face detection model that combines a twofold approach. The first component utilizes MTCNN, a cutting-edge multi-task cascaded convolution neural network, for face detection and alignment. The second component employs FaceNet, a well-known convolutional neural network (CNN) algorithm for face embedding. Finally, a KNN algorithm is used as a classifier to achieve an impressive accuracy rate of 97.1%. In order to prioritize public safety during the pandemic, we have developed a Resnet34 model specifically designed for detecting masks. This model has been trained using the Face Mask Detection dataset and has achieved an impressive accuracy rate of 97%. This work not only focuses on the urgent issues related to patient identification and safety during crises, but also has implications for wider healthcare applications. The offered models present potential opportunities for improving patient care and security.

Well-being is a fundamental aspect of positive psychology, renowned for its beneficial impact on both the personal and professional aspects of individuals, as well as on teams and organizations. Comprehending and advocating for personal well-being is crucial for the health and sustained achievement of staff members. However, existing methods for evaluating subjective well-being rely on lengthy surveys and questionnaires, which hinder the ability to offer immediate feedback necessary for increasing awareness and modifying individual conduct. This research presents a framework for comprehending the process of non-verbal communication in cooperation. It utilizes video data to uncover important factors that can predict an individual's well-being in a team setting. The system utilizes advanced video acquisition methods and cutting-edge artificial intelligence tools to extract specific, comparative, and contextual features from panoramic video footage. Each time series undergoes statistical analysis, resulting in the creation of a dataset consisting of 125 features. These features are subsequently connected to PERMA surveys, which were designed within the field of positive psychology and measure Positive Emotion, Engagement, Relationships, Meaning, and Accomplishments. Machine learning algorithms are used to assess each component of the PERMA model as either a regression or classification problem. The methodology we employed was implemented in a specific instance, wherein 80 students participated in 20 groups over the course of one week, working together on a team assignment in a physical, in-person environment. As a result, we were able to develop multiple hypotheses that pinpoint the characteristics that influence an individual's well-being in a team setting. These encouraging findings indicate intriguing possibilities for further research, such as integrating various forms of media to analyze the personal well-being of individuals in a team setting.

Face recognition plays a crucial role in a wide range of applications, including security, surveillance, and authentication. Many households have installed closed-circuit television (CCTV) cameras for the purpose of enhancing safety and identifying individuals. The purpose of these CCTV cameras is to ensure safety and identify individuals who visit their homes. In a select highly protected locations, access for unknown intruders is severely restricted. This study focuses on a system that use machine learning and artificial intelligence algorithms to identify the face of an intruder through a surveillance camera. The specified design is effectively realized using the HOG feature extraction and SVM classification algorithms. It accurately classifies the faces in a video stream provided as input. The primary aim of this study is to identify individuals' faces in a video using a HOG feature extractor. The faces will then be classified using SVM, allowing the machine to distinguish between authorized personnel working for the business and potential intruders.

The expanding population results in a larger consumer base, which in turn places greater demands on resources to meet the increasing needs of consumers on a daily basis. Given that technology is being employed to address various issues, it is reasonable to consider its application in resolving this particular problem as well. The concept aims to enhance the convenience and sophistication of the supermarket experience by eliminating the need for cashiers and queues, thereby enabling a seamless shopping experience. This project utilizes Artificial Intelligence and Internet of Things to automate the operations of a supermarket, resulting in improved efficiency. To gain access, an individual just needs to enter the premises after scanning their QR code using the designated application, which contains their distinctive identification number. The system will document the customer's presence within the store. The shopping carts and baskets are equipped with sensors that can detect the presence or removal of products. The merchandise are positioned on shelves equipped with pressure sensors that can identify any instance of a product being lifted. These shelves are inaccessible and may only be opened with your shopping cards. Upon reaching the counter, simply swipe your card once more. The amount corresponding to your purchase will be withdrawn from your account, and you will receive a receipt. We anticipate offering this technology to many supermarket chains domestically and internationally, assisting them in its implementation through a modest one-time expenditure.

Autonomous vehicles (AVs) are anticipated to revolutionize future transportation systems, with decision making being a crucial component for achieving advanced automated driving. Data-driven decision-making approaches have gained increased attention as a solution to complex circumstances that rule-based methods struggle to handle well. The selection of datasets for data-driven approaches has a significant impact on decision-making performance. Therefore, it is crucial to thoroughly understand the available datasets. When considering the sources of collected data, driving data may be categorized into three types: vehicle-related data, environment-related data, and driver-related data. This study conducts a comparison of the most advanced datasets in three categories and provides a concise summary of their characteristics, such as the types of sensors employed, the methods of annotation, and the driving scenarios involved. This survey examines the properties of datasets and explores their potential uses in many elements of AV decision making. It aims to help researchers choose suitable datasets to support their own research. An overview of the forthcoming patterns in the evolution of AV datasets is provided.

Precise trajectory tracking is not feasible in real-world situations, but it is often thought to be helpful in designing motion planning algorithms. This study presents a robust and dependable framework for motion planning and control. The system effectively addresses tracking problems resulting from imprecise tracking by coordinating the motion planning layer and controller. More precisely, the motion space is partitioned into areas that are considered safe and areas that are considered risky. This is achieved by determining the size of the movement constraint based on the tracking error, which is used to create the repulsive potential field. The collision-free waypoint set can be achieved by combining global search and the proposed waypoint set filtering approach. An optimization-based strategy is used to suit the planned trajectory by minimizing the acceleration of the reference trajectory. Subsequently, the intended path is examined and adjusted by the implemented anti-collision modification to guarantee safety. By employing invertible transformation and adaptive compensation, it is possible to confine the transient trajectory tracking errors within the intended region, even in the presence of actuator failures. The cooperation between the planning and control levels ensures safety and reliability even in the presence of imprecise tracking and actuator defects, as tracking error is carefully accounted for and managed at the planning level. The simulation and experimental results confirm the benefits and efficacy of the suggested motion planning and control system.

How can the risks associated with autonomous vehicles (AVs) be allocated among those in regular road traffic? The extensive body of literature on the ethics of autonomous vehicles (AVs) mostly focuses on moral decision-making in situations where collisions are inevitable. We advocate for expanding the discussion to encompass driving behaviors in ordinary road traffic, where prevalent ethical dilemmas develop as a result of the continual transfer of risk among road users. The allocation of risks in this scenario gives rise to ethical concerns that cannot be avoided through simplistic strategies like abruptly stopping. To assess participants' preferences regarding the driving actions of autonomous vehicles (AVs), we conducted a comprehensive survey in Germany using an interactive and visual representation of various traffic scenarios. The preferences of our participants differed dramatically from simple collision avoidance. Our participants demonstrated a willingness to assume risks on behalf of other road users, which suggests that the social dilemma of autonomous vehicles (AVs) may be reduced in hazardous conditions. Our research aims to establish a connection between engineers and philosophers in order to facilitate a more productive discussion on the ethical implications of autonomous vehicles.

Artificial intelligence is a burgeoning technology that replicates human intelligence in machines by programming them to emulate human thinking and imitate their behaviors. An autonomous vehicle is capable of operating independently and performing essential tasks without any human intervention. This cutting-edge technology has the potential to enhance passenger safety, alleviate traffic congestion, optimize traffic flow, reduce fuel consumption, minimize pollution, and improve overall travel experiences. Autonomous vehicles are crucial in manufacturing, agricultural, transportation, and military domains. The actions of the autonomous vehicle are facilitated by sensor data and a limited number of artificial intelligence systems. Artificial intelligence encompasses the gathering of data, determining optimal routes, and carrying out tasks in self-driving vehicles, which necessitate the utilization of machine learning methods inherent to artificial intelligence. However, there are certain privacy and security problems associated with this. Autonomous vehicles place significant emphasis on security. This article will address the concerns around cybersecurity when integrating artificial intelligence into autonomous vehicles, as well as the advancements in self-driving car technology.

Over the past few decades, there has been a consistent growth in the number of vehicles on the road, mostly driven by the increasing need for urban transportation and modern logistics. Two of the numerous adverse consequences resulting from the proliferation of vehicles on the road, which also hinder economic progress, are heightened traffic congestion and traffic accidents. The aforementioned challenges can be effectively addressed by enhancing the intelligence of vehicles and minimizing their need on human intervention. In the last century, numerous countries have carried out substantial research that has driven the automation of road vehicles. All major motor manufacturers worldwide are currently actively pursuing the development of autonomous vehicle (AV) technologies. Without a doubt, the extensive adoption of self-driving vehicles is closer than we perceive, thanks to the advancements in artificial intelligence (AI). AI has become an essential component for autonomous vehicles to accurately sense their environment and make real-time judgments. The advancement of AI is propelled by the expansion of big data generated by several sensing devices and state-of-the-art computing resources. In order to fully understand the functions of AI in AV systems, it is necessary to first analyze the development and history of AI.

The future viability of the worldwide automobile sector will be significantly impacted by the fourth industrial revolution and the advancement of artificial intelligence (AI). The future is expected to be shaped by new industry norms, such as the growing prevalence of autonomous self-driving technology, revised safety standards, more intricate insurance regulations, the evolving social acceptance of technological advancements, the need for city infrastructure that bridges the digital divide, and the emergence of disruptive business innovation through strategic collaborations involving open-source AI. This chapter examines the crucial elements of autonomous vehicles (AVs) by utilizing advancements in artificial intelligence (AI) in radar and laser technology. It also considers commercial risks, customer behavior in self-driving vehicles, limitations imposed by city infrastructure, and societal adjustments to new technology. The future direction of the autonomous vehicle (AV) business is anticipated to be shaped by the interaction of commercial, social, risk, infrastructure, and regulatory factors, which will have different effects on the industry's stakeholders. This study forecasts that the most probable sustainable future for the AV industry will be shaped by: (1) AI's pulsed laser LiDAR technology with a sufficiently high frequency of data collection and the need for GPS bi-directional cloud technology, (2) collective insurance instead of individual liability, (3) smart city infrastructure that will likely result in significant disparities in digital connectivity across different transportation regions, leading to regional inequality, and (4) customers who strongly favor a semi-autonomous vehicle controlled by a human driver rather than full machine autonomy.

The future of autonomous vehicles depends on the merging of human-centric design with sophisticated AI capabilities. In the future, autonomous vehicles will not only transport passengers but also engage with and adjust to their preferences, ensuring a comfortable, efficient, and enjoyable travel. This study introduces a new framework that utilizes Large Language Models (LLMs) to improve the decision-making processes of autonomous cars. This framework aims to seamlessly incorporate the advanced language and reasoning capabilities of LLMs into autonomous vehicles by integrating their natural language capabilities and contextual understanding, utilizing specialized tools, synergizing reasoning, and collaborating with various modules. The suggested framework has the capacity to fundamentally transform the functioning of autonomous vehicles by providing customized support, ongoing acquisition of knowledge, and clear decision-making processes, ultimately leading to the development of safer and more effective autonomous driving technologies.

The potential of connected automated cars is diverse, and the progress of automation is closely linked to the growth of the Internet of Things (IoT), which enables artificial intelligence (AI). The initial progress in engineering, electronics, and various other domains has served as a source of inspiration for AI. Multiple technological proposals exist for the implementation of automated cars. Automated vehicles significantly enhance traffic optimization and reduce casualties. When investigating vehicle autonomy, there are two main areas of development: high-level system integrations, such as new-energy cars and intelligent transportation systems, and backward subsystem progress, which focuses on improving sensor and information processing systems. The Advanced Driver Assistance System demonstrates outcomes that align with the anticipated challenges encountered in achieving vehicle autonomy. Situational intelligence, which involves the collection of vast quantities of data, is utilized for the precise construction of high-definition city maps, land surveys, and quality assessment of roadways. The transport's infotainment system incorporates advanced technologies such as gesture recognition, language translation, and environmental perception. These capabilities are enabled by a combination of camera, Light Detection and Ranging (LiDAR), and Radio Detection And Ranging (RADAR) sensors, which also allow for object localization within the scene. This chapter provides an overview of the history of autonomous vehicles (AV), current research areas in artificial intelligence (AI) technology for AV, state-of-the-art datasets used in AV research, and the various Machine Learning (ML)/Deep Learning (DL) algorithms that make up the AV system. It concludes by discussing the challenges and opportunities of AI in AV.

In recent years, artificial intelligence has become an indispensable component of both production and service systems, as technology has become an essential feature of everyday life. Automated driving vehicles, commonly referred to as driverless cars, function automatically without the need for a human driver. Recent years have witnessed significant progress in the field of autonomous vehicles. The civilization currently need artificially intelligent autonomous automobiles. While there may be individuals who are hesitant to relinquish control of their vehicle to a computer, automated driving technologies possess the capacity to enhance road safety. Autonomous vehicles have the potential to tackle both environmental concerns and safety difficulties. Computers do not experience the same challenges as humans in maintaining focus while driving. Moreover, through proper responses, an autonomous vehicle has the ability to avert accidents caused by potentially hazardous situations on the road. Self-driving technology has numerous benefits, including increased accessibility to transportation for individuals who are unable to operate a vehicle. Due to factors such as lack of experience, disability, or advanced age, a significant number of individuals are unable to operate a motor vehicle. These individuals can travel with a significantly higher level of safety and autonomy. Consequently, this chapter will delve into the structures of both the software and hardware components of autonomous cars, along with their constituent parts, advantages, and forthcoming advancements.

The emergence of autonomous vehicles has marked a revolutionary period in transportation, fundamentally altering the realm of mobility through state-of-the-art technologies. The key aspect of this transformation is the incorporation of Artificial Intelligence (AI) and learning algorithms, which drive cars towards unprecedented levels of autonomy. This study offers a thorough examination of the evolutionary path of artificial intelligence (AI) in autonomous cars, mapping the progress from fundamental concepts to the latest breakthroughs. Starting with an analysis of the present situation, the study explores the essential function of AI in molding the ability of cars to make decisions independently. This text explains the many stages of the AI-powered development process in automobiles, while also discussing the ethical concerns and potential biases that can arise in the creation of AI-driven software for autonomous vehicles. The paper provides statistical analysis of the utilization and categories of AI/learning algorithms over time, demonstrating the changing research environment in the automobile industry. Moreover, the research emphasizes the crucial significance of parameters in enhancing algorithms for both trucks and cars, enabling vehicles to adjust, acquire knowledge, and enhance their performance gradually. The text closes by delineating several degrees of autonomy, clarifying the intricate utilization of artificial intelligence and learning algorithms, and automating crucial jobs at each respective level. In addition, the study explores the differences in software package sizes among various levels of autonomy.

The development of more responsive and humane technology has placed significant emphasis on the interaction between humans and artificial intelligence (AI). Artificial empathy tactics are particularly intriguing in this context because they have the potential to enhance customer experiences in terms of emotions and social interactions. The objective of this research is to investigate how artificial empathy tactics might enhance emotive and social customer experiences, hence optimizing human-AI interactions. The research methodology employed is qualitative, involving a comprehensive analysis of multiple studies and relevant literature. The utilized data sources encompass pertinent journals, articles, and books pertaining to the research issue. The research findings indicate that incorporating artificial empathy tactics in human-AI interactions holds significant promise for enhancing the quality of interactions and customer experiences. Utilizing technologies like natural language processing, emotion identification, and sentiment analysis might enhance the ability of AI to accurately and empathetically respond to user wants and emotions.

Empathy computing is a developing area of research that combines artificial intelligence (AI) and big data technology to forecast, detect, simulate, and produce human empathy. This discipline expands upon psychological research by exploring the concepts, measures, brain underpinnings, and practical uses of empathy. It also utilizes cutting-edge computational methods to analyze and simulate empathy. This article provides a thorough evaluation of the existing studies on empathy computing and explores its future prospects from a psychological standpoint. The objective is to support fundamental research and real-world implementations in this domain. The current research on empathy computing can be classified into four distinct themes, each focusing on different objectives and employing various methodologies. Empathy computing focuses on the analysis and understanding of empathy using computers. This undertaking can be further categorized into two distinct groups: (1) individual empathy evaluation, which centers on scrutinizing individual empathetic characteristics, and (2) empathetic content categorization, which centers on studying empathetic attributes in texts rather than individuals. Additionally, research also concentrates on the simulation and expression of empathy through computing. This encompasses the creation of empathetic response systems and the advancement of generative empathetic dialogue systems. The former offers users a restricted set of predetermined rule-based responses and feedback to convey empathy, whereas the latter use artificial intelligence to automatically develop a diverse array of sympathetic dialogues without depending on predetermined rules. These four research streams are distinct but also work well together. Furthermore, as research advances, new avenues will continue to arise, such as enhancing the empathetic abilities of computers through brain-computer interface technology. While empathy computing research is still in its nascent stages, it has demonstrated potential for groundbreaking applications in areas such as mental health, education, business services, and public management. As artificial intelligence becomes more common, fields that need a lot of human-computer contact are likely to become the key areas where this interaction takes place. Consequently, they become the primary use cases for empathy computing. Empathy computing can be utilized in the field of mental health to automatically assess and improve therapists' empathetic skills. Furthermore, it has the capability to offer individualized compassionate assistance and direction through chatbots powered by artificial intelligence. Empathy computing in education can enhance the learning process through the utilization of empathetic AI instructors. Within the commercial sector, it allows firms to provide customized customer experiences, thereby improving happiness and promoting loyalty through the creation of empathetic conversations. Empathy computing can be employed in public management to generate discourse that is empathetic in order to counterbalance negative speech. Furthermore, it enables policymakers to effectively and compassionately address the demands and inquiries of individuals, so promoting trust and confidence in the government. These four scenarios demonstrate the extensive range of possible uses for empathy computing. Nevertheless, the current impracticability of relying solely on computers to carry out sympathetic duties is mostly attributed to safety and ethical considerations. However, it is imperative to establish a partnership between humans and computers. Empathy computing serves as a groundbreaking frontier, offering not only means to quantitatively and comprehensively assess empathy on a bigger scope, but also enhancing the theoretical framework of empathy research. This study expands upon conventional research on empathy in interpersonal relationships to investigate its growing expressions in human-AI relationships. This extension presents new inquiries into the widespread existence of empathy and its possible development in human-computer interaction. Empathy computing has the potential to become a fundamental element of a comprehensive theory of empathy that includes many types of relationship dynamics, spanning from interactions between humans to interactions between humans and machines, and even more. For a thorough understanding of empathy and its effective promotion in an intelligent society, it is advantageous to concentrate future research on creating comprehensive theoretical models of empathy computing, constructing dependable datasets that encompass psychological and behavioral traits related to empathy, and validating and improving empathy computing research using a human-centered approach. Psychologists are essential in guiding, assessing, and enhancing research and practice in this subject. The partnership between researchers in psychology and computer science is crucial to guarantee that AI acquires empathy in a proficient and ethical manner, ultimately promoting the wellness of individuals in the future intelligent society.

This study aimed to examine the level of empathy displayed during interactions between human participants and chatbots among computer science students at Uppsala University, Sweden. This study investigated participants' perceptions of anthropomorphic chatbots as either machines or humans, the occurrence of verbal abuse in human-chatbot encounters, and the influence of gender dynamics on expectations of chatbot helpfulness. A qualitative data collection was carried out using a semi-structured interview style including five students. The data was evaluated manually using thematic analysis. The study's findings indicate that empathy exists in human chatbot interaction, irrespective of participants' perception of anthropomorphic chatbots as either humans or computers. Nevertheless, the overall level of empathy tends to be low as participants become frustrated when they are displeased with the chatbot's response. They often depart the chatbot without expressing their frustration and subsequently forget about it, returning at a later time with different queries. The study additionally demonstrates that participants anticipate greater assistance and courtesy when chatbots are more inclined to possess feminine characteristics.

Conversational Agents (CAs), such as ELIZA and Alexa, have been intentionally created to evoke or display empathy. Empathy has the potential to enhance the ability of technology to meet human needs, yet it can also be misleading and sometimes exploitative. This study aims to define and analyze empathy in interactions with conversational agents (CAs). It emphasizes the significance of differentiating between expressions of empathy between two people and those between a human and a CA. In order to achieve this objective, we methodically stimulate conversational agents supported by extensive language models (LLMs) to exhibit empathy towards 65 unique human identities. Additionally, we analyze and contrast the many ways in which different LLMs demonstrate or simulate empathy. Our research reveals that CAs engage in subjective evaluations of certain identities and may promote identities associated with detrimental ideas, such as Nazism and xenophobia. Furthermore, a computational method for comprehending empathy demonstrates that while CAs are capable of exhibiting empathy, they struggle in accurately interpreting and investigating a user's experience, which is in contrast to human beings.

Health and well-being sectors are increasingly utilizing interactive software agents, such as chatbots. In applications where agents interact with users in interpersonal discussions, such as coaching, providing comfort, or behavior-change interventions, there is a growing demand for understanding the empathetic capacities of these agents. Currently, there are no existing instruments capable of performing that task. To comprehend empathic capacities in interactive software agents, it is essential to possess a clear and exact understanding of empathy. The literature explores multiple interpretations of empathy, although a formal definition remains elusive due to the lack of unanimity. The text presents the development of a formal definition, or ontology, of empathy in interactive agents for health and well-being. This is achieved through a thorough literature survey and qualitative study of contemporary efforts. In this study, we demonstrate the efficacy of a formal definition by utilizing it as a means of evaluating empathy in two advanced health and well-being chatbots, namely Replika and Wysa. Our research indicates that our definition accurately encompasses the essential requirements for evaluating empathy in interactive agents, and how it might reveal and elucidate patterns in evolving perceptions of empathy across time. The concept, implemented in Web Ontology Language (OWL), can be used as an automated tool to enable systems to identify empathy in interactions. This can include an interactive agent evaluating its own empathetic performance or an intelligent system analyzing the empathic competence of its interlocutors.

The improvement in the capabilities of large language models (LLMs) has prompted several academics to suggest the potential development of theory of mind (ToM) in artificial intelligence (AI). LLMs possess the ability to ascribe beliefs, goals, intentions, and emotions, and they will enhance their precision over time. Instead of using the conventional human approach of empathy, they acquire the ability to ascribe mental states by identifying linguistic patterns in a dataset that usually does not involve that specific individual. We inquire whether the lack of empathy in LLMs prevents them from respecting an individual's entitlement to be treated differently, namely, from forming evaluations of character and forecasts of conduct that demonstrate suitable consideration for a person's uniqueness. Can LLMs genuinely entertain the possibility that an individual's case is distinct due to internal mental states like as beliefs, goals, and intentions, or are they constrained to evaluate the case solely based on its resemblances to others? We suggest that the use of empathy is particularly important for recognizing the right to be unique, which is separate from the importance of being able to accurately predict outcomes, in which LLMs excel. In conclusion, we examine the inherent or purely practical worth of employing empathy to examine extraordinary circumstances, and we present theoretical and observational approaches to further explore this inquiry.

As AI systems grow more prevalent in our world, the likelihood of encountering contentious use cases that have a big impact on people's lives increases. Therefore, the growing problem lies in raising awareness about AI prejudice that has the potential to impact impoverished populations. In order to investigate the impact of Virtual Reality on empathy, we conducted a controlled experiment in a laboratory setting. Participants were exposed to a biased Wizard of Oz AI while assuming different personas that differed in their ability to achieve high financial credit scores based on age and gender. Our study revealed that when participants assumed different identities in virtual reality (VR), they experienced a notable increase in empathy towards the characters they embodied. Additionally, they judged the artificial intelligence (AI) as much less fair when compared to a baseline condition where they just imagined being these characters. Moreover, we analyze disparities between embodied personas and examine qualitative findings to obtain a deeper understanding of how participants develop their mental models.

This study explores the complex connections between Emotional Intelligence (EI), Artificial Intelligence (AI), and Investment Decisions (ID) in the changing field of financial decision-making. Our research aims to examine how human emotional intelligence directly affects investment decisions and how artificial intelligence (AI) plays a role in moderating this process. We strive to understand the intricate relationship between human cognition and AI technology. By doing empirical study, we have discovered that EI has a direct impact on ID and also influences it indirectly through AI-mediated pathways. The results emphasize the crucial significance of emotional awareness in the decision-making process of investors, which is further enhanced by the technological capabilities of artificial intelligence (AI). It indicates that the majority of investors are swayed by the recognized emotional intelligence when making investment choices. In addition, AI has a significant influence on investors' decision-making process in the context of investing. However, AI only partially moderates the connection between emotional intelligence and investment decisions. This nuanced comprehension offers useful perspectives for financial professionals, politicians, and researchers, highlighting the necessity for comprehensive approaches that incorporate emotional and technological aspects in navigating the complexities of contemporary investment environments. This study adds to the current discussion about the mutually beneficial connection between human intuition and artificial intelligence in financial decision-making, highlighting their growing importance in investments.

Empathy is a distinct ethical dimension of human conduct. The global workplace, which involves employee stakeholders, encompasses distinct behavioral and ethical factors, including the importance of human empathy. Additionally, the human elements of workplaces fall under the purview of human resources and managerial supervision in corporate companies. Human emotions and interactions are complex due to the expectations and interactions between employees and employers, as well as work practices and the results of employees' work routines. Business ethics, human resources, and risk management strategies are inherent parts of organizations. The growing comprehension of AI-driven business models highlights the necessity of examining the ethical implications of AI's effects on employees in the workplace. This study examines the ethical aspects of AI ideation, development, and deployment in business-employee relations practices. It goes beyond a compliance perspective and offers additional workplace considerations. Empathy is focused on understanding and sharing the objectives of other individuals. Therefore, it is essential to provide ethical guidelines on the role of AI in the workplace and its effects on employees. Furthermore, this study employs a cognitive perspective of empathy and specifically examines artificial morality in relation to the ethical issues, consequences, and procedures of AI advancement, implementation, and workplace protocols that could potentially affect employees across various corporate domains.

Integrating empathy into healthcare chatbots is seen as a viable approach to evoke a feeling of human warmth. Nevertheless, current research often fails to consider the multifaceted nature of empathy, resulting in a limited comprehension of whether manufactured empathy is experienced in a similar manner to interpersonal empathy. This research contends that the implementation of experiential manifestations of empathy may result in unforeseen adverse effects due to their potential inauthenticity. Alternatively, offering instrumental assistance may be more appropriate for simulating artificial empathy, as it is more compatible with computer-based frameworks used in chatbots. Two empirical investigations utilizing healthcare chatbots investigate the impact of empathetic (experiencing with), sympathetic (experiencing for), and behavioral-empathetic (empathetic aiding) versus non-empathetic responses on the perception of warmth, perception of authenticity, and their subsequent effects on trust and behavioral intentions. The findings indicate that the presence of empathy, regardless of its type, increases the perception of warmth, leading to greater trust and intention to use. As predicted, the chatbot's perceived authenticity is diminished by compassionate and sympathetic reactions, hence negating the favorable impact shown in both tests. A third study fails to reproduce this counterproductive impact in interactions between humans. This research emphasizes that empathy is not evenly distributed in human-bot interactions. It also presents the idea of 'perceived authenticity' and shows that uniquely human characteristics can have a negative effect by seeming inauthentic while interacting with chatbots.

Due to the swift advancement of artificial intelligence, a growing number of businesses are depending on the precision and effectiveness of deep learning algorithms. However, because of the incomprehensibility and opaque nature of deep neural networks, we can only receive outcomes without understanding the underlying rationale behind them. Some factions within the field of deep learning-based technologies are skeptical and resistant towards that. When it comes to emotion analysis applied in business and public opinion monitoring, decision-makers often struggle to have confidence in the results generated by computers that are supposed to be devoid of emotions, unless they are provided with an explanation. Mathematical-based explanation techniques frequently conceptualize emotion analysis as a categorization task. However, emotion should be distinguished from other kinds of tasks due to its reliance on human-specific elements and logic. This study presents a framework for explaining emotion analysis that is based on psychological theories that specifically focus on the stimulus aspect of classic emotion theories. This framework prioritizes the examination of the cause and stimulus of emotions as the rationale for deep learning-based emotion analysis. It consists of two primary elements: the extraction of the emotion cause and the visualization of words that trigger emotions.

Artificial intelligence chatbots have become prevalent in the tourism business due to their cost-effectiveness and effectiveness. Nevertheless, academics have not devoted much attention to the impact of emotional expressions of chatbots on service outcomes. Utilizing the framework of expectation violations theory, we conducted three experiments to investigate the impact of emotional expressions displayed by chatbots on customer satisfaction. These studies were conducted within the context of providing tourist attraction suggestions. Chatbots' display of empathy towards customers might enhance customer satisfaction by minimizing instances where customer expectations are not met. Specifically, the direction of consumers towards their goals, the degree to which chatbot avatars resemble humans, and the type of relationship between customers and chatbots can influence the impact of emotional expression on expectancy violation. These findings contribute to the progress of research on the emotional expressions of chatbots and offer crucial insights for the implementation of chatbots in customer care within the tourism industry.

This chapter provides a comprehensive analysis of the correlation between artificial intelligence and emotions in the field of education in Latin America and the Caribbean. The PRISMA systematic review approach was employed to provide an overview of the current state of research on this topic, considering theories, methodologies, countries, and educational levels. A total of fifteen studies, which specifically concentrate on Brazil and Colombia, university-level education, students as the primary subject of analysis, and employ approaches that integrate facial recognition, psychology, and software, were ultimately chosen for publication. The aim is to enhance the depth of research in several areas by incorporating different theories and approaches.

This paper presents a study that uses artificial intelligence (AI) to apply computer vision algorithms for identifying human emotions in video recordings while users interact with various visual stimuli. The objective of the research is to develop software that can detect emotions by utilizing artificial intelligence algorithms and image processing pipelines to recognize face expressions of users. The procedure entails evaluating users using visual stimuli and facilitating the application of computer vision algorithms that are in line with psychology theories that define emotions and their discernible characteristics. The study showcases the practicability of using convolutional neural networks (CNN) and software development and training methods based on facial expressions to recognize emotions. The findings emphasize the successful identification of emotions. However, in order to enhance precision, it is necessary to provide further training for settings that involve a wider range of images and to develop additional algorithms that can differentiate closely related emotional patterns. The discussion and conclusions highlight the inherent capabilities of artificial intelligence. The utilization of computer vision algorithms in emotion detection allows for valuable insights into software development, continuous training, and the dynamic nature of emotion identification technologies. Additional training is required for situations involving a wider range of photos, coupled with the development of algorithms that can accurately differentiate between facial expressions that closely resemble one other in terms of emotional patterns. This will improve the level of certainty and accuracy.

Since the 1950s, numerous clinical instances have provided evidence of the efficacy of art in rehabilitative therapy and psychiatric therapies. The progress of artificial intelligence technology has led to the development of AI painting software that utilizes the Stable Diffusion algorithm paradigm. This software allows for the production of images by using prompts and receiving feedback. Consequently, the potential of AI painting software to have a beneficial influence on human emotions is a crucial consideration for its use in art therapy. This study monitors and quantifies the emotional fluctuations in patients prior to and following their utilization of the AI painting software Stable Diffusion WebUI, employing techniques for measuring emotional lexicon. Based on the empirical evidence from this project, it has been observed that artificial intelligence painting has the ability to elicit a favorable impact on human emotions. This outcome presents a novel opportunity for the fusion of artificial intelligence and art therapy research. On one side, it enables the comprehensive advancement of specialized artificial intelligence painting software that is specifically tailored as a dedicated tool for art therapy, a type of AI software used for creative healing. Conversely, it promotes additional investigation into the efficacy of traditional painting compared to AI-assisted painting in the field of art therapy, with the goal of examining the fundamental principles and mechanisms of art therapy.

INTRODUCTION: In recent times, there has been a merging of Artificial Intelligence with neuroscience, specifically in the examination of the brain and the creation of therapies for neurological illnesses. Artificial neural networks and deep learning offer significant understanding of neural processing and brain functionality. Current study endeavors to elucidate the mechanisms by which brain processes impact an individual's subjective well-being. OBJECTIVES: To assess the correlation between neuroscience and happiness by examining the progress made in Artificial Intelligence. PROCEDURE: A bibliometric study was conducted using publications retrieved from the Scopus database between 2013 and 2023. Additionally, the VOSviewer software was employed for data processing. The study yielded a total of 603 publications, indicating that the United States (184), United Kingdom (74), and China (73) have the highest scientific output. The Co-occurrence - Author Keywords analysis produces three groups. The initial cluster, denoted by the color red, pertains to the use of Artificial Intelligence in forecasting happiness. The subsequent cluster, represented by the color green, is connected to the implementation of Artificial Intelligence tools in the field of neuroscience. Lastly, the third cluster, indicated by the color blue, is concerned with the intersection of neuroscience and psychology. CONCLUSION: Neuroscience research has made substantial advancements in comprehending mental functions such as emotions and consciousness. Neuroscience has embraced the concept of happiness and is now adopting a methodology that utilizes Artificial Intelligence to gather empirical data in order to comprehend individuals' well-being.

The endeavor to develop cognitive architectures influenced by biology, known as biologically inspired cognitive architectures (BICA), has led to substantial progress in the fields of artificial intelligence (AI) and artificial general intelligence (AGI). Nevertheless, the majority of current BICA models are deficient in incorporating a crucial element of human intelligence: emotions and feelings. This study investigates the creation and application of a cognitive architecture that incorporates emotions, replicating the way humans process emotions, within a computer framework. The Emotion-Integrated Cognitive Architecture (EICA) we propose draws inspiration from recent discoveries in cognitive psychology, neurobiology, neuroscience, and affective computing. The objective of EICA is to incorporate emotional processing into the heart of the AI system, allowing for the development of resilient, versatile, and adaptive AI agents capable of responding to intricate and ever-changing surroundings with emotional intelligence similar to that of humans. The EICA model utilizes advancements in brain imaging and recording methodologies to extract knowledge from the neurological foundation of emotions in humans. The architecture integrates systems for producing, recognizing, and regulating emotions, enabling AI entities to perceive, interpret, and react to emotions in themselves and others. We introduce the notion of EICA, outlining its modular framework and its interplay with other cognitive components. In addition, we offer case studies that demonstrate the successful integration of EICA in several AI applications, including virtual assistants and adaptive robotics. This research is a huge advancement in the computational replication of human emotional intelligence, bringing us closer to achieving the BICA Challenge. By incorporating emotions and sensations into AI systems, we come closer to fully fulfilling the potential of mutual comprehension between artificial and organic intelligences.

Network news serves as a crucial means for netizens to acquire social knowledge. The abundance of news content impedes netizens from accessing crucial information. Named entity recognition technology, when applied in an artificial setting, can accurately classify information such as location names and dates inside text data. This article integrates named entity recognition and deep learning technology. More precisely, the suggested technique presents an automated method for labeling Chinese entity triggers and a Named Entity Recognition (NER) model that may attain high precision using a little amount of training data. The approach simultaneously trains sentence and trigger vectors using a trigger-matching network. The trigger vectors are then used as attention queries for future sequence annotation models. In addition, the suggested approach utilizes entity labels to accurately identify newly coined terms in web news. This allows for the modification of the set of words that are considered sensitive and the ability to adjust the number of words within that set. Furthermore, it expands the web news word sentiment lexicon, enhancing the ability to observe sentiment. The experimental results show that the suggested model performs better than the standard BiLSTM-CRF model. It achieves greater performance using only 20% of the training data set, compared to the conventional model which requires 40% of the training data set. Furthermore, the loss function curve demonstrates that my model achieves superior accuracy and faster convergence speed compared to the model being compared. Ultimately, my model attains a mean accuracy rate of 97.88% in detecting sentiment viewpoints.

This paper conducts a preliminary investigation into the expression of emotions and the communication of information in English text. It categorizes the expression of emotions and the communication of information in English text based on the relationship between human emotions and values. Furthermore, it outlines the distinctive features of English emotion expression and information communication. Furthermore, the proposal suggests utilizing artificial intelligence technology to develop an analytical model for English text emotion and information transmission. This will be achieved by employing the BiLSTM neural network. In order to efficiently handle the attributes of English text, it is essential to encode the emotional information of the text. By utilizing the BiLSTM neural network, the emotional features of English text can be extracted and the issue of emotional feature loss can be addressed through the implementation of a loss function. Next, the crawler tool is utilized to acquire the dataset from the Chinese English module within the MOOC of Chinese universities. The evaluation indexes are established based on the model's performance, and subsequently, the English text's emotional expression and information conveyance are analyzed through experimentation. The findings indicate that the BiLSTM-based neural network outperforms the original CNN, LSTM, and T-LSTM in the task of text emotion expression and information conveyance. The accuracy rate consistently remains above 0.925. Additionally, the impact on the English dataset is slightly superior to that on the Chinese dataset. The objective of this study is to improve the instruction of the English language and facilitate effective communication between Chinese and international cultures.

The objective of Multimodal Emotion Recognition in Conversations (ERC) is to detect and classify the emotions expressed in each phrase inside a video of a discussion. Present endeavors face difficulties in achieving a balance between the contextual dependencies inside and across speakers while addressing interactions within the same mode. The balance described here is crucial because it includes both the modeling of self-dependency, where a speaker's own emotions impact them, and the modeling of interpersonal dependencies, where a speaker is influenced by the emotions of others. Moreover, there are difficulties in dealing with cross-modal interactions that entail content with contradictory emotions across several modalities. In order to tackle this problem, we propose the implementation of an adaptive interactive graph network (IGN) known as AdaIGN. This network utilizes the Gumbel Softmax technique to dynamically choose nodes and edges, hence improving interactions inside and across different modes. In contrast to undirected graphs, we employ a directed IGN (Interactive Graph Network) to ensure that future utterances do not influence the current one. Our proposal involves the implementation of Node- and Edge-level Selection Policies (NESP) to provide guidance for selecting nodes and edges. Additionally, we introduce a Graph-Level Selection Policy (GSP) to combine the utterance representation from the original IGN and the NESP-enhanced IGN. Furthermore, we have developed a task-specific loss function that gives priority to text modality and intra-speaker context selection. In order to decrease the computational complexity, we employ pre-determined pseudo labels generated by self-supervised techniques to conceal irrelevant utterance nodes for selection. Empirical evidence demonstrates that AdaIGN surpasses state-of-the-art techniques on two widely used datasets. The code will be accessible on the GitHub repository at https://github.com/TuGengs/AdaIGN.

Tumor segmentation in breast ultrasound (US) pictures is a crucial concern in the field of medical imaging. Due to the low quality of US pictures and the varied specifications of US machines, segmentation and categorization of anomalies create difficulties even for expert radiologists. The research presents a new AI-based hybrid model for US segmentation that achieves high accuracy, uses minimal datasets, and can handle unfamiliar data. The program can be utilized for diagnostics and the US-guided biopsies. A new and resilient hybrid technique that combines deep learning (DL) and multi-agent artificial life (AL) has been introduced. The algorithms undergo verification using three datasets from the United States. The technique outperforms 14 selected state-of-the-art algorithms applied to US pictures characterized by complicated geometry and high level of noise. The study includes an innovative classification of the photos and tests to examine the limits of the DL. The model has been trained and verified on 1264 ultrasound pictures. The photos are in the JPEG and PNG formats. The age of the patients spans from 22 to 73 years. The 14 benchmark algorithms cover deformable forms, edge linking, superpixels, machine learning, and DL approaches. The tests use eight-region shape- and contour-based evaluation measures. The proposed method (DL-AL) produces excellent results in terms of the dice coefficient (region) and the relative Hausdorff distance H3 (contour-based) as follows: the easiest image complexity level, Dice = 0.96 and H3 = 0.26; the medium complexity level, Dice = 0.91 and H3 = 0.82; and the hardest complexity level, Dice = 0.90 and H3 = 0.84. All other metrics follow the same pattern. The DL-AL outperforms the second best (Unet-based) technique by 10–20%. The approach has been also tested by a variety of unorthodox tests. The model was trained on low complexity photos and applied to the whole set of images. These results are summarized below. (1) Only the low complexity images have been utilized for training (68% unknown images): Dice = 0.80 and H3 = 2.01. (2) The low and the medium complexity images have been used for training (51% unknown images): Dice = 0.86 and H3 = 1.32. (3) The low, medium, and hard complexity images have been employed for training (35% unknown images): Dice = 0.92 and H3 = 0.76. These studies reveal a considerable advantage of DL-AL over 30%

Artificial intelligence (AI) has emerged as a transformational force in several fields, including medicine and healthcare. Large language models like ChatGPT highlight AI’s promise by generating human-like writing through prompts. ChatGPT’s versatility holds potential for altering medical practices, increasing patient care, and enhancing interactions among healthcare personnel, patients, and data. In pandemic management, ChatGPT swiftly disseminates crucial information. It serves as a virtual assistant in surgical consultations, supports dental practices, simplifies medical education, and aids in illness diagnostics. A total of 82 papers were categorised into eight major areas, which are G1: treatment and medicine, G2: buildings and equipment, G3: parts of the human body and areas of the disease, G4: patients, G5: citizens, G6: cellular imaging, radiology, pulse and medical images, G7: doctors and nurses, and G8: tools, devices and administration. Balancing AI’s role with human judgment remains a challenge. A systematic literature review employing the PRISMA approach evaluated AI’s transformational potential in healthcare, revealing ChatGPT’s various uses, limitations, motivation, and obstacles. In conclusion, ChatGPT’s numerous medical applications illustrate its potential for innovation, acting as a significant resource for students, professors, and researchers in healthcare. Additionally, this study works as a guide, supporting students, scholars, and researchers in the field of medical and healthcare equally.

Artificial neural networks have developed as computationally feasible models of human language processing. A key critique of these models is that the amount of training data they get far exceeds that of people during language learning. Here, we utilize two distinct approaches to examine how the models’ capacity to capture human fMRI responses to words is affected by the amount of training data. First, we test GPT-2 models trained on 1 million, 10 million, 100 million, or 1 billion words against an fMRI benchmark. We consider the 100-million-word model to be developmentally reasonable in terms of the amount of training data given that this number is equivalent to what children are projected to be exposed to throughout the first 10 years of life. Second, we test the performance of a GPT-2 model trained on a 9-billion-token dataset to obtain state-of-the-art next-word prediction performance on the human benchmark at different phases of training. Across all approaches, we find that (i) the models trained on a developmentally reasonable quantity of data already attain near-maximal performance in capturing fMRI responses to phrases. Further, (ii) lower perplexity—a measure of next-word prediction performance—is associated with stronger alignment with human data, suggesting that models that have received enough training to achieve sufficiently high next-word prediction performance also acquire representations of sentences that are predictive of human fMRI responses. In tandem, these findings indicate that although some training is necessary for the models’ predictive capacity, a developmentally realistic amount of training (~100 million words) may suffice.

This study investigates the ethical problems and regulatory dynamics of Artificial Intelligence (AI) in regard to data integrity and its influence on social dynamics. Employing a cross-sectional survey approach, primary data was obtained from 650 AI practitioners across several sectors, comprising developers, data scientists, ethicists, and policymakers. The study explored the relationships between regulatory compliance, ethical awareness, professional training, and experience in AI practice with the success of AI installation and data integrity. The findings demonstrated a substantial positive association between higher levels of regulatory compliance and perceived efficacy in AI implementation, as well as between AI ethical awareness and data integrity assurance. Moreover, a substantial association was identified between professional training in AI and its good impact on social dynamics. However, experience in the AI sector, while positively connected, revealed a lesser link to data integrity, demonstrating that experience alone is insufficient for assuring effective AI practices. The study underscores the relevance of ethical issues, legal frameworks, and professional training in determining AI development and its societal repercussions. The necessity for dynamic, adaptive, and inclusive regulatory frameworks that may align AI practices with social values and ethical norms is underlined. Future research directions include investigating AI ethics and governance in varied cultural contexts and the impact of emerging technologies like quantum computing on AI ethics.

Advances in artificial intelligence (AI) create a growing similarity between the performance of AI systems or AI-based robotics and human communication. They raise the questions:1. whether it is possible to speak with, understand, and even empathically sense artificial agents;2. if we should give true subjectivity and consequently quasi-personal character to them beyond a certain level of simulation;3. what will be the impact of an increasing dissolution of the distinction between simulated and real encounters.(1) To answer these questions, the paper argues that the precondition for actually understanding others consists in the implicit assumption of the subjectivity of our counterpart, which makes shared feelings and a we-intentionality possible. This assumption is ultimately based on the presupposition of a shared form of life, conceived here as �conviviality.�(2) The possibility that future artificial agents could meet these preconditions is refuted on the basis of embodied and enactive cognition, which links subjectivity and consciousness to the aliveness of an organism.(3) Even if subjectivity is in principle impossible for artificial agents, the distinction between simulated and real subjectivity might nevertheless become increasingly blurred. Here, possible repercussions are examined, especially using the example of virtual psychotherapy. Finally, the paper makes case for a thoughtful appproach to the vocabulary we use to talk about artificial systems and pleads for preventing a systematic pretense of subjectivity.

This study navigates artificial intelligences recent breakthroughs and increased media attention. A prominent focus is made on Eliezer Yudkowsky, a leading figure within the realm of artificial intelligence alignment, who strives to bridge the knowledge gap between popular conceptions and rationalist viewpoints on artificial intelligence technology. This section investigates his expected path of action for artificial intelligence detailed within his unpublished work AGI Ruin: A List of Lethalities. This is achieved by seeking to grasp the concept of intelligence itself and identifying a reasonable working definition of that term. The concept of intelligence is then applied to contemporary artificial intelligence capabilities and advances to understand its applicability to the technologies. This research finds contemporary artificial intelligence systems are, to some extent, intelligent. However, it argues that both weak and strong artificial intelligence systems, devoid of human-defined goals, would not inherently pose existential threats to humanity, challenging the notions of artificial intelligence alignment, bringing into question the validity of Nick Bostroms Orthogonality Thesis. Furthermore, the idea of artificial life constructed through the approach of assembling numerous modules each simulating a separate mind function is considered.

The amazing capacities of living beings derive from the way autonomy is manifested by their bodies. Across scales, living creatures connect computational or cognitive intelligence with physical intelligence through bodily form, material multifunctionality, and mechanical compliance. While soft robotics has advanced the design and construction of physically intelligent bodies, the integration of information-processing skills for computational intelligence remains a difficulty. Consequently, perception and control restrictions have hampered how soft robots are produced today. Progress toward untethered autonomy will need deliberate convergence in how the field codevelops new materials, fabrication methods, and control systems for soft robots. Here, a novel perspective is put forward: that researchers should employ tasks alone to impose material and information limits on soft robot design. A conceptual framework is proposed for a task-first design paradigm that sidesteps limits imposed by control tactics. This concept permits emergent synergies between material and information processing features of soft matter to be conveniently utilized for task-capable agents. Particular focus is made to the scale dependence of solutions. Finally, an outlook is offered on new research opportunities for gaining autonomy in future soft robots as huge as elephant trunks and as little as paramecia.

In this study, Self-Reproduction feature of Artificial Life is brought to computer animation. A Self-Reproduction model of Artificial Fish based on gene control is put forward and produced. Based on Artificial Fish's phenotypic, the contents of its chromosome are given. Based on this model, heredity rules are offered. Artificial Fish could multiply and grow in the virtual marine environment freely regulated by the gene model and laws. Artificial behaviors include predetermined behaviors and nondeterminate behaviors. Cognitive models based on Artificial Intelligence is put forth and constructed to govern behaviors of artificial fish in high level. Simulation program is established and developed based on all these models built above. These made foundations to increase the efficiency and automation level of artificial fish animation.

In this work, the notions of "Life", "Artificial Life" and "Generalized Artificial Life" and the problem "Is Artificial Life true Life?" are discussed.

This study provides an experience in employing an Artificial Life competitive game that simulates an artificial life environment for unstructured and informal Artificial Intelligence (AI) instruction to students from computer science engineering vocations. The game consists of a virtual Petri dish where two colonies of microorganisms-software agents-must struggle to survive. To attain this purpose, the participants must adopt surviving tactics for their agents, which include fighting methods and basic reproduction laws to prevail over all the artificial environment. The technical bases of the challenge as well as a description of the artificial life model are discussed in detail. The pedagogical experience gathered in the contest development is discussed, as well as the ensuing learning experience, which aroused students interest and has helped them to develop mental models of prospective AI algorithms.

Fuzzy logic appears as a strong tool for optimizing power flow solutions, particularly in the setting of deregulated power networks. By applying fuzzy logic controls, the perfect placement of distribution generators (DGs) may be discovered, guaranteeing the dependability indices are recognized through optimal power flow solutions and fuzzy logic controllers to ensure system feasibility. In a deregulated power system, smart placement of distribution generating units plays a critical role in minimizing power loss and boosting overall system performance by controlling swings. To detect areas of weakness, especially within transmission companies, accessing optimal power flow algorithms becomes vital in a deregulated power system. Both transmission and distribution networks should be adequately adjusted to alleviate congestion within the relevant organizations. The aggregator must assess system performance, leveraging data acquired from distribution and transmission businesses inside the deregulated electrical system.

In this article, the reasons of technical disturbances in electrical systems are considered, and numerous specific shortcomings of the protection and automation of elements of electrical systems are noted. The propensity to diminish the reliability of relay protection linked with the move from analog to digital types of protection is proven. Based on the examined cases, the usage of fuzzy logic in safeguards, the practicality of employing fuzzy logic elements in protection devices, and the automation of electrical systems to recognize types of short circuits are justified. This article explores the most common damages and gives the findings of modeling an electrical system with transformer coupling, where all sorts of asymmetric short circuits were initiated. The dynamics of changes in the symmetrical components of short-circuit currents of the forward, reverse, and zero sequences are determined. Rules have been devised for the identification of asymmetric types of short circuits. An algorithm of protection and automation operation employing fuzzy logic elements has been devised. The proposed algorithm of protection and automation will shorten the time to determine the type of damage and trigger protections.

Fuzzy logic-based quantification of usability expectation for an m-commerce mobile application is a way of quantifying the usability of a mobile application by applying fuzzy logic principles. The usability of any mobile application is used to find out the user experience of the mobile application by assessing the user's expectations and preferences. Fuzzy logic always be the ideal choice for quantification. Fuzzy logic-based quantification of usability expectation examines the user experience of an m-commerce mobile application by taking into account the user's needs, preferences, and expectations. Usability expectation also takes into account the ability of the user to understand and interact with the application, the degree to which the program meets the user's expectations, and the overall satisfaction with the application. This approach helps to find areas of improvement, enabling the developers to make essential adjustments for a better user experience. This study discusses to construction of a usability metric framework and then assesses the overall usability quality of an m-commerce mobile application with the assistance of fuzzy logic. The suggested usability metric framework is based on the Goal-Question-Metric (GQM) approach and is designed to give a thorough and systematic approach to build metrics to measure the qualitative element of mobile phone applications. The framework has been designed and tested in an m-commerce environment and provides a set of measurable criteria to quantify m-commerce mobile applications as per standard. The results of the evaluation can then be utilized to improve m-commerce mobile applications and to ensure that the user experience is optimized

﻿The performance of photovoltaic (PV) affected directly by climatic changes, The controller maintain maximum potential energy conversation to operate the pimping system at nominal conditions, fuzzy logic intelligent controllers are successfully suitable and applicable in engineering and applied science. The aim of this paper is present an experimental approach in Implementation of fuzzy logic maximum power point tracking (MPPT) with boost converter based on Arduino Mega micro-controller to maximize energy production in different weather condition applied to small scale pumping system for water and chemical fluid analyses in isolated area. The system is supplied by 20 (W) solar photovoltaic (PV) panel. This study provide a real-time MATLAB/Simulink fuzzy logic technique controlling and monitoring MPPT application using a cheap cost Arduino Mega micro-controller paired with (LV25, LP55) sensors regulating boost converter interconnected with solar panel and plastic pump.

This paper applies a fuzzy logic controller (FLC) to investigate voltage stability in a PV-based DC microgrid. Several photovoltaic (PV) modules, a DC-DC converter, and loads make up the microgrid. Due to the extensive usage of intermittent PV power, voltage stability is a major concern for DC microgrids and is challenging to fulfill. This paper presents an FLC-based voltage control technique that uses input elements including PV output power, DC-DC converter duty cycle, and load current to discover the best course of action for preserving the system's voltage stability. The FLC's performance is assessed by simulation, and it is designed to be resilient to parameter changes and uncertainties. The simulation results reveal that the suggested FLC-based control technique successfully maintains the microgrid's voltage stability under a variety of operational scenarios, including shifting solar irradiance and load changes. Moreover, the FLC works better than other control approaches.

This research goes into the subtleties of adaptive fuzzy event-triggered formation tracking control for nonholonomic multirobot systems defined by infinite actuator faults and range limits. To overcome these difficulties, we use the capabilities of fuzzy logic systems (FLSs) and employ adaptive approaches to approximate unknown nonlinear functions and uncertain parameters found in robotic dynamics. In the course of information exploration, the difficulties of collision avoidance and connectivity maintenance are continually present due to restrictions of distance and vision fields. In this context, we present a general barrier function and specified performance technique to overcome confined range obstructions efficiently. Furthermore, to reduce the number of controller executions and compensate for any effect arising from infinite actuator failures, robots engage with their leader at the moment of actuator faults using fewer network communication resources yet maintain uninterrupted tracking of the desired trajectory generated by the leader. With the aid of the dynamic surface technology, we propose a decentralized adaptive event-triggering fault-tolerant (ETFT) formation control strategy. We guarantee that all signals are semi-global uniformly ultimately bounded (SGUUB). Ultimately, we demonstrate the practical feasibility of the ETFT control strategy for nonholonomic multirobot systems.

Fuzzy inference systems (FISs) have been developed for many years but the use of FISs for high-dimensional problems is still a challenging task. The most frequently used T-norms for computing the firing strengths are product and minimum operators of which the former is often preferred because of its differentiability. However, for high-dimensional problems, the product T-norm suffers from the numeric underflow problem. Here, we primarily focus on addressing the problem that is associated with the use of the T-norms for designing high-dimensional FISs (HDFISs). For the product T-norm, we construct an HDFIS named HDFIS-prod, which easily escapes from the numeric underflow problem. The main novelty is that we propose an adaptive dimension-dependent membership function (DMF). For the minimum T-norm, an empirical observation led us to develop a mechanism that has the natural ability to deal with super high-dimensional problems, which results in another HDFIS named HDFIS-min. Both HDFIS-prod and HDFIS-min are tested on 18 datasets with feature dimensions varying from 1024 to 120450. The simulation results demonstrate that both of them have competitive performance on handling high-dimensional datasets.

This article examines a solution to the major problems of induction machine control in order to achieve superior dynamic performance. Conventional direct torque control and indirect control with flux orientation have some drawbacks, such as current harmonics, torque ripples, flux ripples, and rise time. In this article, we propose a comparative analysis between previous approaches and the one using fuzzy logic. Results from the simulation show that the direct torque control method using fuzzy logic is more effective in providing a precise and fast response without overshooting, and it eliminates torque and flux fluctuations at low switching frequencies. The demonstrated improvements in dynamic performance contribute to increased operational efficiency and reliability in industrial applications.

The main idea of this paper is the substantiation of the methodological approach to the assessment of personnel risks of enterprises based on the application of the fuzzy logic apparatus in order to identify the problems of personnel risk management and provide appropriate recommendations for their solution. The methodological basis of the study is the classic provisions and fundamental works of foreign and domestic scientists, statistical data, the results of our research into the problems of assessing personnel risks of enterprises. The methods of fuzzy set theory, comparative analysis, scientific abstraction, generalization of scientific experience of modern theoretical research, systemcomplex approach were used. The study proposed a methodological approach to assessing the level of personnel risks of an enterprise; numerical experiments were conducted on the basis of a group of construction equipment manufacturers. Analysis of the results of assessing the level of personnel risks of enterprises made it possible to identify the problems of managing personnel risks at enterprises Statement of a mathematical problem: the work considers hierarchical fuzzy data, namely: four groups of indicators for assessing the level of personnel risks (quantitative composition – F1, state of qualifications and intellectual potential – F2, staff turnover – F3, motivational system – F4), each of the indicators has a different number of fuzzy coefficients (there are twelve of them in the current work – vi , i=1÷12). Indicators are functions of fuzzy coefficients: F1 = r(v1, v2, v3); F2 = g(v4,v5, v6, v7); F3 = h(v8, v9, v10,); F4=q(v11, v12). As an output variable, there is a functional – an integrated indicator Int = f(F1, F2, F3, F4) of the personnel risk level, which, in turn, is also a fuzzy value. Here, the functions r, g, h, q, f are unknown functions of the given variables. We have expert evaluations of the change in all input data; as a rule, they vary within three terms: Low (I), Medium (G), High (E). Formalized information on each variable can be written as , then for a group of indicators we have: . Using a fuzzy system and performing calculations with its help requires the system to have the following structural elements: membership functions of input and output variables, a rule base, and an output mechanism. These structural elements are the components that will be built when designing a fuzzy system. The built mathematical model and the method of its formalization on the basis of FST make it possible to estimate the level of personnel risk at the enterprise, which enables further substantiation of a set of measures to increase the efficiency of its use. The constructed system of fuzzy logical inference can be considered intelligent as it uses elements of computational intelligence, in particular, the theory of fuzzy sets. The proposed methodological approach to assessing the level of personnel risks of enterprises based on the apparatus of fuzzy logic allows, in contrast to existing ones, to integrate the consideration of both qualitative and quantitative indicators when assessing the level of personnel risks and personnel movement indicators and to significantly increase the efficiency of decision-making under conditions of uncertainty and reduce costs in the event of adverse situations.

Real-acting objects are characterized by the presence of various types of random perturbations, which significantly reduce the quality of the control process, which determines the use of modern methods of intellectual technology to solve the problem of synthesis of control systems of structurally complex dynamic objects, allowing to compensate the influence of external factors with the properties of randomness and partial uncertainty. The article considers issues of synthesis of the automatic control system of dynamic objects by applying the theory of intelligent control. In this case, a neural network based on radial-basis functions is used at each discrete interval for neuro-fuzzy approximation of the control system, allowing real-time adjustment of the regulator parameters. The radial basis function is designed to approximate functions defined in the implicit form of pattern sets. The neuro-fuzzy regulator's parameter configuration is accomplished using a genetic algorithm, enabling more efficient computation to determine the regulator's set parameters. The regulator's parameters are represented as a vector, facilitating their application to multidimensional objects. To determine the optimal tuning parameters of the neuro-fuzzy regulator, characterized by high convergence and the possibility of determining global extrema, a genetic algorithm was used. The effectiveness of the neuro-fuzzy regulator is explained by the possibility of providing quality control of the dynamic object under random perturbations and uncertainty of input data.

Easy internet access and technological advancements have resulted in information overload and a plethora of options, making decision-making extremely difficult. Recommender System (RS) is a potential solution for assisting users in making decisions by recommending or predicting product ratings. Three fundamental forms of RS that use implicit or explicit feedback for recommendation are collaborative, content-based, and hybrid filtering. Ratings are the most common form of feedback, but product descriptions, reviews, images, audios, and videos are also important and can help improve the performance of the traditional RS. These additional variables can have a significant impact on RS’s performance. Traditional RSs used approaches based on the nearest neighbor or other machine learning models, but thanks to recent advances in artificial intelligence and deep learning, RSs are now being developed using Convolutional Neural Networks (CNN), which can efficiently exploit auxiliary information. In addition to comparing CNN-based RSs on common grounds, this article provides a full examination of CNN-based RSs and how they might use various types of auxiliary information. The study also discusses data characteristics, data statistics, and auxiliary information in a variety of publicly available datasets. Different evaluation measures for RSs are also discussed, and readers are provided with interesting challenges and open research issues.

In recent years, with the continuous progress and development of science and technology, especially the continuous development of artificial intelligence, machine algorithm and other technologies, the education system has also begun to carry out more personalized content from traditional functions. Traditional education systems often adopt a one-size-fits-all approach to teaching that does not take into account the unique needs and learning styles of each student. An education system personalized and optimized by machine learning algorithms can provide customized learning materials and recommendations based on each student's learning history, interests and abilities to improve learning outcomes, and machine learning algorithms can provide real-time feedback on student performance and adjust learning plans based on feedback. This makes the learning process more dynamic and personalized. It can therefore be applied to all types of education, including language learning, mathematics, science, etc. However, improving the efficiency of machine learning algorithms depends more on the improvement of numerical optimization algorithms, so it is necessary to summarize the optimization algorithms in large-scale machine learning. This paper tries to make a detailed overview of the existing machine learning algorithms in optimizing personalized education recommendation system, and introduces the algorithm optimization process.

This paper presents a comprehensive literature review of the research and application of machine learning (ML) algorithms in recommender systems (RS). The study aims to identify recent trends, explore real-life applications, and guide researchers in positioning their research activities in this domain published in 2023 (Jan-June). The findings are categorized into different domains including education, healthcare, ML algorithms (auto-encoders and reinforcement learning), e-commerce, and digital journalism. The review highlights the enhanced recommendation accuracy, increased scalability, personalization and context awareness, diverse ML techniques, and strategies for handling cold start and data sparsity, and the foundation for future advancements in ML algorithms for RSs considering the application in manufacturing enterprises.

Smart cities represent the convergence of information and communication technologies (ICT) with urban management to improve the quality of life of city dwellers. In this context, recommender systems, tools that offer personalised suggestions to city dwellers, have emerged as key contributors to this convergence. Their successful application in various areas of city life and their ability to process massive amounts of data generated in urban environments has expedited their status as a crucial technology in the evolution of city planning. Our methodology included reviewing the Web of Science database, resulting in 130 articles that, filtered for relevancy, were reduced to 86. The first stage consisted of carrying out a bibliometric analysis with the objective of analysing structural aspects with the SciMAT tool. Secondly, a systematic literature review was undertaken using the PRISMA 2020 statement. The results illustrated the different processes by which recommendations are filtered in areas such as tourism, health, mobility, and transport. This research is seen as a significant breakthrough that can drive the evolution and efficiency of smart cities, establishing a solid framework for future research in this dynamic field.

Internet of Things (IoT) based remote healthcare applications provide fast and preventative medical services to the patients at risk. However, predicting heart disease is a complex task and diagnosis results are rarely accurate. To address this issue, a novel Recommendation System for Cardiovascular Disease Prediction Using IoT Network (DEEP-CARDIO) has been proposed for providing prior diagnosis, treatment, and dietary recommendations for cardiac diseases. Initially, the physiological data are collected from the patient’s remotely by using the four bio sensors such as ECG sensor, Pressure sensor, Pulse sensor and Glucose sensor. An Arduino controller receives the collected data from the IoT sensors to predict and diagnose the disease. A cardiovascular disease prediction model is implemented by using BiGRU (Bidirectional-Gated Recurrent Unit) attention model which diagnose the cardiovascular disease and classify into five available cardiovascular classes. The recommendation system provides physical and dietary recommendations to cardiac patients based on the classified data, via user mobile application. The performance of the DEEP-CARDIO is validated by Cloud Simulator (CloudSim) using the real-time Framingham’s and Statlog heart disease dataset. The proposed DEEP CARDIO method achieves an overall accuracy of 99.90% whereas, the MABC-SVM, HCBDA and MLbPM method achieves 86.91%, 88.65% and 93.63% respectively.

The latest effort in delivering computing resources as a service to managers and consumers represents a shift away from computing as a product that is purchased, to computing as a service that is delivered to users over the internet from large-scale data centers. However, with the advent of the cloud-based IoT and artificial intelligence (AI), which are advancing customer experience automations in many application areas, such as recommender systems (RS), a need has arisen for various modifications to support the IoT devices that are at the center of the automation world, including recent language models like ChatGPT and Bard and technologies like nanotechnology. This paper introduces the marketing community to a recent computing development: IoT-driven fog computing (FC). Although numerous research studies have been published on FC “smart” applications, none hitherto have been conducted on fog-based smart marketing domains such as recommender systems. FC is considered a novel computational system, which can mitigate latency and improve bandwidth utilization for autonomous consumer behavior applications requiring real-time data-driven decision making. This paper provides a conceptual framework for studying the effects of fog computing on consumer behavior, with the goal of stimulating future research by using, as an example, the intersection of FC and RS. Indeed, our conceptualization of the “fog-based recommender systems” opens many novel and challenging avenues for academic research, some of which are highlighted in the later part of this paper.Keywords: fog computing; recommender system; internet of things (IoT); edge computing; artificial intelligence (AI); software defined networks (SDNs)ormation as well as personal and situational data [66].

Purpose: The general purpose of the study was to investigate the effectiveness of recommender systems in knowledge discovery. Methodology: The study adopted a desktop research methodology. Desk research refers to secondary data or that which can be collected without fieldwork. Desk research is basically involved in collecting data from existing resources hence it is often considered a low cost technique as compared to field research, as the main cost is involved in executive’s time, telephone charges and directories. Thus, the study relied on already published studies, reports and statistics. This secondary data was easily accessed through the online journals and library. Findings: The findings reveal that there exists a contextual and methodological gap relating to recommender systems in knowledge discovery. The study on the effectiveness of recommender systems in knowledge discovery found that such systems played a pivotal role in facilitating users' exploration of vast information repositories, enabling them to uncover relevant resources and expand their knowledge. It found that recommender systems employing advanced algorithms and personalized techniques demonstrated higher effectiveness in generating relevant recommendations tailored to users' preferences and needs. Additionally, the study highlighted the positive correlation between user engagement metrics and knowledge discovery outcomes, emphasizing the importance of fostering active user participation in the recommendation process. Contextual information was also identified as a crucial factor influencing recommendation effectiveness. Overall, the study underscored the significance of continuous refinement and optimization of recommender system algorithms to enhance knowledge discovery outcomes for users. Unique Contribution to Theory, Practice and Policy: The Social Learning theory, Information Foraging theory and Cognitive Load theory may be used to anchor future studies on recommender systems in knowledge discovery. The study provided recommendations to enhance the efficacy of such systems. It suggested adopting hybrid recommender systems that combine collaborative and content-based filtering techniques to offer more accurate and diverse recommendations. Additionally, the study emphasized the importance of integrating contextual information into recommendation algorithms to dynamically adjust recommendations based on situational context. Furthermore, it recommended the use of explainable AI techniques to improve transparency and user understanding of recommendation processes. Maximizing user engagement through active participation and feedback was also highlighted as crucial, along with prioritizing recommendation diversity to foster exploration and serendipitous discovery of new knowledge resources.

The application of Artificial Intelligence (AI) is significantly increasing in many Human Resources (HR) functions. This research aims to understand how diverse experts from distinct organisations, such as Project Managers, Managers, Supervisors and Human Resource Managers, perceive the potential of artificial intelligence-based recommender systems to match job profiles with employee profiles. This study employs a Delphi study-based methodology specifically, organising an expert panel that provides their opinions through their ratings and comments of a set of propositions. Based on the online Delphi study results and participant opinions, this research aims to identify the challenges related to employee-job profile matching through artificial intelligence and machine learning tools in the form of recommender systems. In this study, we have delved into the various challenges of matching employee profiles to job profiles and the current problems faced by executives, human resource personnel or supervisors such as project managers in an organisation. The study also sheds light on the potential or feasibility solutions of artificial intelligence in the form of recommender systems where we also test a couple of propositions that focus on potential solutions and various challenges for matching employee profiles to job profiles in an organisation.

Facial Expression Recognition (FER) is utilized in various fields, such as education, gaming, robotics, healthcare, and others. Facial expression techniques, for instance, an interactive robot with Artificial Intelligence, recognize human faces, detect the emotions of the person it is conversing with, and then use these emotions to choose appropriate answers. One use case for face emotion detection is playing music based on the user’s mood. To do this, we can analyze the user’s facial expression to deduce their feelings. As a result, new emotion models require more investigation as existing one’s struggle to correctly measure music’s connection with facial emotion. In this paper, we implement this kind of job using Convolution Neural Network (CNN) based deep learning approach. Deep learning can more effectively analyze unstructured data, movies, and other forms of media than machine learning. In our research, we have created a real-time system that can recognize human faces, assess human emotions, and even recommend music to users. The OAHEGA and FER-2013 datasets were utilized for experimental study. We created and trained two emotion recognition models using various combinations of these datasets. The proposed model’s accuracy is 73.02%. Using our CNN model, we can predict six emotions: anger, fear, joy, neutral, sadness, and surprise. The proposed system can be utilized in different places where real-time facial recognition plays an important role.

Given the challenges of inter-domain information fusion and data sparsity in collaborative filtering algorithms, this paper proposes a cross-domain information fusion matrix decomposition algorithm to enhance the accuracy of personalized recommendations in artificial intelligence recommendation systems. The study begins by collecting Douban movie rating data and social network information. To ensure data integrity, Levenshtein distance detection is employed to remove duplicate scores, while natural language processing technology is utilized to extract keywords and topic information from social texts. Additionally, graph convolutional networks are utilized to convert user relationships into feature vectors, and a unique thermal coding method is used to convert discrete user and movie information into binary matrices. To prevent overfitting, the Ridge regularization method is introduced to gradually optimize potential feature vectors. Weighted average and feature connection techniques are then applied to integrate features from different fields. Moreover, the paper combines the item-based collaborative filtering algorithm with merged user characteristics to generate personalized recommendation lists. In the experimental stage, the paper conducts cross-domain information fusion optimization on four mainstream mathematical matrix decomposition algorithms: alternating least squares method, non-negative matrix decomposition, singular value decomposition, and latent factor model (LFM). It compares these algorithms with the non-fused approach. The results indicate a significant improvement in score accuracy, with mean absolute error and root mean squared error reduced by 12.8% and 13.2% respectively across the four algorithms. Additionally, when k = 10, the average F1 score reaches 0.97, and the ranking accuracy coverage of the LFM algorithm increases by 54.2%. Overall, the mathematical matrix decomposition algorithm combined with cross-domain information fusion demonstrates clear advantages in accuracy, prediction performance, recommendation diversity, and ranking quality, and improves the accuracy and diversity of the recommendation system. By effectively addressing collaborative filtering challenges through the integration of diverse techniques, it significantly surpasses traditional models in recommendation accuracy and variety.

Video games have been in the focus of the research and academic community for the last few years, with the study and experimentation of Artificial General Intelligence (AGI) standing out. AGI experimentation platforms allow to analyze and study, in a visual way, the behavior of different AI agents previously defined. In this work a novel game engine, called GAGI, capable of serving as an AGI experimentation platform is presented. As a game engine, GAGI is able to design and create novel 2D and 3D video games using C++ programming language. Moreover, GAGI provides the user with a unique environment for simulating and studying AI agents inside the created game. Users can deploy multiple AI agents while interacting with them in real time, improving the understanding of their interactions and behaviors. The features of the proposed software is compared against others widely-used game engines in the video games industry as well as in the research community, highlighting the advantages in terms of design capability and AI support. GAGI also offers the possibility to reproduce the experiments, opening up multiple possibilities for the research community.

Monte Carlo Tree Search (MCTS) is a pronounced empirical search algorithm for agent decision-making, especially when enhanced by Deep Learning (DL), in mastering board games that were once thought to be unconquerable. However, it does not appear to be as equally successful in the domain of real-time video games, where the simulation time limit for exploration is a crucial factor, since they are generally designed to be played by human users and hence require a significant amount of resources for simulation. We in this paper propose a surrogate-assisted MCTS approach, specifically targeting commercial real-time video games by approximating the result of gameplay with a deep-learning-based surrogate model. The key contribution of our work is that we designed a modified MCTS for video games that are both commercial and processed in real-time. Since commercial video games include considerably more complex and dynamic gameplays to satisfy their market consumers, as opposed to their non-commercial analogs, our work can be regarded as having challenged the domain unattempted by precedent studies. We validated the performance of our method by conducting a comparative experiment with other algorithms, including the traditional MCTS, under the environment of a commercial real-time video game.

Whether the application of exergames in physical education (PE) courses can significantly improve student performance in PE learning is still controversial. This review explores the promoting effect of exergames on student PE learning and the conditions in which the effect of exergames can be maximized. Based on the PICOS method, two researchers independently searched the ProQuest database, EBSCO database, Web of Science (WoS) database, PubMed database, Chinese National Knowledge Infrastructure (CNKI) database, Wanfang database, and VIP database, evaluated the literature quality using the Cochrane system evaluation manual, and performed a meta-analysis of the included literature. A total of 16 randomized controlled trials involving 2962 subjects were included in this study. The meta-analysis showed that exergames effectively improved student performance in PE learning (SMD = 0.45, 95% CI: 0.27–0.63, P < 0.00001). Subgroup analysis indicated that better results could be achieved when exergames were introduced in small kindergarten classes and continued for 1–2 months.

Artificial Intelligence (AI) stands as a pivotal innovation deeply ingrained in both our daily routines and industrial operations. Its rapid evolution promises transformative impacts across various sectors, from cutting-edge industries to the lives of ordinary individuals. AI constantly updates human experiences, shaping interactions and augmenting capabilities. For instance, contemporary educational institutions leverage AI algorithms for attendance tracking via facial recognition technology. Looking ahead, the advent of autonomous vehicles represents a pinnacle of AI application, where vehicles rely entirely on AI systems for navigation, detecting traffic signals, and navigating roads.

International relations scholarship has long emphasized that popular culture can impact public understandings and political realities. In this article, we explore these potentials in the context of military-themed videogames and their portrayals of weaponized artificial intelligence (AI). Within paradoxical videogame representations of AI weapons both as insurmountable enemies that pose existential threats to humankind in narratives and as easy targets that human protagonists routinely overcome in gameplay, we identify distortions of human machine interaction that contradict real-world scenarios. These distortions revolve around videogames affording players enhanced human agency to dominate AI weapons to offer enjoyable gameplay, contradicting the same weapons being intended to diminish human agency on real-world battlefields. By leveraging the Actor-Network Theory concept of translation, we explain how these distorted portrayals of AI weapons are produced by entanglements between heterogeneous human and non-human actors that aim to make videogames mass-marketable and profitable. In so doing, we echo game studies research that calls for greater attention to the commercial and ludic dimensions of videogames so that international relations scholarship can better account for pop cultures bounded abilities to impact public understandings and political realities.

Accurately scientific disciplines, including biomechanics, genetics, ethology, and neurology, it is essential to accurately track the behavior of animals throughout studies, particularly without employing markers. However, it has proven difficult to extract precise stances from backgrounds that are always shifting. Recently, we unveiled an open-source toolset that makes use of a cutting-edge algorithm for estimating human position. With the help of this toolbox, users may train a deep neural network to accurately monitor user-defined features with tracking accuracy that rivals that of human labeling. We have added new features, including as graphical user interfaces (GUIs), efficiency improvements, and network refinement based on active learning, to this revised Python module. In order to help customers create a unique and repeatable analysis pipeline using a graphical processing unit (GPU).

Providing an appropriate difficulty level in a game is critical for keeping players engaged. Dynamic Difficulty Adjustment (DDA) is a common approach for optimizing player experience by automatically modifying game aspects. This paper reviews literature addressing mechanisms for adjusting video game difficulties in response to players performance, emotions, or personality. For this purpose, we examined DDA studies using employed machine-learning techniques, player modeling approaches, data types used to assess players states, testbed game genre, and application. Journal and conference articles published up to September 2022 served as the data sources in this review. The findings reveal that most studies have shown significant effects of DDA on parameters such as enjoyment, flow, motivation, engagement, and immersion. In addition, machine-learning and player modeling techniques have recently received more attention in the DDA design. However, given the ever-increasing use of games in various domains, more research is needed to understand player preferences better to adjust game parameters efficiently. By conducting further research into players cognitive characteristics, such as visual attention, working memory, and response time, it will be possible to understand players preferences better.

Serious video games provide an immersive learning environment for agriculture by simulating real-life challenges scenarios. However, empirical evidence of their effectiveness is sparse. This scoping review follows PRISMA-ScR guidelines to summarize literature on serious video games for agricultural learning, highlighting research trends and identifying gaps. We systematically searched nine prominent research databases for papers on serious video games for agriculture learning published between January 2000 and July 2022. Two independent reviewers conducted screening, data extraction, and synthesized the collected data using a narrative approach. The initial search identified 3,297 articles, of which 0.58% ( n = 19) were included in the review. Most reviewed games were released in the last five years, with a predominant presence in the mobile platform. They commonly employed a simulation-based approach, featuring 2-D graphics and designed for single-player experiences. These games mainly target students, focusing on crop production and sustainable agriculture. Educational theories were often unspecified in the studies. Evaluation protocols primarily consisted of pilot studies, emphasizing user experience and knowledge enhancement. Positive outcomes, such as improved user experiences, knowledge, and attitude and behavior changes, were commonly observed in these studies. This study highlights advancements in using serious video games for agricultural learning over 20 years. However, it stresses the need for deeper exploration of game elements' impact on user experience and effectiveness. Creating games for underrepresented players and specific agricultural challenges is essential, as is enhancing theoretical foundations and learning approaches. Rigorous research designs are vital for assessing game effectiveness across short, medium, and long terms.

With the development of education and technology, teachers have gradually realized that games should not be just a way for students to entertain themselves. Applying games to teaching resources can achieve better teaching outcomes. However, related resources are constantly emerging on the internet. To achieve higher quality recommendations, a personalized recommendation model for educational video game resources based on knowledge graphs is proposed. Firstly, feature extraction is performed alternately on the user side and the item side. Then a hidden Markov model is introduced on the basis of the dual end neighbor algorithm. Considering the temporal nature of the user, the model is optimized. The optimized model takes into account the long-term and short-term preferences of users and mines their potential preferences. Through experimental analysis, the hit rate index value of the designed model reaches 0.7989. The normalized cumulative gain value of the broken line is 0.6045. More than 89% of users are satisfied with the recommendation of this model. The running time is 0.2863s. The constructed model can achieve efficient and high-quality recommendation of educational video game resources, providing users with a more convenient and efficient online experience.

The metaverse has emerged as an exciting new paradigm for human-computer interaction (HCI) and virtual collaboration. This paper presents a comprehensive review of the metaverse to address the gap in the existing literature where there is a lack of a survey that reviews the nature of the metaverse and its building blocks from a human-centric perspective. We first synthesize a definition of the metaverse from existing literature and delineate key affordances. We then introduce a detailed framework encompassing the metaverses nature, infrastructure technologies, and input/output technologies that facilitate multi-sensory HCI, alongside applications across diverse domains. The components within this framework are explained in depth, offering insights into the metaverses nature and the readiness level of current technologies. Based on this comprehensive analysis, we outline major open challenges and propose promising directions demanding further exploration and investigation. By clarifying the vision for the metaverse and characterizing the building blocks required to realize it, this review provides essential insights and serves as an invaluable resource for metaverse developers and researchers working to advance this transformative new medium.

The lifestyle of modern society has changed significantly with the emergence of artificial intelligence (AI), machine learning (ML), and deep learning (DL) technologies in recent years. Artificial intelligence is a multidimensional technology with various components such as advanced algorithms, ML and DL. Together, AI, ML, and DL are expected to provide automated devices to ophthalmologists for early diagnosis and timely treatment of ocular disorders in the near future. In fact, AI, ML, and DL have been used in ophthalmic setting to validate the diagnosis of diseases, read images, perform corneal topographic mapping and intraocular lens calculations. Diabetic retinopathy (DR), age-related macular degeneration (AMD), and glaucoma are the 3 most common causes of irreversible blindness on a global scale. Ophthalmic imaging provides a way to diagnose and objectively detect the progression of a number of pathologies including DR, AMD, glaucoma, and other ophthalmic disorders. There are 2 methods of imaging used as diagnostic methods in ophthalmic practice: fundus digital photography and optical coherence tomography (OCT). Of note, OCT has become the most widely used imaging modality in ophthalmology settings in the developed world. Changes in population demographics and lifestyle, extension of average lifespan, and the changing pattern of chronic diseases such as obesity, diabetes, DR, AMD, and glaucoma create a rising demand for such images. Furthermore, the limitation of availability of retina specialists and trained human graders is a major problem in many countries. Consequently, given the current population growth trends, it is inevitable that analyzing such images is time-consuming, costly, and prone to human error. Therefore, the detection and treatment of DR, AMD, glaucoma, and other ophthalmic disorders through unmanned automated applications system in the near future will be inevitable. We provide an overview of the potential impact of the current AI, ML, and DL methods and their applications on the early detection and treatment of DR, AMD, glaucoma, and other ophthalmic diseases.

With the unprecedented advancement of data aggregation and deep learning algorithms, artificial intelligence (AI) and machine learning (ML) are poised to transform the practice of medicine. The field of orthopedics, in particular, is uniquely suited to harness the power of big data, and in doing so provide critical insight into elevating the many facets of care provided by orthopedic surgeons. The purpose of this review is to critically evaluate the recent and novel literature regarding ML in the field of orthopedics and to address its potential impact on the future of musculoskeletal care.

Industry 4.0 concepts and technologies ensure the ongoing development of micro- and macro-economic entities by focusing on the principles of interconnectivity, digitalization, and automation. In this context, artificial intelligence is seen as one of the major enablers for Smart Logistics and Smart Production initiatives. This paper systematically analyzes the scientific literature on artificial intelligence, machine learning, and deep learning in the context of Smart Logistics management in industrial enterprises. Furthermore, based on the results of the systematic literature review, the authors present a conceptual framework, which provides fruitful implications based on recent research findings and insights to be used for directing and starting future research initiatives in the field of artificial intelligence (AI), machine learning (ML), and deep learning (DL) in Smart Logistics.

Machine learning (ML) is a form of artificial intelligence which is placed to transform the twenty-first century. Rapid, recent progress in its underlying architecture and algorithms and growth in the size of datasets have led to increasing computer competence across a range of fields. These include driving a vehicle, language translation, chatbots and beyond human performance at complex board games such as Go. Here, we review the fundamentals and algorithms behind machine learning and highlight specific approaches to learning and optimisation. We then summarise the applications of ML to medicine. In particular, we showcase recent diagnostic performances, and caveats, in the fields of dermatology, radiology, pathology and general microscopy.

Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL) have revolutionized the field of advanced robotics in recent years. AI, ML, and DL are transforming the field of advanced robotics, making robots more intelligent, efficient, and adaptable to complex tasks and environments. Some of the applications of AI, ML, and DL in advanced robotics include autonomous navigation, object recognition and manipulation, natural language processing, and predictive maintenance. These technologies are also being used in the development of collaborative robots (cobots) that can work alongside humans and adapt to changing environments and tasks. The AI, ML, and DL can be used in advanced transportation systems in order to provide safety, efficiency, and convenience to the passengers and transportation companies . Also, the AI, ML, and DL are playing a critical role in the advancement of manufacturing assembly robots, enabling them to work more efficiently, safely, and intelligently. Furthermore, they have a wide range of applications in aviation management, helping airlines to improve efficiency, reduce costs, and improve customer satisfaction. Moreover, the AI, ML, and DL can help taxi companies in order to provide better, more efficient, and safer services to customers. The research presents an overview of current developments in AI, ML, and DL in advanced robotics systems and discusses various applications of the systems in robot modification. Further research works regarding the applications of AI, ML, and DL in advanced robotics systems are also suggested in order to fill the gaps between the existing studies and published papers. By reviewing the applications of AI, ML, and DL in advanced robotics systems, it is possible to investigate and modify the performances of advanced robots in various applications in order to enhance productivity in advanced robotic industries.

Commercial applications of artificial intelligence and machine learning have made remarkable progress recently, particularly in areas such as image recognition, natural speech processing, language translation, textual analysis, and self-learning. Progress had historically languished in these areas, such that these skills had come to seem ineffably bound to intelligence. However, these commercial advances have performed best at single-task applications in which imperfect outputs and occasional frank errors can be tolerated. The practice of anesthesiology is different. It embodies a requirement for high reliability, and a pressured cycle of interpretation, physical action, and response rather than any single cognitive act. This review covers the basics of what is meant by artificial intelligence and machine learning for the practicing anesthesiologist, describing how decision-making behaviors can emerge from simple equations. Relevant clinical questions are introduced to illustrate how machine learning might help solve them—perhaps bringing anesthesiology into an era of machine-assisted discovery.

Adaptation and innovation are extremely important to the manufacturing industry. This development should lead to sustainable manufacturing using new technologies. To promote sustainability, smart production requires global perspectives of smart production application technology. In this regard, thanks to intensive research efforts in the field of artificial intelligence (AI), a number of AI-based techniques, such as machine learning, have already been established in the industry to achieve sustainable manufacturing. Thus, the aim of the present research was to analyze, systematically, the scientific literature relating to the application of artificial intelligence and machine learning (ML) in industry. In fact, with the introduction of the Industry 4.0, artificial intelligence and machine learning are considered the driving force of smart factory revolution. The purpose of this review was to classify the literature, including publication year, authors, scientific sector, country, institution, and keywords. The analysis was done using the Web of Science and SCOPUS database. Furthermore, UCINET and NVivo 12 software were used to complete them. A literature review on ML and AI empirical studies published in the last century was carried out to highlight the evolution of the topic before and after Industry 4.0 introduction, from 1999 to now. Eighty-two articles were reviewed and classified. A first interesting result is the greater number of works published by the USA and the increasing interest after the birth of Industry 4.0.

Autoimmune diseases are chronic, multifactorial conditions. Through machine learning (ML), a branch of the wider field of artificial intelligence, it is possible to extract patterns within patient data, and exploit these patterns to predict patient outcomes for improved clinical management. Here, we surveyed the use of ML methods to address clinical problems in autoimmune disease. A systematic review was conducted using MEDLINE, embase and computers and applied sciences complete databases. Relevant papers included “machine learning” or “artificial intelligence” and the autoimmune diseases search term(s) in their title, abstract or key words. Exclusion criteria: studies not written in English, no real human patient data included, publication prior to 2001, studies that were not peer reviewed, non-autoimmune disease comorbidity research and review papers. 169 (of 702) studies met the criteria for inclusion. Support vector machines and random forests were the most popular ML methods used. ML models using data on multiple sclerosis, rheumatoid arthritis and inflammatory bowel disease were most common. A small proportion of studies (7.7% or 13/169) combined different data types in the modelling process. Cross-validation, combined with a separate testing set for more robust model evaluation occurred in 8.3% of papers (14/169). The field may benefit from adopting a best practice of validation, cross-validation and independent testing of ML models. Many models achieved good predictive results in simple scenarios (e.g. classification of cases and controls). Progression to more complex predictive models may be achievable in future through integration of multiple data types.

Drug designing and development is an important area of research for pharmaceutical companies and chemical scientists. However, low efficacy, off-target delivery, time consumption, and high cost impose a hurdle and challenges that impact drug design and discovery. Further, complex and big data from genomics, proteomics, microarray data, and clinical trials also impose an obstacle in the drug discovery pipeline. Artificial intelligence and machine learning technology play a crucial role in drug discovery and development. In other words, artificial neural networks and deep learning algorithms have modernized the area. Machine learning and deep learning algorithms have been implemented in several drug discovery processes such as peptide synthesis, structure-based virtual screening, ligand-based virtual screening, toxicity prediction, drug monitoring and release, pharmacophore modeling, quantitative structure–activity relationship, drug repositioning, polypharmacology, and physiochemical activity. Evidence from the past strengthens the implementation of artificial intelligence and deep learning in this field. Moreover, novel data mining, curation, and management techniques provided critical support to recently developed modeling algorithms. In summary, artificial intelligence and deep learning advancements provide an excellent opportunity for rational drug design and discovery process, which will eventually impact mankind.

Artificial intelligence (AI) has recently become a very popular buzzword, as a consequence of disruptive technical advances and impressive experimental results, notably in the field of image analysis and processing. In medicine, specialties where images are central, like radiology, pathology or oncology, have seized the opportunity and considerable efforts in research and development have been deployed to transfer the potential of AI to clinical applications. With AI becoming a more mainstream tool for typical medical imaging analysis tasks, such as diagnosis, segmentation, or classification, the key for a safe and efficient use of clinical AI applications relies, in part, on informed practitioners. The aim of this review is to present the basic technological pillars of AI, together with the state-of-the-art machine learning methods and their application to medical imaging. In addition, we discuss the new trends and future research directions. This will help the reader to understand how AI methods are now becoming a ubiquitous tool in any medical image analysis workflow and pave the way for the clinical implementation of AI-based solutions.