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. The segmentation and categorization of abnormalities pose challenges for even experienced radiologists due to the subpar quality of US pictures and the diverse specifications of US machines. The research presents a new AI-based hybrid model for US segmentation that achieves high accuracy, uses minimal datasets, and can handle unfamiliar data. This program is suitable for performing diagnostics and conducting US-guided biopsies. An innovative and resilient hybrid methodology that integrates deep learning (DL) and multi-agent artificial life (AL) has been presented. The algorithms are validated using three datasets from the United States. The solution surpasses 14 chosen cutting-edge algorithms when applied to US photos with intricate geometry and a significant amount of noise. The research presents a novel categorization of the photos and conducts experiments to assess the boundaries of deep learning. The model has undergone training and validation using a dataset consisting of 1264 ultrasound pictures. The photos are stored in the JPEG and PNG file formats. The patients' ages span from 22 to 73 years. The set of 14 benchmark algorithms encompasses deformable forms, edge linking, superpixels, machine learning, and deep learning methodologies. The evaluations employ eight-region measures that assess shape and contour. The proposed method, DL-AL, achieves outstanding results in terms of the dice coefficient (region) and the relative Hausdorff distance H3 (contour-based). Specifically, for images with the easiest complexity level, the dice coefficient is 0.96 and the Hausdorff distance is 0.26. For images with medium complexity, the dice coefficient is 0.91 and the Hausdorff distance is 0.82. Lastly, for images with the hardest complexity level, the dice coefficient is 0.90 and the Hausdorff distance is 0.84. All other measures exhibit a consistent pattern. The DL-AL surpasses the second best method (based on Unet) by a margin of 10-20%. The approach has also undergone a range of non-traditional examinations. The model underwent training using images of low complexity and was subsequently applied to the whole dataset of images. The following is a summary of these outcomes. (1) The training process only utilized images with minimal complexity, with 68% of the images being unknown. The performance metrics for this training were a Dice score of 0.80 and an H3 score of 2.01. (2) The training process included low and medium complexity images, with 51% of them being unknown. The evaluation metrics for these images were Dice = 0.86 and H3 = 1.32. (3) The training process utilized images of several difficulty levels, including low, medium, and hard. Approximately 35% of the images used were unknown. The performance metrics for this training process were a Dice coefficient of 0.92 and an H3 score of 0.76. The tests demonstrate a notable superiority of DL-AL compared to 30%.

Artificial intelligence (AI) has become a powerful and influential factor in multiple industries, such as medicine and healthcare. Language models such as ChatGPT demonstrate the capabilities of AI by producing text that closely resembles human language when given cues. ChatGPT's versatility shows potential for transforming medical practices, enhancing patient care, and improving interactions between healthcare professionals, patients, and data. ChatGPT efficiently spreads crucial information in the field of pandemic management. It functions as a digital assistant during surgical consultations, assists dental offices, streamlines medical education, and aids in illness diagnostics. 82 papers were classified into eight main categories: G1: treatment and medicine, G2: buildings and equipment, G3: parts of the human body and disease areas, G4: patients, G5: citizens, G6: cellular imaging, radiology, pulse, and medical images, G7: doctors and nurses, and G8: tools, devices, and administration. Striking a balance between the function of AI and human judgment continues to be a difficulty. A systematic literature review conducted using the PRISMA approach examined the transformational capabilities of artificial intelligence (AI) in healthcare. The review specifically focused on the various uses, limitations, motivation, and problems of ChatGPT in this field. Ultimately, the varied medical uses of ChatGPT highlight its capacity for groundbreaking advancements, making it an invaluable tool for students, scholars, and healthcare researchers. Moreover, this study functions as a comprehensive manual, providing support and guidance to students, scholars, and researchers in the domain of medicine and healthcare.

Artificial neural networks are now seen as viable models for simulating human language processing due to their computational feasibility. One significant critique of these models is that they are trained on a far larger amount of data compared to what humans typically get during language acquisition. In this study, we employ two complimentary methodologies to investigate the impact of training data quantity on the models' capacity to accurately replicate human fMRI responses to phrases. Initially, we assess GPT-2 models that have been trained on varying amounts of words (1 million, 10 million, 100 million, or 1 billion) by comparing their performance against an fMRI benchmark. The 100-million-word model is considered developmentally credible because it is trained on a similar quantity of data that children are predicted to be exposed to throughout their first 10 years of life. Next, we evaluate the efficiency of a GPT-2 model that has been trained on a dataset containing 9 billion tokens. We want to achieve the best possible performance in predicting the next word in a sentence, as measured by a human benchmark. This evaluation is conducted at several phases throughout the training process. Both approaches demonstrate that models trained on a realistic quantity of data already attain almost optimal performance in capturing fMRI responses to phrases. In addition, a lower perplexity, which is a measure of how well a model can predict the next word, is linked to a stronger alignment with human data. This implies that models that have undergone extensive training and can accurately predict the next word also develop sentence representations that are predictive of human fMRI responses. These data demonstrate that the models' predictive power requires some training, but a realistic quantity of training, approximately 100 million words, may be sufficient.

This study investigates the ethical dilemmas and regulatory mechanisms around Artificial Intelligence (AI) with regards to data integrity and its impact on social dynamics. A cross-sectional survey approach was used to collect primary data from 650 AI practitioners in different sectors, including developers, data scientists, ethicists, and policymakers. The study examined the associations between regulatory compliance, ethical awareness, professional training, and expertise in AI practice with the efficacy of AI installation and data integrity. The results showed a significant and positive relationship between increased levels of adherence to regulations and the perceived success of implementing artificial intelligence. Additionally, there was a favorable association between awareness of AI ethics and the assurance of data integrity. Furthermore, a notable correlation was found between receiving professional education in artificial intelligence and the favorable influence it has on social interactions. Nevertheless, although there is a favorable relationship between experience in the AI sector and data integrity, the connection is not very strong. This suggests that having experience alone is not enough to guarantee good AI practices. The study emphasizes the significance of ethical considerations, legal frameworks, and professional training in influencing the development of AI and its impact on society. There is a strong emphasis on the requirement for regulatory frameworks that are dynamic, adaptive, and inclusive. These frameworks should be able to connect AI practices with societal values and ethical norms. Potential areas for future research involve investigating AI ethics and governance within various cultural contexts, as well as examining the influence of new technologies such as quantum computing on AI ethics.

The progress in artificial intelligence (AI) is leading to a growing resemblance in the way AI systems or AI-based robots perform and communicate compared to humans. The questions they pose are as follows: 1. Is it feasible to speak with, comprehend, and perhaps empathetically perceive artificial agents? Whether we should attribute genuine subjectivity and therefore quasi-personal status to them after they reach a certain level of simulation. The increasing dissolution of the distinction between simulated and real encounters will have a significant impact. In order to comprehend others, it is essential to acknowledge the subjectivity of our counterparts, which enables the experience of shared emotions and a collective intentionality. This paper argues that these factors are crucial for understanding the consequences of this phenomenon. This assumption is ultimately grounded on the underlying belief in a common way of living, referred to as "conviviality." The potential for future artificial agents to fulfill these requirements is disproven based on the principles of embodied and enactive cognition, which connect subjectivity and consciousness to the vitality of an organism. Even if subjectivity is fundamentally unattainable for artificial agents, the differentiation between simulated and genuine subjectivity may still become less clear. In this discussion, we specifically examine potential outcomes, with a particular focus on the utilization of virtual psychotherapy as an illustrative case. Ultimately, the study argues in favor of adopting a thoughtful approach when discussing artificial systems and emphasizes the importance of avoiding a deliberate pretense of subjectivity.

This article explores the recent progress and growing media coverage of artificial intelligence. Eliezer Yudkowsky, a prominent player in the field of artificial intelligence alignment, is dedicated to bridging the gap between public views and rationalist viewpoints on artificial intelligence technology. This analysis examines his anticipated plan of action for artificial intelligence as described in his unpublished document titled "AGI Ruin: A List of Lethalities." This is accomplished by striving to comprehend the notion of intelligence itself and establishing a practical and logical definition of that concept. The concept of intelligence is then employed to analyze the relevance of modern artificial intelligence capabilities and advancements to these technologies. This study concludes that current artificial intelligence systems possess a certain degree of intelligence. Nevertheless, it contends that artificial intelligence systems, whether weak or strong, that lack human-defined objectives, would not inherently present existential risks to humanity. This challenges the concept of aligning artificial intelligence and raises doubts about the validity of Nick Bostrom's Orthogonality Thesis. Moreover, the potential for generating synthetic life by combining several modules, each simulating a distinct cognitive function, is being examined.

The remarkable powers of living beings stem from the manner in which their bodies manifest autonomy. Living organisms integrate computational or cognitive intelligence with physical intelligence by means of body morphology, material multifunctionality, and mechanical compliance, at various levels of organization. Although soft robotics has made progress in developing and creating physically intelligent bodies, including information-processing abilities for computational intelligence is still difficult. Hence, the construction of soft robots is now restricted by limits in perception and control. Achieving complete independence in autonomy would necessitate a purposeful alignment in the joint development of novel materials, manufacturing techniques, and control strategies for soft robots. Here, a novel viewpoint is proposed: researchers should only employ tasks to impose limitations on the design of soft robots, namely in terms of materials and information. A proposed conceptual framework introduces a task-first design paradigm that bypasses limits imposed by control mechanisms. This framework enables the efficient utilization of the combined material and information processing abilities of soft matter for the creation of agents capable of performing specific tasks. Special emphasis is given to the scale dependency of solutions. Lastly, this article discusses potential research prospects for attaining autonomy in upcoming soft robots, ranging in size from elephant trunks to paramecia.

This paper introduces the concept of self-reproduction in Artificial Life and its application to computer animation. An Artificial Fish model that can reproduce itself, based on gene control, is proposed and constructed. The chromosome of the Artificial Fish contains the genetic information that determines its phenotype. According to this paradigm, hereditary rules are provided. Artificial Fish have the ability to reproduce and grow inside a virtual marine environment that is under the precise control of a gene model and set of regulations. Artificial behaviors encompass both predetermined behaviors and indeterminate behaviors. Artificial Intelligence-based cognitive models are proposed and developed to regulate the actions of artificial fish at a high level. The simulation program is created using the models provided earlier. These efforts laid the foundation for enhancing the efficiency and automation of artificial fish animation.

This paper explores the ideas of "Life," "Artificial Life," and "Generalized Artificial Life," as well as the question of whether Artificial Life can be considered actual Life.

This study presents an experiment including the utilization of an Artificial Life competitive game to replicate an environment for teaching Artificial Intelligence (AI) to computer science engineering students in an unstructured and informal manner. The game has a virtual Petri dish in which two colonies of microorganisms, represented as software agents, must compete for survival. In order to accomplish this objective, the participants must employ survival tactics for their agents, which encompass combat methods and fundamental reproduction guidelines to overcome the entire artificial environment. The contest's technical foundations and the artificial life model's description are provided in thorough detail. This text discusses the pedagogical experience gained from developing the contest, as well as the resulting learning experience. The learning experience has produced enthusiasm among students and has aided in the construction of mental models for potential AI algorithms.

Fuzzy logic is a highly effective method for optimizing power flow solutions, especially in the setting of deregulated power systems. The use of fuzzy logic controls allows for the determination of the optimal location of distribution generators (DGs), guaranteeing that reliability indices are recognized through optimal power flow solutions and fuzzy logic controllers to preserve system feasibility. Strategically positioning distribution generator units is vital in a deregulated power system to minimize power loss and improve overall system performance by reducing volatility. In a deregulated power system, it is crucial to have access to optimal power flow algorithms in order to detect areas of vulnerability, particularly within transmission companies. Both the transmission and distribution networks should be suitably modified to minimize congestion within their respective organizations. The aggregator is responsible for evaluating the efficiency of the electricity system by analyzing data provided by distribution and transmission businesses operating within the deregulated power system.

This article examines the factors that contribute to technological disruptions in electrical systems and emphasizes various inherent drawbacks of protecting and automating components of electrical systems. The decline in the reliability of relay protection due to the shift from analog to digital protection systems is justified. The justification for employing fuzzy logic in protection systems is supported by the analysis of investigated examples. The practicality of incorporating fuzzy logic elements in protection devices and the automation of electrical systems for identifying different forms of short circuits are also substantiated. This article examines the prevalent forms of damage and shows the findings of simulating an electrical system with transformer coupling, in which various forms of asymmetrical short circuits were initiated. The behavior of the symmetrical components of short-circuit currents in the forward, reverse, and zero sequences is analyzed to understand their dynamics. Guidelines have been established to identify asymmetrical types of short circuits. A protection and automation operating algorithm utilizing fuzzy logic features has been created. The proposed algorithm for protection and automation will decrease the time required to identify the nature of the harm and activate protective measures.

The process of quantifying the usability expectation for an m-commerce mobile application using fuzzy logic principles involves testing the usability of the application. The usability of a mobile application is determined by assessing the user's expectations and preferences to assess their experience with the program. Fuzzy logic is consistently the most advantageous option for quantification. The usability expectation of an m-commerce mobile application is assessed using a fuzzy logic-based quantification method. This assessment considers the user's needs, preferences, and expectations to evaluate their overall user experience. Usability expectation encompasses the user's capacity to comprehend and engage with the application, the extent to which the application fulfills the user's expectations, and the overall level of happiness with the application. This technique facilitates the identification of areas that require improvement, allowing developers to implement essential modifications to enhance the user experience. This study introduces a framework for measuring usability and applies fuzzy logic to quantify the overall usability quality of an m-commerce mobile application. The proposed framework for measuring usability is founded on the Goal-Question-Metric (GQM) methodology. Its purpose is to offer a thorough and methodical method for designing metrics that evaluate the qualitative element of mobile phone applications. The framework has been created and evaluated in the context of mobile commerce (m-commerce) and offers a collection of quantifiable criteria to measure the quality of mobile applications for m-commerce according to a standard. The evaluation results can be utilized to enhance m-commerce mobile applications and guarantee the optimization of the user experience.

The performance of photovoltaic (PV) systems is directly influenced by changes in climate. The controller ensures that the maximum potential energy is converted to operate the pumping system under normal conditions. Fuzzy logic intelligent controllers have proven to be effective and applicable in engineering and applied science. This paper aims to demonstrate an experimental method for implementing fuzzy logic maximum power point tracking (MPPT) with a boost converter based on the Arduino Mega micro-controller. The objective is to maximize energy production in various weather conditions for a small-scale pumping system used in water and chemical fluid analysis in isolated areas. The system is equipped with a set of 20 solar photovoltaic (PV) panels, each with a power output of 20 watts (W). This work introduces a real-time approach for regulating and monitoring Maximum Power Point Tracking (MPPT) using MATLAB/Simulink and fuzzy logic. The method utilizes a low-cost Arduino Mega micro-controller and (LV25, LP55) sensors to operate a boost converter coupled to a solar panel and plastic pump.

This paper utilizes a fuzzy logic controller (FLC) to examine voltage stability in a photovoltaic (PV)-based direct current (DC) microgrid. The microgrid consists of many photovoltaic (PV) modules, a DC-DC converter, and various loads. Ensuring voltage stability in DC microgrids is a challenging task due to the extensive utilization of intermittent PV power. This paper presents a voltage control technique based on Fuzzy Logic Control (FLC). The technique utilizes input elements such as photovoltaic (PV) output power, duty cycle of the DC-DC converter, and load current to determine the most suitable action for maintaining the stability of the system's voltage. The performance of the FLC is evaluated by simulation, with the objective of ensuring its resilience to parameter changes and uncertainties. The simulation findings indicate that the proposed FLC-based control technique effectively preserves the voltage stability of the microgrid in several operational scenarios, such as fluctuations in solar irradiance and load variations. Furthermore, the FLC exhibits superior performance compared to alternative control approaches.

This study explores the complexities of adaptive fuzzy event-triggered formation tracking control for nonholonomic multirobot systems that are defined by unlimited actuator faults and range limits. In order to tackle these problems, we make use of fuzzy logic systems (FLSs) and utilize adaptive techniques to estimate unfamiliar nonlinear functions and uncertain parameters that exist in robotic dynamics. During the process of exploring information, the challenges of avoiding collisions and maintaining connectedness are constantly present because of constraints in distance and visual perception. To address confined range obstacles effectively, we present a comprehensive barrier function and prescribed performance approach. In addition, robots minimize the number of controller executions and address any impact caused by infinite actuator failures by communicating with their leader when actuator faults occur. This communication is done using fewer network resources, while still ensuring uninterrupted tracking of the desired trajectory set by the leader. Using dynamic surface technology, we provide a decentralized adaptive event-triggering fault-tolerant (ETFT) formation control technique. All signals are guaranteed to be semi-global uniformly ultimately bounded (SGUUB). In conclusion, we prove the practical possibility of implementing the ETFT control approach for nonholonomic multirobot systems.

Fuzzy inference systems (FISs) have been developed over an extended period, although employing FISs for high-dimensional issues remains a formidable undertaking. The most commonly employed T-norms for calculating the firing strengths are the product and minimum operators, with the former being favored due to its differentiability. However, in the case of high-dimensional issues, the product T-norm is susceptible to the issue of numeric underflow. Our main goal is to address the issue related to the utilization of T-norms in the construction of high-dimensional Fuzzy Inference Systems (HDFISs). To address the issue of numeric underflow, we create an HDFIS (Hierarchical Decision Fuzzy Inference System) called HDFIS-prod, specifically designed for the T-norm product operation. The primary innovation is in our proposal of an adaptive dimension-dependent membership function (DMF). Based on empirical observation, we have developed a technique called HDFIS-min that effectively handles super high-dimensional issues by utilizing the minimum T-norm. Both HDFIS-prod and HDFIS-min undergo testing on 18 datasets, with feature dimensions ranging from 1024 to 120450. The simulation findings indicate that both of them exhibit comparable performance in managing datasets with a large number of dimensions.

This article explores a solution to address the significant challenges associated with controlling induction machines, with the aim of achieving exceptional dynamic performance. Conventional direct torque control and indirect control with flux orientation suffer from certain limitations, including the presence of current harmonics, torque ripples, flux ripples, and extended rising time. This article presents a comparison analysis of earlier methodologies and the one that use fuzzy logic. The simulation results demonstrate that the utilization of fuzzy logic in the direct torque control approach yields superior performance by delivering accurate and rapid responses without any overshooting. Additionally, it effectively reduces fluctuations in both torque and flux at low switching frequencies. The showcased enhancements in dynamic performance enhance operational efficiency and reliability in industrial applications.

The primary objective of this paper is to justify the methodological approach to evaluating personnel risks in enterprises by utilizing the fuzzy logic framework. This approach aims to identify issues related to personnel risk management and offer suitable recommendations for their resolution. The study is grounded on the established principles and essential works of both foreign and domestic scientists, statistical data, and our own research findings on the evaluation of human hazards in organizations. The study included many techniques including fuzzy set theory, comparative analysis, scientific abstraction, generalization of scientific experience, and a systematic and comprehensive methodology. The study presented a methodological methodology for evaluating the extent of people hazards in a company. Numerical experiments were carried out using a cohort of construction equipment manufacturers. The analysis of the results from assessing the level of personnel risks at enterprises has revealed the issues in managing personnel risks. The study focuses on hierarchical fuzzy data, specifically four groups of indicators for assessing the level of personnel risks: quantitative composition (F1), state of qualifications and intellectual potential (F2), staff turnover (F3), and motivational system (F4). Each indicator has a varying number of fuzzy coefficients, with twelve coefficients considered in this study (vi, i=1÷12). The indicators are defined as functions of fuzzy coefficients. F1 is determined by the values of v1, v2, and v3. F2 depends on the values of v4, v5, v6, and v7. F3 is calculated based on the values of v8, v9, and v10. Finally, F4 is determined by the values of v11 and v12. The output variable, Int, represents the personnel risk level and is determined by a functional relationship with the input variables F1, F2, F3, and F4. The personnel risk level is also expressed as a fuzzy value. The functions r, g, h, q, and f are unspecified functions of the provided variables. We possess proficient assessments of the modification in every input data, often categorized into three levels: Low (I), Medium (G), and High (E). The formalized information for each variable can be expressed as follows: . For a set of indicators, we can then state: . To utilize a fuzzy system and do computations using it, the system must possess the following structural components: membership functions for input and output variables, a rule base, and an output mechanism. The structural elements refer to the constituent parts that will be constructed during the construction of a fuzzy system. The developed mathematical model and its formalization using FST allow for the estimation of personnel risk levels at the firm, facilitating the justification of a range of measures to enhance its utilization efficiency. The developed fuzzy logical inference system can be regarded as intelligent since it incorporates components of computational intelligence, specifically the theory of fuzzy sets. The proposed methodology for evaluating personnel risks in enterprises, using fuzzy logic, offers a unique advantage over existing methods. It allows for the integration of both qualitative and quantitative indicators when assessing personnel risks and movement, leading to more effective decision-making in uncertain situations and reducing costs in adverse scenarios.

Real-world objects exhibit random perturbations that negatively impact the control process. To address this issue, modern methods of intelligent technology are used to design control systems for complex dynamic objects. These methods aim to compensate for the effects of external factors that possess random and partially uncertain properties. The paper discusses the synthesis of automatic control systems for dynamic objects using intelligent control theory. In this scenario, a neural network that relies on radial-basis functions is employed at every distinct interval to approximate the control system using neuro-fuzzy techniques. This enables the regulator settings to be adjusted in real-time. The radial basis function is specifically designed to provide an approximation for functions that are defined in the implicit form of pattern sets. The parameter configuration of the neuro-fuzzy regulator is achieved by the utilization of a genetic algorithm, which allows for more efficient calculation in order to determine the set parameters of the regulator. The parameters of the regulator are expressed as a vector, which makes it easier to apply them to objects with many dimensions. A evolutionary algorithm was employed to identify the ideal tuning parameters of the neuro-fuzzy regulator, which is known for its strong convergence and ability to detect global extrema. The neuro-fuzzy regulator is effective because it can provide quality control for a dynamic object even when there are random disturbances and ambiguity in the input data.

Convenient internet access and rapid technological progress have led to an overwhelming amount of information and a wide range of choices, which has made decision-making highly challenging. A Recommender System (RS) is a promising system that aids users in decision-making by providing recommendations or predictions for product ratings. There are three primary types of RS that utilize either implicit or explicit feedback for recommendation: collaborative filtering, content-based filtering, and hybrid filtering. Ratings are a prevalent type of feedback, but product descriptions, reviews, photographs, audios, and videos are equally significant and can enhance the effectiveness of the conventional RS. These supplementary variables can greatly influence the performance of RS. Previously, traditional recommendation systems (RSs) relied on methods such as nearest neighbor or other machine learning models. However, with recent advancements in artificial intelligence and deep learning, RSs are now being created utilizing Convolutional Neural Networks (CNN). CNNs are able to effectively utilize additional information. This article not only compares CNN-based recommendation systems (RSs) based on common criteria, but also thoroughly explores the utilization of different types of auxiliary information in CNN-based RSs. The study also examines the attributes of the data, statistical information about the data, and additional supporting details found in various datasets that are accessible to the public. The paper also examines several assessment metrics for recommendation systems and presents readers with intriguing problems and ongoing research topics.

Recently, due to the rapid advancements in science and technology, particularly in artificial intelligence and machine algorithms, the education system has started incorporating more tailored content in addition to its traditional roles. Conventional education systems frequently employ a standardized teaching method that fails to consider the distinct requirements and learning preferences of individual students. A machine learning-based education system can offer tailored learning materials and suggestions by analyzing individual students' learning history, interests, and abilities. This personalized approach aims to enhance learning outcomes. Additionally, machine learning algorithms can provide immediate feedback on student performance and adapt learning plans accordingly. This enhances the learning process by making it more dynamic and tailored to individual needs. Consequently, it can be utilized in all educational domains, encompassing language acquisition, mathematics, science, and so on. Enhancing the effectiveness of machine learning algorithms mostly relies on the enhancement of numerical optimization algorithms. Therefore, it is imperative to consolidate the optimization algorithms used in large-scale machine learning. This work aims to provide a comprehensive analysis of the current machine learning algorithms used in optimizing personalized education recommendation systems. It also presents the process of optimizing these algorithms.

This paper provides a thorough examination of the existing body of literature on the study and implementation of machine learning (ML) methods in recommender systems (RS). The study's objective is to analyze current patterns, examine practical uses, and provide guidance to scholars in aligning their research endeavors in this field published between January and June of 2023. The findings are classified into many categories, such as education, healthcare, ML algorithms (namely auto-encoders and reinforcement learning), e-commerce, and digital journalism. The review emphasizes the improved precision of recommendations, greater ability to handle larger amounts of data, customization and understanding of context, various machine learning techniques, and approaches for dealing with new and sparse data. It also lays the groundwork for future developments in machine learning algorithms for recommendation systems, particularly in the context of manufacturing enterprises.

Smart cities are the result of combining information and communication technology (ICT) with urban management in order to enhance the quality of life for people living in cities. Recommender systems, which provide personalized advice to urban residents, have become important contributors to this confluence. Their effective implementation in diverse aspects of urban life and their capacity to handle vast quantities of data produced in city environments has accelerated their importance as a vital technology in the advancement of urban planning. Our research involved doing a thorough examination of the Web of Science database, which yielded a total of 130 articles. After applying a relevancy filter, the number of articles was decreased to 86. The initial phase involved doing a bibliometric analysis using the SciMAT program to examine structural factors. Furthermore, a methodical examination of existing literature was conducted utilizing the PRISMA 2020 declaration. The results demonstrated the various mechanisms by which recommendations are screened in domains such as tourism, health, mobility, and transit. This research is considered an important discovery that has the potential to enhance the development and effectiveness of smart cities, laying a strong foundation for future research in this rapidly changing sector.

Remote healthcare solutions based on the Internet of Things (IoT) offer rapid and preventive medical treatments to individuals who are at danger. Nevertheless, forecasting cardiac disease is a complicated undertaking and diagnostic outcomes are seldom precise. A unique Recommendation System for Cardiovascular Disease Prediction Using IoT Network (DEEP-CARDIO) has been proposed to address this issue. It aims to provide before diagnosis, therapy, and nutrition recommendations for cardiac disorders. At first, the patient's physiological data are gathered remotely using four bio sensors: an ECG sensor, a pressure sensor, a pulse sensor, and a glucose sensor. An Arduino controller retrieves the gathered data from the IoT sensors in order to forecast and diagnose the illness. A cardiovascular disease prediction model is developed using the BiGRU (Bidirectional-Gated Recurrent Unit) attention model to diagnose and classify cardiovascular diseases into five distinct categories. The recommendation system utilizes classified data to provide cardiac patients with activity and dietary suggestions using a mobile application. The DEEP-CARDIO's performance is verified through the utilization of Cloud Simulator (CloudSim) using the real-time Framingham's and Statlog heart disease dataset. The DEEP CARDIO approach obtains an accuracy of 99.90%, whereas the MABC-SVM, HCBDA, and MLbPM methods reach accuracies of 86.91%, 88.65%, and 93.63% respectively.

The current endeavor in providing computing resources as a service to managers and consumers signifies a departure from computing as a product that is bought, to computing as a service that is provided to users over the internet from extensive data centers. Nevertheless, the emergence of cloud-based Internet of Things (IoT) and artificial intelligence (AI) has led to significant advancements in automating customer experiences across various domains, such as recommender systems (RS). Consequently, there is a growing demand for modifications to accommodate IoT devices, which play a central role in automation. This includes recent language models like ChatGPT and Bard, as well as technologies like nanotechnology. This study presents the marketing community with a new advancement in computing called IoT-driven fog computing (FC). While there have been several research studies on FC "smart" applications, none of them have focused on fog-based smart marketing domains like recommender systems. FC is regarded as an innovative computational system that can reduce latency and enhance bandwidth usage for autonomous consumer behavior applications that necessitate real-time data-driven decision making. This paper presents a theoretical framework for examining the impact of fog computing on consumer behavior. The objective is to encourage further research by utilizing the combination of fog computing and recommendation systems as an illustrative case. Our conceptualization of "fog-based recommender systems" presents new and challenging opportunities for academic research. Some of these opportunities are discussed 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).

Purpose: The primary objective of the study was to examine the efficacy of recommender systems in the process of knowledge discovery. technique: The study utilized a desktop research technique. Desk research, often known as secondary data, refers to the collection of information that does not need fieldwork. Desk research mostly involves gathering data from pre-existing resources, making it a cost-effective strategy when compared to field research. The primary expenses associated with desk research include the time of the executive, telephone rates, and directories. Therefore, the study relied on previously published studies, reports, and statistics. The secondary data was readily available via internet journals and library resources. Analysis: The analysis indicates that there is a lack of context and methodology in the field of recommender systems in knowledge discovery. The research on the efficacy of recommender systems in knowledge discovery revealed that these systems played a crucial role in aiding users' exploration of extensive information repositories, allowing them to locate pertinent resources and enhance their knowledge. It was discovered that recommender systems utilizing sophisticated algorithms and personalized methodologies exhibited greater efficacy in producing pertinent recommendations customized to users' tastes and requirements. Moreover, the study emphasized the significance of promoting active user participation in the recommendation process by pointing out the positive relationship between user engagement measures and knowledge discovery outcomes. The identification of contextual information was also recognized as a pivotal component impacting the effectiveness of recommendations. In summary, the study emphasized the importance of constantly improving and optimizing recommender system algorithms in order to improve the outcomes of information discovery for consumers. The Social Learning theory, Information Foraging theory, and Cognitive Load theory can serve as foundational frameworks for future research on recommender systems in knowledge discovery, offering distinct and valuable insights. The study offered suggestions to improve the effectiveness of such systems. The proposal recommends the adoption of hybrid recommender systems, which integrate collaborative and content-based filtering techniques, in order to provide more precise and varied recommendations. Furthermore, the study highlighted the significance of including contextual data into recommendation algorithms in order to adapt recommendations according to situational circumstances. Moreover, it suggested the utilization of explainable AI methodologies to enhance transparency and user comprehension of recommendation procedures. Emphasizing the need of user engagement through active participation and feedback was also identified as vital. Additionally, promoting recommendation diversity is necessary to encourage exploration and the accidental discovery of new knowledge resources.

Artificial Intelligence (AI) is being extensively utilized in many Human Resources (HR) operations. The objective of this research is to get insight into the perspectives of various professionals from different organizations, including Project Managers, Managers, Supervisors, and Human Resource Managers, about the potential of artificial intelligence-based recommender systems in aligning job profiles with employee profiles. This study utilizes a Delphi study approach, which involves assembling a panel of experts who express their thoughts by scoring and commenting on a series of propositions. This research seeks to uncover the obstacles associated with matching employees to job profiles using artificial intelligence and machine learning tools, namely recommender systems. The study is based on the results of an online Delphi study and participant perspectives. This study examines the challenges associated with aligning staff profiles with job profiles, as well as the specific issues encountered by executives, human resource personnel, and supervisors, such as project managers, inside an organization. The study also provides insights into the possibility and viability of using artificial intelligence in the form of recommender systems. We also examine several propositions that address potential solutions and obstacles in matching employee profiles to job profiles inside an organization.

Facial Expression Recognition (FER) is employed in diverse domains, including education, gaming, robotics, healthcare, and other sectors. Facial expression techniques, such as an interactive robot equipped with Artificial Intelligence, have the ability to identify human faces, analyze the emotions of the individual it is engaging with, and subsequently utilize these emotions to select suitable responses. An application of face emotion detection is to select and play music that corresponds to the user's emotional state. In order to accomplish this, we can examine the user's facial expression to infer their emotions. Consequently, further research is needed to explore new emotion models, as current ones face difficulties in accurately assessing the relationship between music and facial emotions. This research employs a Convolution Neural Network (CNN) based deep learning approach to implement this type of task. Deep learning is superior than machine learning in its ability to evaluate unstructured data, movies, and other types of media with greater effectiveness. We have developed a live system in our research that is capable of accurately identifying human faces, evaluating human emotions, and providing music recommendations to users. The experimental investigation made use of the OAHEGA and FER-2013 datasets. We developed and instructed two emotion identification models by utilizing different mixes of these datasets. The accuracy of the proposed model is 73.02%. Our CNN algorithm has the capability to accurately forecast six distinct emotions: anger, fear, joy, neutral, sadness, and surprise. The proposed technology can be employed in various locations where real-time facial identification is crucial.

This paper suggests a cross-domain information fusion matrix decomposition algorithm to improve the accuracy of personalized recommendations in artificial intelligence recommendation systems, considering the difficulties of inter-domain information fusion and data sparsity in collaborative filtering algorithms. The study commences by gathering Douban movie rating data and social network information. In order to maintain the accuracy of the data, the procedure of Levenshtein distance detection is used to eliminate duplicate scores. Additionally, natural language processing technology is applied to extract keywords and topic information from social texts. In addition, graph convolutional networks are employed to transform user associations into feature vectors, while a distinctive thermal coding technique is employed to turn discrete user and movie information into binary matrices. In order to mitigate overfitting, the Ridge regularization technique is employed to systematically optimize the potential feature vectors. Subsequently, the weighted average and feature connection approaches are employed to amalgamate characteristics derived from various domains. In addition, the article integrates the item-based collaborative filtering algorithm with merging user characteristics in order to produce tailored recommendation lists. The research performs cross-domain information fusion optimization on four widely-used mathematical matrix decomposition strategies throughout the experimental phase. These algorithms include the alternating least squares method, non-negative matrix decomposition, singular value decomposition, and latent factor model (LFM). It contrasts these algorithms with the non-fused technique. The findings demonstrate a notable enhancement in the precision of scores, as seen by a decrease of 12.8% and 13.2% in the mean absolute error and root mean squared error, respectively, across all four algorithms. Moreover, with k=10, the mean F1 score attains 0.97, and the LFM algorithm's ranking accuracy coverage experiences a 54.2% rise. In summary, the integration of the mathematical matrix decomposition technique with cross-domain information fusion offers significant benefits in terms of accuracy, prediction performance, suggestion diversity, and ranking quality. Furthermore, it enhances the precision and variety of the recommendation system. By successfully tackling the obstacles of collaborative filtering through the incorporation of several methodologies, it greatly exceeds conventional models in terms of suggestion precision and diversity.

Over the past few years, the scientific and academic community has been particularly interested in video games, specifically in studying and experimenting with Artificial General Intelligence (AGI). AGI experimental systems enable the analysis and study of the behavior of various pre-defined AI agents in a visual manner. This work introduces a new game engine called GAGI, which can be used as a platform for experimenting with AGI (Artificial General Intelligence). GAGI, functioning as a game engine, possesses the capability to develop and produce innovative 2D and 3D video games by utilizing the C++ programming language. Furthermore, GAGI offers users a distinctive platform for simulating and analyzing AI agents within the game that they have designed. Users have the ability to deploy many AI agents and engage with them in real time, enhancing their comprehension of the agents' interactions and behaviors. The suggested software's features are compared to those of widely-used game engines in the video games industry and the research community, emphasizing its advantages in terms of design capability and AI support. GAGI also provides the opportunity to replicate the studies, hence expanding the range of possibilities for the research community.

Monte Carlo Tree Search (MCTS) is an effective empirical search method used for agent decision-making. It is particularly successful when combined with Deep Learning (DL) in mastering board games that were previously considered unbeatable. However, real-time video games do not seem to achieve the same level of success. This is because these games have a time restriction for exploration, which is a critical aspect. They are primarily meant for human users and therefore demand a substantial number of resources for simulation. In this research, we provide a surrogate-assisted Monte Carlo Tree Search (MCTS) method that is designed for commercial real-time video games. Our strategy involves using a deep-learning-based surrogate model to approximate the outcome of gameplay. Our work's main contribution lies in the development of a customized Monte Carlo Tree Search (MCTS) algorithm specifically tailored for real-time commercial video games. Our work can be seen as exploring a domain that previous research have not addressed, as commercial video games offer more intricate and dynamic gameplay to meet the demands of its consumers compared to non-commercial games. We assessed the effectiveness of our approach by performing a comparative experiment with different algorithms, including the conventional MCTS, within the context of a commercial real-time video game.

The controversy surrounding the use of exergames in physical education (PE) courses and its impact on student performance in PE learning remains unresolved. This review examines the impact of exergames on student physical education (PE) learning and identifies the optimal circumstances for maximizing this impact. Following the PICOS method, two researchers conducted separate searches in the ProQuest, EBSCO, Web of Science (WoS), PubMed, Chinese National Knowledge Infrastructure (CNKI), Wanfang, and VIP databases. They assessed the quality of the literature using the Cochrane system evaluation manual and conducted a meta-analysis of the included studies. This analysis comprised a total of 16 randomized controlled trials with 2962 patients. The meta-analysis demonstrated that exergames had a significant positive impact on student performance in physical education learning. The standardized mean difference (SMD) was 0.45, with a 95% confidence interval (CI) of 0.27 to 0.63, and a p-value of less than 0.00001. Subgroup analysis revealed that introducing exergames in small kindergarten groups and maintaining them for a duration of 1-2 months led to improved outcomes.

Artificial Intelligence (AI) is a transformative advancement that has become an integral part of our everyday lives and industrial processes. The rapid evolution of this technology holds the potential to bring about significant changes in a wide range of areas, including advanced industries and the daily lives of ordinary people. Artificial intelligence continuously enhances human experiences by influencing interactions and enhancing skills. Contemporary educational institutions utilize AI algorithms to track attendance using facial recognition technologies. In the future, the emergence of autonomous vehicles signifies the highest point of AI implementation, as vehicles depend solely on AI systems to navigate, identify traffic signals, and travel on roadways.

International relations studies has consistently highlighted the significant influence of popular culture on public perceptions and political dynamics. This article examines the possibilities of military-themed video games and how they depict weaponized artificial intelligence (AI). In paradoxical depictions of AI weapons in video games, they are portrayed both as formidable enemies that pose existential threats to humanity in the game's storylines, and as easy targets that human protagonists effortlessly defeat during gameplay. These representations create distortions in the way humans interact with machines, which do not align with real-world scenarios. These distortions arise from the fact that videogames empower players with increased control over AI weaponry, allowing them to dominate and enjoy the gameplay. This contradicts the original purpose of these weapons, which is to reduce human control on real-world battlefields. We elucidate the production of these inaccurate depictions of AI weaponry by examining the entanglements between diverse human and non-human actors, utilizing the idea of translation from the Actor-Network Theory. These entanglements are driven by the objective of making video games widely marketable and financially lucrative. By doing this, we are aligning with game studies research that emphasizes the need to focus more on the commercial and playful aspects of video games. This will enable international relations academics to more effectively analyze how popular cultures can influence public perceptions and political situations.

In scientific areas like as biomechanics, genetics, ethology, and neurology, it is crucial to precisely monitor the behavior of animals throughout investigations, especially without using markers. Nevertheless, it has been challenging to derive exact positions from constantly changing backgrounds. We have recently introduced a collection of tools that are open-source and utilize a state-of-the-art algorithm to estimate the position of humans. Using this toolbox, users can train a deep neural network to effectively monitor user-defined features with tracking accuracy comparable to that of human labeling. The redesigned Python package now includes additional capabilities like as graphical user interfaces (GUIs), efficiency enhancements, and network refinement through active learning. To assist customers in developing a distinct and replicable analysis pipeline utilizing a graphical processing unit (GPU).

Ensuring the right amount of challenge in a game is crucial for maintaining player engagement. Dynamic Difficulty Adjustment (DDA) is a widely used method for enhancing player experience by automatically altering various features of the game. This paper examines the literature on processes used to adapt video game difficulty based on players' performance, emotions, or personality. To achieve this objective, we analyzed DDA research that utilized machine-learning methodologies, player modeling approaches, various data types to evaluate player states, testbed game genres, and applications. The data sources for this review consisted of journal and conference articles published until September 2022. The results indicate that the majority of research have demonstrated substantial impacts of DDA on factors such as pleasure, seamless experience, drive, involvement, and deep absorption. Furthermore, there has been a growing focus on incorporating machine-learning and player modeling approaches into the design of Dynamic Difficulty Adjustment (DDA) systems. Nevertheless, due to the escalating utilization of games in diverse fields, further investigation is necessary to have a deeper understanding of player preferences in order to effectively modify game characteristics. By performing additional research on players' cognitive traits, such as visual attention, working memory, and response time, it will be feasible to gain a deeper understanding of players' preferences.

Immersive video games offer a realistic learning environment for agriculture by imitating challenging real-life events. Nevertheless, there is a scarcity of actual information regarding their usefulness. This scoping review adheres to the PRISMA-ScR principles in order to provide a concise summary of the existing literature on serious video games used for agricultural learning. The review aims to identify research trends and pinpoint areas where further investigation is needed. We conducted a comprehensive search across nine significant research databases to identify publications on the use of serious video games for agricultural learning. The search was limited to papers published from January 2000 to July 2022. Two autonomous reviewers performed screening, data extraction, and synthesized the acquired data using a narrative technique. Out of the 3,297 papers initially found, only 0.58% (n = 19) were selected for the review. The majority of the games that received reviews were launched within the past five years, with a significant focus on the mobile platform. Their preferred method was a simulation-based technique, utilizing 2-D graphics and specifically tailored for individual players. The primary audience for these games is students, with a specific emphasis on agricultural production and sustainable agriculture. The studies frequently lacked specificity in their treatment of educational theories. The evaluation protocols largely focused on conducting pilot studies that emphasized the improvement of user experience and knowledge. The studies generally showed positive outcomes, including enhanced user experiences, increased knowledge, and changes in attitude and behavior. This study emphasizes the progress made in utilizing serious video games for agricultural education over a span of 20 years. Nevertheless, it emphasizes the necessity for more investigation into the influence of game components on user experience and efficacy. It is crucial to develop games that cater to minority players and address unique agricultural concerns. Additionally, it is important to improve the theoretical underpinnings and learning methodologies in this field. Thorough research designs are crucial for evaluating the effectiveness of games across short, medium, and extended periods of time.

As education and technology have advanced, teachers have come to recognize that games should have a purpose beyond just entertainment for children. Utilizing gamification in educational materials can lead to improved teaching results. Nevertheless, new resources that are connected to the topic are consistently appearing on the internet. A personalized recommendation strategy for educational video game resources based on knowledge graphs is developed to enhance the quality of recommendations. Firstly, feature extraction is carried out in an alternating manner on both the user side and the item side. Next, a hidden Markov model is shown using the dual end neighbor technique as a foundation. Given the user's temporal characteristics, the model is optimized. The optimized model considers both the enduring and immediate preferences of users and extracts their latent preferences. By doing experimental analysis, the hit rate index value of the designed model achieves a score of 0.7989. The broken line has a normalized cumulative gain value of 0.6045. The satisfaction rate for the suggestion of this model exceeds 89%. The duration of the operating process is 0.2863 seconds. The developed methodology may successfully achieve effective and top-notch suggestion of instructional video game resources, offering consumers a more convenient and efficient online experience.

The metaverse has arisen as a captivating new framework for the interaction between humans and computers, as well as for virtual collaboration. This study provides a thorough examination of the metaverse to fill the void in current research, where there is a scarcity of a survey that evaluates the characteristics of the metaverse and its fundamental components from a human-centered viewpoint. Initially, we compile a precise description of the metaverse by analyzing relevant literature and identifying its essential characteristics. Next, we present a comprehensive framework that covers the characteristics of metaverses, the technologies used for infrastructure, and the technologies used for input/output. This framework enables the creation of multi-sensory human-computer interaction and may be applied in various disciplines. This framework provides comprehensive explanations of its components, delivering valuable insights into the inherent characteristics of metaverses and the current technological preparedness level. Using this extensive research, we identify significant unresolved issues and suggest potential avenues that require additional exploration and investigation. This review offers crucial insights and acts as a vital resource for metaverse developers and academics aiming to progress this revolutionary new medium. It clarifies the goal for the metaverse and outlines the necessary building pieces to bring it to life.

In recent years, the advent of artificial intelligence (AI), machine learning (ML), and deep learning (DL) technologies has brought about considerable changes in the lifestyle of modern society. Artificial intelligence is a complex technology that encompasses multiple dimensions and includes advanced algorithms, machine learning (ML), and deep learning (DL). In the near future, AI, ML, and DL are anticipated to offer automated gadgets to ophthalmologists, enabling them to diagnose ocular problems early and administer prompt therapy. Indeed, artificial intelligence (AI), machine learning (ML), and deep learning (DL) have been employed in the field of ophthalmology to authenticate disease diagnoses, interpret images, conduct corneal topographic mapping, and calculate intraocular lens measurements. Diabetic retinopathy (DR), age-related macular degeneration (AMD), and glaucoma are the three predominant factors leading to permanent loss of vision worldwide. Ophthalmic imaging offers a means to diagnose and objectively monitor the advancement of several pathologies, such as diabetic retinopathy (DR), age-related macular degeneration (AMD), glaucoma, and other ophthalmic problems. In ophthalmic practice, there are two diagnostic imaging technologies commonly used: fundus digital photography and optical coherence tomography (OCT). It is worth mentioning that OCT has emerged as the predominant imaging technique in ophthalmology practices in developed countries. The increasing need for such images is driven by changes in population demographics and lifestyle, the lengthening of average lifespan, and the shifting prevalence of chronic disorders such as obesity, diabetes, DR, AMD, and glaucoma. Moreover, the scarcity of retina specialists and adequately educated human graders is a significant challenge in numerous nations. Therefore, due to the ongoing trends in population increase, it is unavoidable that the analysis of such photos will require a significant amount of time, financial resources, and is susceptible to mistakes made by humans. Hence, the identification and management of diabetic retinopathy (DR), age-related macular degeneration (AMD), glaucoma, and other eye illnesses using unmanned automated systems would be unavoidable in the coming years. We present a comprehensive analysis of how the current approaches of Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL) can potentially affect the early identification and management of diseases such as Diabetic Retinopathy (DR), Age-related Macular Degeneration (AMD), glaucoma, and other eye-related conditions.

Thanks to the remarkable progress in data aggregation and deep learning algorithms, artificial intelligence (AI) and machine learning (ML) are on the verge of revolutionizing the field of medicine. The discipline of orthopedics is well-suited to use the potential of big data, which can offer valuable insights to enhance various aspects of care delivered by orthopedic surgeons. This review aims to assess the latest and innovative literature on machine learning (ML) in the field of orthopedics and its potential implications for the future of musculoskeletal care.

Industry 4.0 encompasses concepts and technology that promote the continuous growth of both small-scale and large-scale economic entities through the principles of interconnectedness, digitalization, and automation. Artificial intelligence is considered a significant facilitator for Smart Logistics and Smart Production activities in this particular environment. This study conducts a comprehensive analysis of the scientific literature on artificial intelligence, machine learning, and deep learning as they relate to the management of Smart Logistics in industrial businesses. In addition, the authors of the systematic literature review present a conceptual framework that offers valuable implications derived from recent research findings and insights. This framework can be used to guide and initiate future research endeavors in the field of artificial intelligence (AI), machine learning (ML), and deep learning (DL) in the context of Smart Logistics.

Machine learning (ML) is a branch of artificial intelligence that has the potential to revolutionize the twenty-first century. The rapid and recent advancements in both the design and algorithms of computers, as well as the expansion of datasets, have resulted in a significant increase in computer proficiency across various sectors. These encompass tasks such as operating a car, translating languages, developing chatbots, and achieving superior performance in complex board games like Go. In this article, we will examine the basic principles and algorithms that underlie machine learning and emphasize particular methods for learning and optimization. Next, we provide a concise overview of the various uses of machine learning in the field of medicine. Specifically, we present recent advancements in diagnostic accuracy and limitations in the areas of dermatology, radiology, pathology, and general microscopy.

In recent years, the fields of sophisticated robotics have been transformed by Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL). Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL) are revolutionizing the domain of sophisticated robotics, enhancing the intelligence, efficiency, and adaptability of robots in intricate tasks and challenging settings. AI, ML, and DL are utilized in advanced robotics for various purposes such as autonomous navigation, object recognition and manipulation, natural language processing, and predictive maintenance. These technologies are likewise utilized in the advancement of collaborative robots (cobots) that can operate alongside humans and adjust to dynamic situations and tasks. Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL) can be employed in sophisticated transportation systems to enhance passenger safety, optimize operational efficiency, and offer convenience to both passengers and transportation businesses. The utilization of AI, ML, and DL in manufacturing assembly robots is crucial as it enhances their efficiency, safety, and intelligence. Moreover, they possess a diverse array of uses in aviation administration, aiding airlines in enhancing efficiency, diminishing expenses, and elevating client happiness. Furthermore, artificial intelligence (AI), machine learning (ML), and deep learning (DL) can assist taxi firms in enhancing their services by offering improved efficiency and safety to clients. The study provides a comprehensive analysis of the latest advancements in Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL) inside sophisticated robotics systems. It also explores the diverse range of uses these systems have in modifying robots. Additional research is recommended to explore the utilization of artificial intelligence (AI), machine learning (ML), and deep learning (DL) in advanced robotics systems. This will help bridge the gaps between current studies and published publications. By examining the utilization of artificial intelligence (AI), machine learning (ML), and deep learning (DL) in sophisticated robotic systems, it becomes feasible to analyze and adjust the capabilities of advanced robots across different applications with the aim of improving productivity in advanced robotic industries.

Artificial intelligence and machine learning have made significant advancements in commercial applications, including in picture recognition, natural speech processing, language translation, textual analysis, and self-learning. Progress in these areas has previously been slow, causing these talents to be closely associated with intelligence. Nevertheless, these commercial advancements have excelled only in single-task applications where it is acceptable to have imprecise outputs and occasional blatant errors. Anesthesiology is distinct in its approach and methodology. The concept encompasses the need for utmost dependability and a demanding sequence of understanding, physical execution, and reaction, rather than a solitary mental process. This paper provides a concise explanation of artificial intelligence and machine learning for anesthesiologists, focusing on how decision-making processes might arise from basic mathematical equations. The introduction of relevant clinical questions serves to exemplify how machine learning might potentially aid in their resolution, potentially ushering anesthesiology into an era of machine-assisted discovery.

Adaptation and innovation are crucial to the manufacturing industry. This advancement is expected to result in the implementation of environmentally-friendly production methods through the utilization of innovative technologies. In order to advance sustainability, the implementation of smart industrial technologies necessitates a worldwide outlook. Thanks to extensive research in the field of artificial intelligence (AI), several AI-based approaches, including machine learning, have been successfully used in the industry to promote sustainable production. The objective of this research was to thoroughly assess the scientific literature on the use of artificial intelligence and machine learning (ML) in the industry. Indeed, the advent of Industry 4.0 has positioned artificial intelligence and machine learning as the primary catalysts behind the transformative smart factory revolution. The objective of this review was to categorize the literature based on many factors such as publication year, authors, scientific sector, nation, institution, and keywords. The analysis was conducted utilizing the Web of Science and SCOPUS database. In addition, the researchers utilized UCINET and NVivo 12 software to carry out the tasks. A systematic analysis of empirical studies on machine learning (ML) and artificial intelligence (AI) published in the past century was conducted to examine the progression of the subject before and after the advent of Industry 4.0, spanning from 1999 to the present. A total of eighty-two papers were examined and categorized. One notable finding is the higher quantity of publications produced by the United States, which has seen a surge in interest following the emergence of Industry 4.0.

Autoimmune illnesses are long-lasting, complex ailments that include multiple factors. Machine learning (ML), a subset of artificial intelligence, enables the identification of patterns in patient data. These patterns can be utilized to forecast patient outcomes, leading to enhanced clinical care. In this study, we examined the application of machine learning techniques to tackle clinical issues related to autoimmune diseases. A systematic review was performed utilizing the MEDLINE, Embase, and Computers and Applied Sciences Complete databases. The publications considered relevant were those that contained the terms "machine learning" or "artificial intelligence" along with the search term(s) related to autoimmune illnesses in their title, abstract, or key phrases. Exclusion criteria: studies written in languages other than English, studies lacking real human patient data, studies published before 2001, studies that were not subjected to peer review, studies focusing on comorbidity research and review papers unrelated to autoimmune diseases. A total of 169 out of 702 studies satisfied the criteria for inclusion. Support vector machines and random forests were the predominant machine learning techniques employed. The most prevalent ML models utilized data pertaining to multiple sclerosis, rheumatoid arthritis, and inflammatory bowel disease. Only a tiny fraction of research (7.7% or 13 out of 169) incorporated multiple data types during the modeling procedure. 8.3% of the studies (14 out of 169) used cross-validation and a separate testing set to evaluate their models, which helps ensure more reliable results. It would be advantageous for the field to implement a standard procedure of validating, cross-validating, and independently testing machine learning models. Several models demonstrated excellent prediction performance in straightforward circumstances, such as classifying cases and controls. Future advancements may allow for the development of more sophisticated predictive models by integrating numerous forms of data.

Drug design and development is a crucial field of study for pharmaceutical businesses and chemical researchers. Nevertheless, the obstacles of low effectiveness, inaccurate distribution, lengthy process, and exorbitant expenses provide significant problems that affect the development and exploration of new drugs. In addition, the drug discovery pipeline is hindered by the inclusion of intricate and extensive data from genomes, proteomics, microarray data, and clinical trials. Artificial intelligence and machine learning are essential in the process of drug discovery and development. Artificial neural networks and deep learning algorithms have revolutionized the field. Machine learning and deep learning algorithms have been utilized in various drug discovery procedures, including 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. The historical evidence bolsters the integration of artificial intelligence and deep learning in this domain. In addition, advanced data mining, curation, and management strategies have played a crucial role in supporting the development of new modeling algorithms. To summarize, the progress made in artificial intelligence and deep learning presents a promising chance to enhance the rational medication design and discovery process, ultimately benefiting humanity.

Artificial intelligence (AI) has gained significant attention due to groundbreaking technological advancements and remarkable experimental outcomes, particularly in the domain of picture analysis and processing. Within the field of medicine, several specializations such as radiology, pathology, and oncology have recognized the significance of utilizing images. As a result, substantial research and development efforts have been dedicated to harnessing the capabilities of artificial intelligence (AI) for therapeutic purposes. As AI becomes increasingly common in medical imaging analytic activities like diagnosis, segmentation, and classification, the safe and efficient use of clinical AI applications depends, in part, on well-informed practitioners. The objective of this review is to provide an overview of the fundamental technological foundations of artificial intelligence (AI), together with the most advanced machine learning techniques and their utilization in the field of medical imaging. Furthermore, we delve into the emerging patterns and prospective avenues for future investigation. This text aims to elucidate the increasing prevalence of AI approaches in medical image analysis workflows and their potential to facilitate the adoption of AI-based solutions in clinical settings.