Chapter 8
Role of Artificial Intelligence and IoT in Environmental Monitoring—A Survey

S. Karkuzhali and S. Senthilkumar

Abstract According to a World Health Organization (WHO) survey, 97 percent of cities in low- and middle-income countries with over 100,000 inhabitants do not comply with WHO recommendations on air quality. Air pollution can lead to chronic and respiratory problems, such as asthma, and fatal diseases, such as lung cancer. Internet of Things (IoT) and artificial intelligence (AI) will provide tools for real-time monitoring of air pollution. The tools can identify sources of air pollution quickly and accurately. Consequently, nations around the world have raised their directions in titles of monitoring as well as regulating and handling consequent infection like COVID-19. Over the last several years, people have developed dramatically with the rush of the manufacturing revolt in which a new production of wireless communication facilitates ubiquitous connectivity among things. The recent advancement of the IoT and AI plays the major role in various enterprises. IoT is regularly perceived as practical things, broadly distributed, with low repository ability and processing potential, with the purpose of enhancing authenticity, enforcement, and preservation of the smart living and its foundations. The paper directs to a significant criterion change of how to monitor, sense, and track dynamic phenomena in real time in the environment. From this review, it is visible that there are remaining a few exciting opportunities and challenges on improvement and deployment of IoT and AI algorithms for smart and dynamic environmental monitoring.

Keywords Artificial intelligence (AI) · Internet of Things (IoT) · Environmental monitoring · Pollution · Environmental protection

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8.1 Introduction

Traffic-related air contamination has been a genuine worry among strategy creators and general society because of its physiological and natural effects. An early admonition framework dependent on precise estimating apparatuses must along these lines be actualized to bypass the unfavorable impacts of introduction to significant air contaminations. The multi layer percptron network is used to monitor the Air pollution and meteorological information over a two-year period from an observing site in Marylebone Road, Central London, to foresee side of the road focus estimations of NO_2 24 h ahead [1]. Ongoing years have seen an expanding enthusiasm for Demand Response (DR) as a way to give adaptability and henceforth improve the unwavering quality of vitality frameworks in a savvy way. The artificial intelligence (AI) and machine learning (ML) plays a vital role in providing solutions for DR. Computer-based intelligence techniques can be utilized to handle different challenges, running from choosing the ideal arrangement of buyers to react, learning their characteristics and inclinations, dynamic evaluating, planning and control of gadgets, and figuring out how to boost members in the DR plans and how to compensate them in a reasonable and financially productive manner [2].

8.2 Literature Review

The advancing period of globalization and industrialization has brought upon its result in mask of its different associative harmful components which have maladjusted the harmony of the earth. The ill-advised treatment of such components has come about into the pollution of essential components of biological system which serve the premise to continue human life. This is one of the most urgent issues relating to endurance of agreeable conjunction among human and nature. The chief advance to figure the arrangement is deciding the degree of harm and dependent on it taking preventive and destruction measures. The developing innovation of Internet of Things (IoT) gives an extent of part possible models for the above expressed purposes [3]. The stage breaks the current latent strategy and gathers information progressively through IoT sensor based on 5G remote system. So as to forestall phony and altering of gathered information, we use blockchain innovation to encode what's more, transmit to cloud and give continuous air contamination list estimation stage. You can separate innovation escalated information through edge and distributed computing [4]. IoT gives a broad incorporated system to human services to battle with COVID-19 pandemic. Every clinical gadget is associated to the Web, and during any basic circumstance, it naturally passes on a message to the clinical staff [5].

Savvy producing is basic in improving the nature of the procedure business. In keen assembling, there is a pattern to consolidate various types of new-age data

advancements into process safety investigation, well-being, and ecological guidelines. Rising data innovations, for example, man-made consciousness (AI), are very encouraging as a methods for defeating these challenges [6, 7].

Liu et al. (2020) used to review various algorithms in AI, machine learning, and deep learning in the lack of irrigation and water management in agriculture [8].

Nourani et al. (2019) discussed that vehicular traffic clamor is the fundamental wellspring of commotion contamination in significant urban areas around the world [9].

Shafiq et al. (2020) proposed another system model and a crossover calculation to settle this issue. Right off the bat BoT-IoT recognizable proof informational collection is applied, and its 44 viable highlights are chosen from various highlights for the AI calculation. To discover which ML calculation is powerful and ought to be utilized to choose for IoT oddity and interruption traffic recognizable proof, a bijective delicate set approach and the calculation are applied. At that point, we applied the proposed calculation dependent on bijective delicate set methodology. The author uses 5 different machine learning approaches and calculated the performance measures for all the five approches out of them using the best one [10].

Nishant et al. (2020) reviewed that AI offers a freeing chance to fabricate frameworks of insight that will create information required for saving life. Be that as it may, for AI to convey even a small amount of the possible advantages for manageability, information system (IS) research must investigate approaches to go around restrictions and conceptualize novel approaches to use AI. Artificial intelligence cannot be a panacea for all our complex natural maintainability issues. Generally, new advancements have vowed to tackle quick issues, yet in time demonstrated impractical. In this manner, we must perceive the confinements of this development, investigate approaches to go around a few imperatives, and conceptualize novel approaches to use AI [11].

Goralski et al. (2020) examination consolidates the viewpoints of business system and open approach to investigate the effects of AI on practical advancement with a particular concentrate on the progression of the SDGs. It likewise draws a few exercises on administrative learning and authority improvement for worldwide maintainability. Simulated intelligence presents a wide exhibit of uses that can fill in as distinct advantages for the quest for economical turn of events, which will include numerous entertainers from various nations, societies, and divisions. Through the UN Global Compact, organizations around the globe have been called to assume a job in accomplishing the Sustainable Development Goals (SDGs). As should be obvious in the three contextual analyses featured above, AI can be an amazing empowering agent of the worldwide exertion to advance monetary turn of events and simultaneously economically address the effect of our creation what's more, utilization on our social orders, administration frameworks, and nature. The advances made by the trendsetters, activists, and worldwide victors of advancement utilizing AI-empowered applications put them at the wilderness of the reasonable improvement work. Their advancements have improved effectiveness of ventures and areas, assisted with moderating valuable, non-sustainable assets, diffuse information and skill, connect the worldwide holes in assets and innovation, and assisted with fashioning compelling

multi-area associations (governments, private part, respectful society, and residents) that add to worldwide supportability.

As we enter the Age of Sustainable Development, in which the 17 Sustainable Development Goals (SDGs) are defining the development agenda for the nations of the world, AI is also rapidly opening up a new frontier in the fields of business, corporate practices, and governmental policy. The intelligence of machines and robotics with deep learning capabilities is already solving cognitive problems commonly associated with human intelligence. They run from aloofness, latency, and the obliviousness of individuals and the absence of assets also, political will of governments, to the quest for momentary benefit by enterprises and the limited focal point of restricted national interests by the country states to the disregard of the worldwide basic great. The battle for worldwide maintainability and the eventual fate of humankind on the planet will require a dedication from a scope of open and private segment associations, national governments and common society, and all the assets they can gather. The appearance of SDGs comprises an extremely noteworthy business open door for the early AI industry. Man-made intelligence can create information for additional canny focusing of mediation (as on account of Plant Village), diminish waste and misfortunes underway and utilization (for example, in Smart Water Management), make new applications that will change whole enterprises and callings, and give the vital upgrades in availability and cost decreases (Clean Water AI) that brings the advantages of the quick pace of mechanical improvement to numerous individuals around the world. These SDG-propelling advancements and activities, in any case, may must be embraced and systematized at an expense and bear a few likely dangers. Computer-based intelligence is a twofold edged blade. It can accompany multifaceted entanglements and complex issues that must be thoroughly examined and figured out how to contain its negative and unintended outcomes. Its invigorating and supportability advancing applications may likewise be utilized for evil, in exercises that will intensify the most exceedingly awful effects of an unnatural weather change, contamination, unbridled utilization, what's more, untrustworthy creation strategies to take care of the way of life of ceaseless development endemic to the entrepreneur worldwide financial request of today. As we find in the three cases above, even probably the most straightforward and minimal effort developments would require motivating forces and organizations between governments, partnerships, networks, laborers, businesses, and the scholarly community to embrace, oversee also, and continue these transformative applications. [12].

Mohanta et al. (2020) portrayed an outline of the IoT innovation and the zone of its application. The essential security issue CIA (Confidentiality, Integrity and Availability) and layer-wise issues are recognized [13].

Moazamnia et al. (2020) developed AI-based displaying procedure that is a two-level learning process; at Levels 1 and 2, it give apparatuses to plan the SWI weakness of the examination region. Model exhibitions in the paper are considered utilizing RMSE and R2 measurements, where the models at Level 1 are seen as fit-for-reason and the SVM at Level 2 is improved especially as for the decreased size of dissipates in the outcomes. Assessing the outcome and groundwater tests by Piper outline affirms the correspondence of SWI status with powerlessness list [14].

Díaz-Alcaide et al. (2019) discussed about fecal contamination an inexorably significant danger to groundwater supplies in some low-pay districts of the world. Thirteen machine inclining classifiers, including diverse measurable calculations, case-based students, and tree-based models, were utilized to decide the spatial dissemination of fecal contamination according to five informative factors (restroom thickness, separation to the nearest restroom, borehole yield, water table profundity, and populace thickness). The best performing classifiers, chosen on test scores, were then used to create prescient guides. Irregular woodland and strategic relapse rendered forecast scores for fecal contamination in abundance of 0.90. Multilayer perceptrons, bolster vector machines, and quadratic discriminant investigations additionally demonstrated proficient at guaging fecal contamination. Outfit planning shows that 30–50 m cradles around household wells might be adequate to forestall defilement of local supplies in most cases. This shows AI may give an adaptable methodological option in contrast to customary Darcian approaches. Then again, the down to earth troubles associated with looking after wellhead assurance zones recommend the need to actualize funneled water supplies [15].

Tung et al. (2020) review covers the model structure, input fluctuation, execution measurements, local speculation examination, and far reaching appraisals of AI model progress in stream quality exploration. Henceforth, this is profoundly accentuating the inclusion of AI model improvement which can manage missing information, ready to incorporate the highlights of a discovery model [16].

Shu et al. (2020) developed image recognition technology dependent on implanted innovation that has the attributes of high separation, high adequacy, and solid touch sense. It is of extraordinary criticalness for natural observing to utilize image recognition technology. Image recognition technology is to catch a similar situation by computerized camera and afterward store the got picture captured by PC [17].

Senthilkumar et al. (2020) proposed an inserted framework, where sensors gather the air quality data inside period time and send it over the mist hubs [18].

Zhao et al. (2020) presented an orderly survey of four parts of the use of man-made reasoning to wastewater treatment: innovation, economy, the executives, and wastewater reuse. At long last, we give points of view on the likely future bearings of new exploration wildernesses in the use of man-made brainpower in wastewater treatment plants that at the same time address toxin expulsion, cost decrease, water reuse, and the board challenges in complex reasonable applications [19].

Zahmatkesh et al. (2020) discussed about fog computing that can act as a link between IoT smart devices and cloud data centers in order to provide services that have better delay performance [20].

Sharma et al. (2020) presented a WSN and IoT-based stage for the discovery of flames at a beginning phase. Remote sensor arrange has been effectively actualized utilizing sense nut equipment stage. The sensor hubs are conveyed in an outside situation for gathering and examination of constant information. Information gathered through the sensor hubs is put away on the cloud for investigation. A few plots have been planned utilizing the ThingSpeak cloud application for smoke, temperature, mugginess, and light power. The framework is prepared to do detecting different ecological boundaries and effective in the identification of an occasion, by breaking

down constant information. A fire discovery framework is planned dependent on the cloud stage and IoT gadgets [21].

Abdallah et al. (2020) orderly survey concentrated on evaluating the different AI models utilized in SWM applications, extricated from 85 examinations distributed somewhere in the range of 2004 and 2019. The presentation of AI algorithms was looked at, and the qualities and constraints of AI applications in squander the executives were examined [22].

Cabaneros et al. (2019) assessed air pollution by multilayer perceptron. By far, most of the distinguished works used meteorological and source discharge indicators only. Besides, impromptu methodologies are seen as dominatingly utilized for deciding ideal model indicators, proper information subsets, and the ideal model structure. Multilayer perceptron and gathering type models are overwhelmingly actualized. In general, the discoveries feature the need for creating deliberate conventions for growing incredible ANN models [23].

Elkiran et al. (2019) used three single Artificial Intelligence (AI) based models i.e., Back Propagation Neural Network(BPNN), Adaptive Neuro Fuzzy Inference System (ANFIS), Support Vector Machine (SVM) and a linear AutoRegressive Integrated Moving Average (ARIMA) model as well as three different ensemble techniques i.e., Simple average ensemble (SAE), Weighted Average Ensemble (WAE) and Neural Network Ensemble (NNE) are applied for single and multi-step ahead modeling of dissolve oxygen (DO) in the Yamuna River, India [24].

Fan et al. (2018) performed survey that depicts the essentials, preferences, and constraints of AI instruments. Counterfeit neural systems (ANNs) are the AI apparatuses every now and again embraced to foresee the contamination evacuation forms as a result of their capacities of self-learning and self-adjusting, while hereditary calculation (GA) and molecule swarm improvement (PSO) are likewise helpful AI procedures in effective quest for the worldwide optima [25].

Kaab et al. (2019) used AI for determining energy and environmental impacts. The vitality utilization and yield vitality age for sugarcane creation in planted homesteads are 172,856.14 MJ ha^{-1} and 120,000 MJ ha^{-1}, respectively, while, in ratoon ranches, the relating esteems are 122,801.15 MJ ha^{-1} and 98,850 MJ ha^{-1}, individually [26].

Kalia et al. (2020) recommended compact gadget which is skilled to check and measure the air quality and particulate matter concentration in understanding ecological boundary like encompassing temperature, dampness, environmental weight, and dew point [27].

Wang et al. (2019) investigation, a ANN called the incorporated long momentary memory arrange (LSTM), utilizing cross-connection and affiliation rules (a priori), was used to distinguish the qualities of water poisons and follow modern point wellsprings of contaminations. Water quality observing information from Shandong Province, China, was utilized to check the relevance of the man-made reasoning framework utilizing a cross-connection technique to build up a water quality cross-relationship map [28]. Wang et al. (2020) give a scientific classification examination of the current solar power forecasting determining models dependent on AI calculations. Scientific classification is a procedure of efficiently partitioning sun

oriented vitality expectation techniques, analyzers, and forecast systems into a few classifications dependent on their disparities and likenesses [29].

Zhao et al. (2019) built up a wind energy decision system in light of multitude insight improvement, which incorporates two modules: wind vitality appraisal and wind speed anticipating. In the breeze vitality evaluation module, the boundaries of the Weibull dispersion were enhanced by utilizing a numerous multitude knowledge advancement calculation, and the ideal Weibull dispersion was gotten [30].

Kishorebabu et al. (2020) secure distinctive ecological data utilizing the various sensors and push the information to the site page or as SMS. The experiments were conducted for 15 days in June 2018 and changes in climatic conditions of Hyderabad region were studied and information was handed over to local farmers in terms of indica-tors which can be used as an assist to decide which crop (cotton, jowar, redgram) has to be cultivated/reaped. The result of the tests was summarized, and data about the earth is given to ranchers of Hyderabad district who utilized the information as a help to develop/procure provincial yields, for example, Cotton, Jowar, Corn, and Red Gram. The curiosity of the strategy is that it presented two checks (downpour and wind) with information approved utilizing meteorologist. The framework is an information assortment model, gathers information, and deciphers a marker to the ranchers that causes them in their yield. The accuracy of the framework is consistently a little concerned, and a significant level information examination must be performed to connect information between rancher's harvest and sensor information [31]. Tastan et al. (2019) developed an IoT device for monitoring air quality checking [32].

Karar et al. (2020) introduced another versatile application, to be specific GASDUINO to permit the clients to quantify and characterize the degree of the air contamination utilizing the Internet of Things (IoT) effectively [33].

Parmar et al. (2017) utilize minimal effort air quality observing hubs which include minimal effort semiconductor gas sensor with Wi-Fi modules. This framework measures centralizations of gases which utilize semiconductor sensors. The sensors will accumulate the information of different natural boundaries and give it to Raspberry Pi which go about as a base station. Acknowledgment of information accumulated by sensors is shown on Raspberry Pi 3-based Webserver. A MEAN stack is created to show information over site. The basic part of proposed work is to give minimal effort framework to empower the information assortment and scattering to all partners [34].

Geetha et al. (2016) presented a nitty gritty diagram of ongoing works completed in the field of shrewd water quality checking [35].

Singh et al. (2018) comprised utilizing different sensors and IoT devices air quality monitoring [36].

Ejaz et al. (2019) describe the idea of the keen city that was acquainted as the possible arrangement with the challenges made by urbanization with perplexing and exorbitant activities. The imagined objective of keen city is to be savvy, wise, and independent with convenience giving better personal satisfaction. Most definitions for brilliant city include the utilization of data and correspondence advances (ICTs) to improve the nature of urban existence with diminished expense and asset utilization. As of late, ICT union with the IoT has been successfully abused to furnish numerous

novel highlights with least human intercession in brilliant urban communities. This book portrays various parts of IoT for shrewd urban areas including sensor advances, correspondence innovations, large information examination, and security. The book is sorted out into five sections that are depicted underneath. IoT offers savvy answers for urban areas as far as administration, financial development, natural manageability, personal satisfaction, transportation, force, and water utilization [37].

Blessy Evangelin et al. (2019) made the created air quality checking and perception framework precisely estimated the grouping of poisons carbon monoxide, carbon dioxide, smoke and residue in climate. The sensor has been composed with IoT structure which has capably been used to evaluate and screen the pollutions ceaselessly. This framework beats the issue of contamination observing, wellbeing checking, vocation estimation, supportability evaluations and estimation related fields. The data's are normally put away in the database; this information can be used by the specialists to take brief exercises. It also causes the run of the mill people to consider the proportion of defilements in their overall region and to take control measures. This is an incredible structure which is useful in organizations due to the growing pollution on account of addition in adventures. This structure is straightforward, and cost of the thing is sensible. This structure is checking only five boundaries and from now on can be stretched out by considering more boundaries that reason the tainting especially by the endeavors [38].

Lai et al. (2019) build up a minimal effort air quality checking and expectation framework by means of Raspberry Pi, which is an edge gadget to run the Kalman filter calculation [39].

Malche et al. (2019) developed IoT-based environmental monitoring system. Consequently, so as to keep away from well-being dangers because of the dirtied condition, it is basic to screen its state. In the present situation, monitoring of data on the state of the environment is not a well-researched field. Along these lines, it is required to build up a framework which can proficiently gather and dissect information on the earth so as to maintain a strategic distance from any likely dangers. The Internet is one of the vital and significant apparatuses which can be utilized to build up a framework equipped for observing and sharing data on natural contamination. This examination proposes IoT-based condition observing and ready framework. The proposed framework screens the district explicit condition for air quality, what's more, stable contamination, while likewise encouraging secure information transmission over the system which explains the security issues in IoT framework [40].

Mokrani et al. (2019) reviewed a testing of examination papers about the utilization of IOT frameworks for contamination and air quality observing, introduced the significant toxins and the related sicknesses, and set up a few groupings. In addition, a basic part of an examination business was introduced related to the effect of poisons on well-being. Additionally, we talked about the surveyed papers what's more, featured a few disadvantages. Be that as it may, this audit is not thorough: Some difficult perspectives, for example, security and protection, flexibility, and different classifications about vitality utilization recipes, or client suggestion are not talked about here and are arranged in an all-inclusive rendition of this paper as well as some

measurable investigations. At the light of the overviewed papers, a few difficulties are brought up in the last segments. They speak to promising issues of existing frameworks that should be tended to and issues for expected logical coordinated efforts and exploration headings [41].

Kumar et al. (2019) introduced IoT device for air quality monitoring. IoT use smart devices and internet to provide innovative solutions to various chal-lenges and issues related to various business, governmental and public/private industries across the world [42].

Kim et al. (2018) sum up the most recent exploration on sensor-based home IoT and concentrate on indoor air quality, what's more, specialized examinations on arbitrary information age. Moreover, they build up an air quality improvement model that can be promptly applied to the market by obtaining introductory investigative information and building foundations utilizing range/thickness investigation and the regular cubic spline strategy. Likewise, they produce related information dependent on client social qualities. They incorporate the rationale into the current home IoT framework to empower clients to effectively get to the framework through the Web or portable applications. They expect that the current presentation of a useful promoting application strategy will contribute to upgrade the development of the home IoT market. Moreover, they build up an air quality improvement model that can be promptly applied to the market by obtaining beginning logical information and building frameworks utilizing range/thickness investigation and the normal cubic spline strategy. The author generate related data based on user behavioral values. They integrate the logic into the existing home IoT system to enable users to easily access the system through the Web or mobile applications. They incorporate the rationale into the current home IoT framework to empower clients to effectively get to the framework through the Web or versatile applications. It is expected that the current presentation of a reasonable promoting application strategy will contribute to upgrade the extension of the home IoT showcase [43].

Fang et al. (2014) present a novel IIS that joins Internet of Things (IoT), distributed computing, geoinformatics [remote detecting (RS), geological data framework (GIS), and worldwide situating framework (GPS)], and e-Science for ecological observing and the board, with a contextual investigation on territorial environmental change and its biological impacts [44].

Elmustafa et al. (2019) discussed that savvy condition sensors incorporated with IoT innovation can give another idea in following, detecting, and observing objects of condition. This can give potential advantages paving the way to the chance of accomplishing a green world and a manageable way of life. IoT permits ecological sensors to associate with different frameworks such advanced mobile phones through Bluetooth or Wi-Fi to send tremendous measures of information to the system and can permit us to have a superior comprehension of our environmental factors and find appropriate answers for now natural issues. In this audit article, we will give a short origination of condition regions of study dependent on IoT innovation and examine the defense behind utilizing IoT in the field of ecological examinations. Additionally, we will examine many proposed utilizations of ecological exploration dependent on IoT [45].

Wu et al. (2019) presented a low-power wearable sensor hub for natural Internet of Things (IoT) applications, framing remote sensor organize (WSN) in light of XBee. Natural information is checked by the wearable sensor hub and afterward transmitted to a distant cloud worker by means of WSN. The information is shown to approved clients through an online application situated in cloud worker. The trial results demonstrate that the introduced wearable sensor organize framework can screen natural conditions reliably. The creator presents a wearable IoT remote sensor organize for condition checking. Utilizing remote sensor arrange for wearable ecological observing is talked about. Low force procedures, programming, and detecting ecological boundaries are portrayed. The proposed work gives a powerful and dependable answer for long haul observing that presents numerous open doors in security-related checking applications [46].

Zhao et al. (2018) concentrated on the issue of urban air contamination which is exceptionally connected with the exorbitant specific issue noticeable all around; the work builds up an ongoing remote sensor framework mimicking the situation of a green rooftop that screens the PM 2.5 and other related sensor boundaries, for example, relative mugginess, temperature, and wind speed which depend on the IEEE 802.11b/g/n principles. The principle objective of the methodology is to legitimize the security, extensibility, what's more, information exactness of the model which was structured what's more, tried. Considering the way that genuine utilizations of green rooftops in the city require different simultaneous gadgets on the Web, the exhibition in the observing framework was extravagantly assessed and upgraded for simultaneous associations. What's more, we did various examinations to inspect and assess the framework as far as key focuses by and large execution, idleness, and exactness of information. Additionally, by cautiously choosing the equipment parts just as programming arrangement, the arrangement is profoundly powerful and has a wide possible application [47] (Figs. 8.1, 8.2, 8.3, 8.4 and 8.5).

8.3 Discussion

This chapter surveys the work of many researchers to get a brief overview about the current implementation of automation in agriculture, diagnosis of COVID-19, pollution monitoring using IoT devices, AI, and ML. IoT devices are dynamic and have constrained capacity and handling abilities. In any case, these regular brought together mists have a few troubles, similar to high idleness and system disappointment. So as to illuminate explicit challenges, haze processing has been advanced as an expansion of the cloud, in spite of nearer to the IoT devices in which all information handling will be done at haze hubs, through lessening dormancy, especially for time-delicate applications.

The proposed framework has no limits on the establishment place. IoT cloud was utilized to look at air quality information and to deliver the information perceptions for the end user. When breaking down the air quality pattern and practically identical elective information, some interesting realities will unfurl it. Likely, long haul and

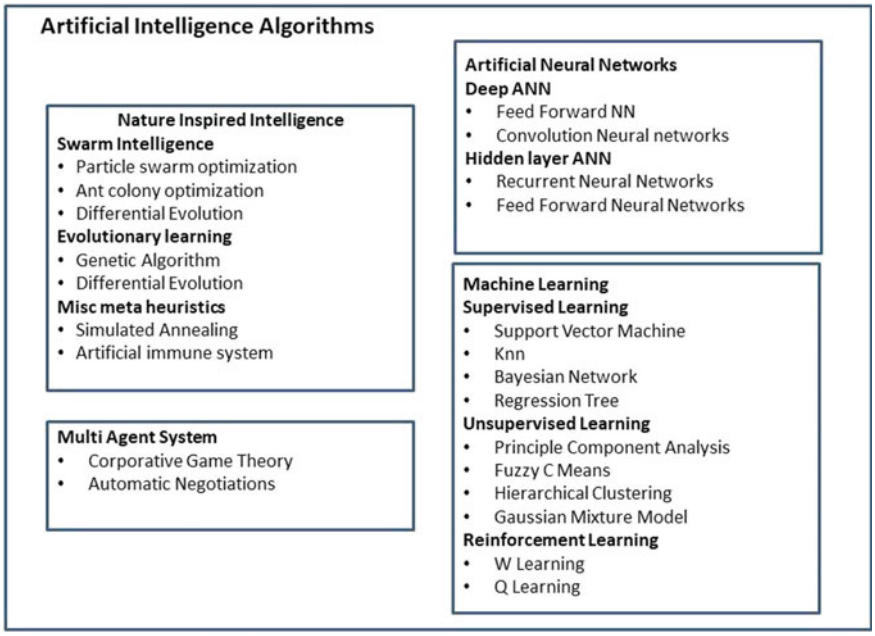

Fig. 8.1 Artificial intelligence algorithms used in diabetic retinopathy

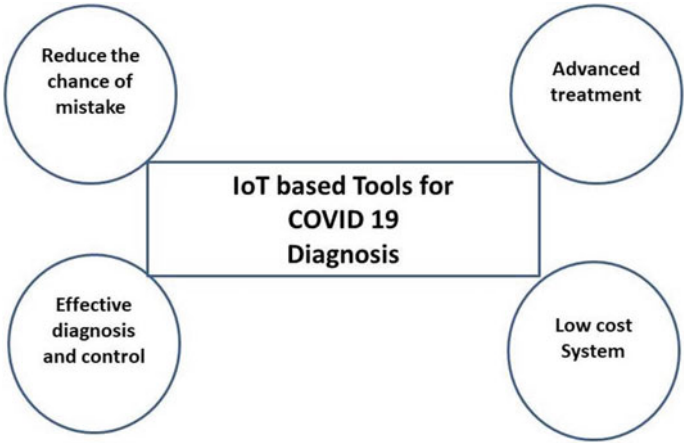

Fig. 8.2 Advantages of using IoT for COVID-19

huge scope air observing will altogether bolster us know air contamination and comprehend the procedure to take care of the issue of air contamination at any rate incompletely.

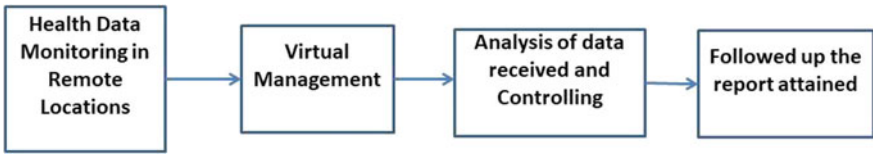

Fig. 8.3 Step-by-step process for detecting COVID-19 using IoT

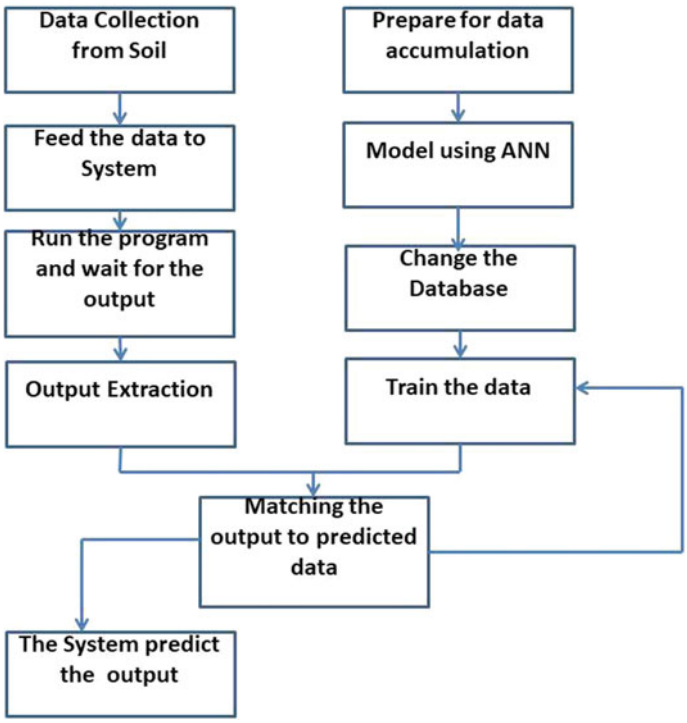

Fig. 8.4 AI-based crop predictor using smartphone

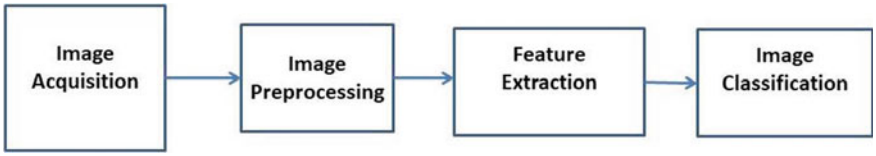

Fig. 8.5 Architecture of image recognition tool

8.4 Conclusion

Research activity in the field of environmental monitoring forecasted using IoT, AI, artificial neural networks (ANNs), and deep learning has increased dramatically in recent years. The discoveries of this audit likewise propose that more endeavors are coordinated toward the utilization of worldwide streamlining techniques in deciding the ideal model structure, as most of the distinguished papers done specially appointed methodologies and principally experimentation technique. This pattern may not be valuable to future modelers in the field of environmental pollution, estimating as specially appointed techniques offer restricted repeatability due to their case-explicit nature. Thus, there is a requirement for a more set up and precise convention for recognizing ideal model structures that takes into account a wide scope of model indicator yield elements.

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