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Smart Eye Technology: A tool for microorganism management

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Abstract - Microorganisms like viruses, bacteria and mosquito borne diseases like Zika, dengue, chikungunya, and yellow fever, malaria, filariasis, tularaemia, encephalitis and many others. are flourishing worldwide. These created a global challenge in the public health sector due to a sequence of diseases. One of the solutions of such cutting-edge situations is the knowledge of related microorganisms, their behaviour, impacts on living beings and other related information. Most of these assist in adopting preventive measures like social distancing, medicinal drug manufacturing, human displacement etc. for higher disease control management. The limitation of the human eye can be equipped with scientific tools like magnifying equipment, light diffraction techniques, and field variation to come across microorganisms even like small objects like viruses. The lack of spontaneous microorganism detection generation is a main reason for associated ailment unfolding like COVID-19. The technology advancement allows synthetic intelligence to handle hundreds of thousands of microorganism records quickly.

The human-AI interaction can assist the health management sector in careful balance among microorganism data and public health services to conquer any unpleasant situation. This work proposed integration of AI with detection strategies for microorganism population assessment and associated danger degree assessment. Here we have proposed smart eye technology – a low cost AI detection eyes for mosquitoes assessment for municipal workers. this could be prolonged to locate contagious diseases such as the COVID-19, flu, the common cold, Ebola, Hantavirus super spreader with some addition. The proposed detector behaves like a superhuman eye to accumulate big microorganism data at the surface and probably also assist in human infection detection. Their detection will decrease the possibilities of getting infected, infected individual segregation which now not handiest limits its spreading but additionally protects others. a machine vision system with AI detection is an innovative and low cost machine in comparison to all health costs. Most of these not only save life however also limit financial damages via higher microorganism management.

Key Words: Detector, Health management, Artificial Intelligence (AI), Smart Eye technology

1. INTRODUCTION

God has given living being eyes- a novel detection organ to receive and process visual information. Humans are capable of seeing very distant mega structures like the moon, stars, planets and also small objects like hair. On the other hand, it's astonishing that there is a range of things near us like germs, microorganisms… even residue bugs… which are surrounding us and undetectable. This eye limitation limits our small objects visibility without any external assistance. These invisible microorganisms are responsible for many human diseases. Rapid increase in the number of diseases also increases global concern for microorganism. This varies from non visible agents like viruses to visible agents like Mosquitoes. Some related infections are mild like Flu-the cold, Chickenpox and a couple of them are acute like dengue, herpes, and COVID-19. The contagious nature of a few can affect the respiratory system of the living object and raise alarm to humankind. Some studies [1,2] mark seasonal cyclicity as a ubiquitous feature of few such diseases, like -Flu outbreaks occur with cold winter, chickenpox outbreaks peak each spring, typhoid tends to peak during the summer. Mosquito-borne ailments like dengue are prospering around the world in summer. The conceivable arrangement is to utilize microorganism patterns as a precaution. The detection could also be a major step in this regard.

Experts accept that the unaided eye - a typical eye with ordinary vision and without the use of any external devices can see objects as little as about 0.1 millimeters [5]. The foremost minor things a person can ordinarily observe with the unaided eye are things like human hair, but its structure with a magnifying technology. The magnifying apparatus like microscopes which utilizes an exceptional focus or a mixture of focal points to twist light at an edge to make the size of the image that's sent to the eye. With the assistance of wonderful magnifying instruments, however, people can see unbelievably little objects difficult to determine with the unaided eye. Newly discovered- "microsphere nanoscope", a mix of the ordinary microscope with a mind-boggling gadget "transparent microsphere" to allow you to determine inside human cells and even examine live viruses for the first time ever [56]. Light behaves a kind of wave and its distortion helps in seeing things. Even with a typical microscope, it's extremely difficult to detect anything below the wavelength of sunshine that's only about half a micrometer - about 2000 millimeters. There are ways to undertake things within the sunshine meaning you will get slightly but that, using funny things called metamaterials, but they're rare. For much more magnification, one must use something with a smaller wavelength, a typical one to use waves associated with a moving electron, much shorter and thus you will see much much smaller things. The sunshine is between 400 and 700 nm and infrared, microwave and radio waves have long wavelengths for interactions with virus-like COVID-19. It is too small to interact with these light wavelengths, not absorbing or reflecting that light, don't interact. But the short end of the spectrum (10–400 nm) certainly interacts with the virus. It is sensitive to ultraviolet and helps to detect COVID-19. This technology is developed by Danielli of the Alexander Kofkin Faculty of Engineering at Bar-Ilan University. This has reduced the time of diagnosis of the Zika virus and is currently getting used at the Israel [1]. This enables the critical detection of direct RNA sequencing by virtue of the viral RNA to fluorescent light molecules when illuminated by a beam. The two main goals aimed toward

building this technology are to simplify the diagnostic process and make it more accurate. One can also use scanning tunneling electron microscopes to measure upto large atoms, here one must measure the electrical current between a measurement error and your object.

The synthesis of magnifying tools and field (electric / magnetic/EM) variation techniques with AI made it possible to detect all microorganisms. The foremost areas where AI can contribute within the present scenario of COVID-19 is varied from a public health management to detection using CT Scan / X-Ray. The COVID-19 heat symptom automatic detection is a common application of IA used these days. The microorganism detective measure will be one of additional strategies to limit the spread of COVID-19 like diseases. This will decrease the probabilities of getting infected and help in adopting preventive measures. The infected people segregation not only limits its spreading but also protects others.

This work proposed a smart eye technology - artificial integrated detection technology to eliminate and for a better health management. The proposed detector behaves as a superhuman eye to collect surrounding extensive microorganism data, their classification for danger assessment, infection detection and also help in human health prevention. This not only saves lives but also limits economic damages through better resource management.

The section II discusses the potential use of AI for the healthcare sector. Section III discusses detection technology-light and electron microscope detection limits and how artificial intelligence plays a role in this regard. In section IV proposed some basic layout for a Smart Eye detection Technology and its simple application to mosquitoes management. In the end we proposed some future directions in this regard.

2. AI USE FOR HEALTHCARE SERVICES

Artificial intelligence (AI) utilizes computers to think in the same way that humans do : to learn and to improve on the past. It works on two basic strategies: supervised learning and unsupervised learning. The supervised AI tasks are performed by currently written data points called a training set, whereas unsupervised learning helps to detect all kinds of unknown patterns in the data. Artificial Intelligence will be one of the most important and most beneficial scientific advances ever made, helping humans the most pressing challenges, from climate change to improved health delivery. AI is getting increasingly sophisticated at doing what humans do, but more efficiently, more quickly and at a lower cost. The potential for both AI and robotics in healthcare is vast. Just like in our every-day lives, AI and robotics are increasingly a part of our healthcare ecosystem. One of AI's biggest potential benefits is to help people stay healthy so they don't need a doctor, or at least not as often.

AI is getting more and more state-of-the-art at doing what people do, but more efficiently, greater speedy and at a decreased cost. It utilizes computers to think in the same way that humans do : to learn from past mistakes and to improve. A kind of known data training required in supervised learning whereas in unsupervised learning it detects all kinds of unknown patterns. AI and robotics becomes a part of our every-day lives and provide better output from the most pressing climate change challenges to improved health delivery. The usage of AI and consequently the Internet of Medical Things (IoMT) in customer health programs is already helping human beings. One of AI's biggest potential blessings is to help human beings stay healthy simply so they don't need a doctor, or or at least not as often. Technology packages and apps inspire healthier behaviour in individuals and help with the proactive management of a healthy lifestyle. Various healthcare businesses practice cognitive technology to unlock huge amounts of health information and power diagnosis. AI can store and analyse far more clinical information – symptom, case study of treatment and response around the world exponentially faster than any human. Improving care requires the alignment of big health data with suitable and well-timed decisions, and predictive analytics can support doctors decision-making and moves also as prioritise administrative tasks. The AI pattern recognition abilities - heartbeat, temperature, pressure, eyes movements, blood flow, muscle scanning etc help to identify deteriorated way of lifestyle. This makes AI potential for independent life care through various alert systems to slow dying conditions like dementia, heart failure and osteoporosis. It's additionally a phase of life that's regularly stricken by loneliness. AI combined with the advancements in humanoid design are permitting technology to tour even further and have ‘conversations’ and different social interactions with humans to stay ageing minds sharp.

3. AI DETECTION TECHNOLOGY

Along with useful microorganisms, there are a few that cause potential damage to the animals and plants. Detection and identification of these dangerous organisms in a value and time effective manner is a project for the researchers. The destiny of detection methods for microorganisms will be guided by biosensor, which has already contributed especially in sensing and detection generation. The diverse biosensors, evolved by way of integrating the biological and physicochemical/mechanical homes (of transducers), which could have good sized implications in healthcare, food, agriculture and biodefense. The detection of seen microorganisms like mosquito, fly and so forth is an easy challenge for AI, but the detection of invisible microorganisms like bacteria, virus is a tedious undertaking. The X ray lens, de Broglie wave, optical /electric / magnetic variant are homes which help to locate such microorganisms. Like an eye lens can grow the visibility to a few micrometers from naked eye's few millimeters capacity, it is the scale of microorganisms which makes a decision of the kind of detection technique. The integration of optical phenomena and magnetic variant can increase the detection upto micron such as flu virus, smallpox virus and various bacterias. The use of laser mild can grow this degree too.

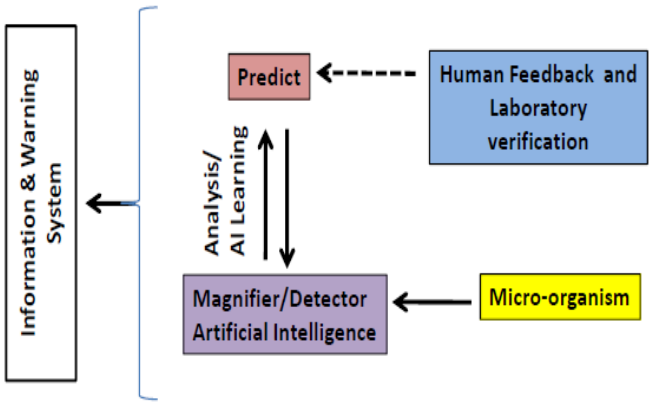

Fig 1 : AI detecter learning model

The most vital role is played by means of AI algorithms. First predicted results like versions in optical pattern or field variation for given objects used for training purposes. The AI models rely upon historical facts to make predictions from external observation. The size of observation will increase accuracy and make the analysis level very high. The AI learns by means of trial and error to achieve a complicated target. Reducing the wide variety of variables in a dataset like detection of a particular microorganism leads to greater accuracy of prediction.

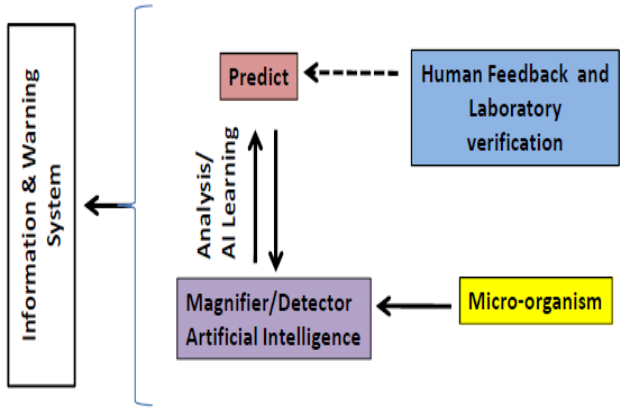

Fig 1 : AI detecter learning model

The use of AI is COVID-19 generation is remarkable. This virus is commonly spherical with 120-a hundred and sixty nm diameters and embellished with large (~20 nm) petal-shaped surface projection. Rapid and undetectable viral spread is one of the major problems in regards, creating havoc. Early prognosis is crucial for the treatment and isolation of sufferers to prevent the spread of the virus. The Temperature screening of one of the tools in this regard. The latest learning version referred to as COVID-19 to reap a neural network (COVNet), developed to capture the precise findings of COVID-19 and to distinguish between the findings of pneumonia and different lung diseases [6,7]. AI models primarily based on existing statistics can help covid pastimes make better use of scarce health care resources, offer personalized patient management programs, inform policy, and speed up medical trials. Artificial intelligence could make this detection smart, more secure in a short span. This has helped the government in separating dubious instances and saving the lives of many.

4 SMART EYE TECHNOLOGY

With the improvement of information technology, the concept of clever detection has gradually come into healthcare management. Such smart healthcare technology uses a new era of information technology, together with the internet of things (loT), massive information, cloud computing, and synthetic intelligence, to transform the conventional medical device in an all-spherical way, making healthcare extra efficient, extra convenient, and greater personalized. With the intention of introducing the idea of smart healthcare, in this work we integrate smart AI technology, detection strategies with biological data to the key technologies that support healthcare and introduce the modern popularity of smart healthcare in several critical fields. Then we expound the existing problems with the smart eye era and try to recommend solutions to them.

The smart eye technologies permit the continuous tracking of microorganism bodily activities and behaviors, in addition to physiological and biochemical parameters during day to day life. The preexisting biological information can assist to differentiate and verify the level of danger to humankind. The most typically detected data include microorganism nature, population, growth rate etc and so on help the person to advise vital action. The smart eye record reflects light in the form of waveforms and examines associated imaging information with preloaded facts on the smart eye / to a far off server. The smart eye requires to accumulate distinctive types of imaging statistics, consisting of horizontal visible monitoring, vertical visible monitoring, gazing, saccade, and extra for higher accuracy. Such technologies may be not simplest innovative solutions for healthcare issues, however additionally help in patient control and disease control. This can directly affect scientific decision-making and virtually enhance the exceptionality of patient care while decreasing the cost of care, inclusive of patient rehabilitation outside of hospitals. The massive information generated with the aid of wearable gadgets is both a challenge and possibility for researchers who can apply more AI strategies on that data in the future. Additionally, such stored data assist prehospital diagnostic and supply targeting before it takes an uncontrolled shape. The data recording, data classification, warning device and possible solution, tracking functions etc. can make this more useful for humankind. This has additionally been designed to be lightweight, slim, battery operated and snug to wear. The use of an external replaceable battery can increase operation period. The one of the proposed designs is shown in Fig.1.2 for the purpose of detecting microorganisms.

Fig 1.2 Smart Eye Glass design

One of the simplest applications of the smart eye is for microorganism - mosquitoes, one of the deadliest animals within the world. It has the capability to hold and spread the disease to human beings and causes thousands and thousands of deaths every year. There are numerous kinds of mosquitoes and a few have the potential to carry many kinds of diseases. The global incidence of dengue has risen 30-fold in the past 30 years, and more countries are reporting their first outbreaks of the disorder. Zika, dengue, chikungunya, and yellow fever, malaria,filariasis, tularemia, dirofilariasis, encephalitis are all transmitted to people by the mosquito [56]. More than half of the world's population live in areas where this mosquito species is present. The smart eye will help municipal human beings to categorize the kind of mosquitoes, population, growth rate, etc. with the help of attached AI sensors. It not only helps in assessing hazard level however also recommend control measures to the worker. The quality of controlling measures will increase with each operation because of the autocorrected AI format. This will help in sustaining mosquito management efforts but also to save you outbreaks from these diseases. It also facilitates in developing an important warning system for better safety and disease management.

Finally, we look in advance and compare the future possibilities of smart healthcare. Such smart eyes detected image or video could provide extra medical data which include heart fee, blood pressure, and body temperature, in addition to blood oxygen saturation, posture, and bodily activities through using electrocardiogram (ECG), ballistocardiogram (BCG) and other devices. This may be connected to a further sensor to acquire such data and transmit it to a remote server for storage and analysis. Similarly one can extend use of the smart eye to detecting numerous other diseases. microorganisms on surfaces or inside living beings. Such trained AI devices require properties like optical optical pattern version of UV laser mild, electric field variation, magnetic version or combination of these. This allows humans with no technical experience to detect the exact region of the important remedial actions.The detection of their presence also facilitates to limit its effect and spreading in case of contagious disease,

5. CONCLUSION

Microorganisms like viruses, bacteria and mosquito borne illnesses like dengue, malaria, are flourishing global in summer. The covid-19, due to a microorganism called virus, increases global concern in public fitness as it causes a sequence of fitness issues, in particular to the modern generation. The preventive measure varies with kind of microorganism interplay, one of pre requirement for the same is to their identification. One of the most important challenges in the remedy of infected sufferers is the detection of microorganism and involved growth rate, threat of exposure records. The optical devices help in visualization of such microscopic and further those also have an effect on electric / magnetic fields. The use of AI with a number of detection increases the accuracy of detections and records analysis. The fine way to prevent or to gradual contagious ailment transmission is to higher understand what microorganism causes it, and the way it spreads. Prevention strategies cognizance on affected person segregation and careful infection control, including suitable steps to be taken at some stage in prognosis and the availability of clinical care to an infected patient.. For example, droplets touch and airway protection mechanisms are followed in covid-19 spread control.

Various AI based totally technologies including thermal scanner, resources control, medical control, GIS based totally locator etc are proved very useful today. AI allows the ones in education to go through naturalistic simulations in a way that simple laptop-pushed algorithms cannot. The creation of natural speech and the capacity of an AI computer to draw instantly on a massive database of scenarios, the way the reaction to questions, decisions or advice from a trainee can project in a manner that a human cannot. And the training programme can examine previous responses from the trainee, that means that the demanding situations can be continually adjusted to meet their learning needs. And training can be done anywhere; with the electricity of AI embedded on a smartphone, quick seize up sessions, after a tricky case in a health center or while travelling, will be possible.

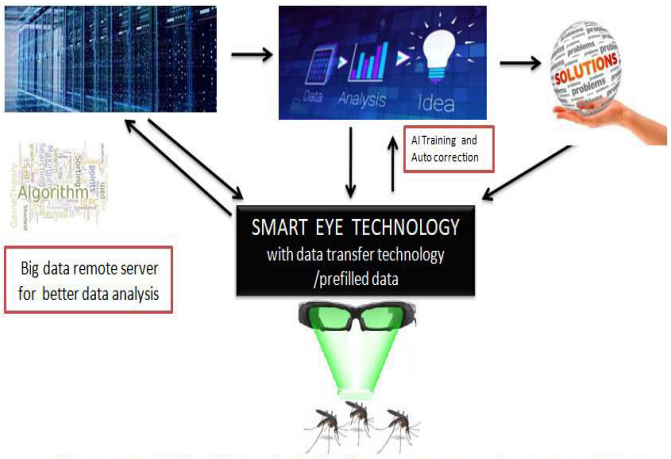

Fig 3 - Smart Eye Technology Application to mosquitoes management

The proposed smart eye technology uses such AI training for microorganism detection. The human AI interplay can assist fitness offerings in careful balance among microorganism statistics and public fitness services to overcome any dangerous situation. The generation advancement permits synthetic intelligence to deal with tens of millions of microorganism facts quickly. The use of such generation for dengue control is mentioned in section 4. Surely, in destiny this generation may be reached to a nano level to be able to hit upon viruses on surfaces or in humans' organs like mouth ect in just a look. This can be extended to discover contagious diseases such as the flu, the common cold, Ebola, Hantavirus superspreader. Machine vision machine with AI detection is an innovative and low cost device in contrast to all health expenses. This will help manage control agencies for reasons and it spreads manipulation. This will show a better tool for communicable disease prevention and safety. All those no longer only save life but also limit monetary damages through better aid management.

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