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Review Article

Mobile Health and Medical Care

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Abstract

Cloud computing is becoming the foundation of distributed systems in recent years, realizing unified storage and multi-thread fast processing. In this paper, we discuss the design for mobile health and medical care, which contains health management and intelligent medicine, open for both individuals and clinics. The mobile care assists people to build up health idea by reading, practice and community and provides integrated and intelligent diagnoses and treatment. The system aims to improve health situation, medical precaution, etiology analysis and recovery.

Keywords: Health and Medical Care; Cloud Computing; Artificial Intelligence; Health Community; Intelligent Medicine

Introduction

Health is always an important theme in human history. There are huge literature and significant progress on medicine since ancient times [1]. The internet service and mobile equipment make real-time health care, inter-clinic consultation and operation robotics become reality [2-7]. From scientific point of view, the general principle plays a vital role so that one therapy can cure people with the similar symptom. While for person, individualized treatment shows more efficiency. Combination of health and medical mobile care is an attempt to realize health self-protection and intelligent medical care.

Precaution has different ways [8,9]. Based on the medical research and clinical cases, various vaccinations are invented to protect health from infectious or mortal diseases [10,11]. However in ordinary life, actions are still required to prevent disease caused by internal or external reasons, such as gene and genetics, environment, climate, work., *et al*. Tracking the medical advance is one way to be refreshed with the latest technologies, recording life schedule and sharing health activities are also contributory in modern society [12,13].

Artificial intelligence contains both classical principles and machine learning algorithms to construct the model by dealing with complex data for various practical problems. Towards the large health and medical data, AI has been successfully adopted to predict cancer, segment tumor, inspect bone break etc. The training process keeps updating the model while iterating data and computing the optimization and simulates different learning methods to resolve the situation. Several strategies are invented to prevent over-fitting problem therefore the output model is more suitable in practice. AI mechanism is showing more power in industry and being applied for the health and medical care which is discussed in [14-17].

In this paper we show the design for mobile health and medical care which is composed of health management in section 2 and intelligent medicine in section 3. For health management, we construct the platform of literature guide, individual record and health community. The intelligent medicine contains four essential processes which are data analysis, case analysis, medical imaging and integrated diagnoses and treatment. The linkage between health and medicine platform will be discussed in the conclusion of section 4.

Health management

When reviewing the growth process, human health is not only good living and working habits but also a combination of psychology, physiology and environment. There are several points of view. Life is matter, energy and information by pathologist [18]. Digital human shows the modern scientific representation and illustration in which various medical testing results shows different facets of body, organ, breath, blood, etc., according to system scientist [19]. Life is the balance of entropy, circuit loop, metabolic system, dissipation system, *et al*. [20-23]. There are unified scientific principles and health laws, however for individual differences comefrom gene, blood, organs, microbes, and also from the natural environment, education and social group [24]. Based on these studies, we have the following management: health branch shows recent literature, individuals can record their health data and share their healthy activities. These functions were realized through webpage [25].

Health branch

This section focuses on the selected literature on health and medicine. First of all, health is an education and secondly depends on practice. Scientific reading arms individuals with rightness and technologies of various disciplines. The accumulation builds up health insight in depth and leads the correct action in life. Figure 1 shows the webpage of the health guidance which contains ten catalogs [26,27] covering wide medical topics ranging from science to technology, from etiology analysis to practice, from vaccination to medical treatment, from ancient medicine to precise treatment, from psychology to physiology. It also emphasizes on major diseases and focusing groups.

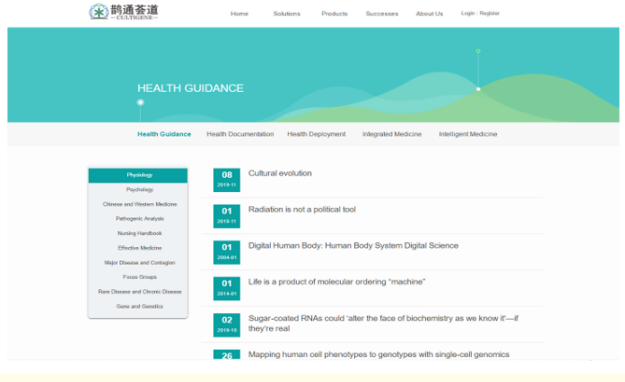

Figure 1: Health Guidance webpage.

Individualized health

Medical research studies human body and the corresponding problems from all aspects since human is the highest-level creature and a complicated system digitized by various equipments. Although gene is the essential and controls the main mechanism of human body, the everyday interaction and chemical exchange with outer world have important impact on human as time accumulates. In ordinary life, health problem is dissolved in time schedule, environment, water and meals, living and work activities, etc. Handheld medical instruments are now available for real-time check and diagnose such as ECG bracelet.

We provide the account for persons to record their regular life realizing individualized health. This documentation tool establishes the relationship between life and the health and reminds people to set up suitable living/work schedule according to the environment and society. The record is also helpful for intelligent medicine.

Health community

There are several ways of staying health especially details. People can communicate with medical experts. Beside medicine or medical care, there are plentiful approaches for precaution and treatment such as imaging, music, video, exercise, food, etc. The famous traditional book HuangDi Cannon [1] presented this relationship by five-phase law. And this macroscopic point of view can be proved by science and technology e.g. the wave length of light corresponds to colors showing different strength and power. Different food has various chemical components and plays special roles in human body. Multi-frequency sound vibrations impress person in different ways.

We set up the platform of health community for people to share the experience. Everyone has individual account and publishes health experiences or comments. This community discusses easy, practical and efficient ways to deal with health problem which is a complement of the formal treatment. The various responses show the truth of individual diversity and people can find inspirational therapies.

Intelligent medicine

As we know that medical problem is complicated and tough but there are always more than one therapy, and doctors make diagnoses and treatment mainly based on their experience. Intelligent medicine computes an automated or semi-automated model for definite problem. The training data is collected from various hos-

pitals and intelligent model provides better solution. Traditional methods are ideal to characterize pure properties. Machine learning is adaptive for real situations and deep learning for intricate noisy data. Their combination which accurately and comprehensively makes predictions is our destination.

In this section we focus on four models: statistical analysis, patient history analysis, imaging and integrated diagnose and treatment which are primary for medical care, reporting the quality and quantity characteristics of the data and offering the best solutions.

Statistics analysis

Medical data is blowing up with the development of medical network and data science. Statistics studies the distribution or conditional distribution of the random world. For blind data, statistics makes prediction, judgement, compare or estimation to approximate and compute the precision with strategies such as Bayesian, bootstrap, random processing etc. In medicine, statistics is a powerful tool to get quantitative properties such as the distribution, classification, efficiency, validation etc. [28].

Statistics is also an inverse mechanism applied in machine learning and deep learning. CRF [29,30] combined with neural network shows more details in image segmentation. More statistics methods will be applied in intelligent medicine.

Patient history analysis

Clinical history and health record are essential for diagnose and treatment. The history data assists to determine the cause and development of disease and predict its tendency therefore provide suitable therapy. The data collected from various clinic departments, is unified and regulated into achieve, put into training machine and outputs the requested result for medical staff and patients. AI is to be applied for history analysis. The diversity of disease is due to different human corporeity, habitus and environment and the same for the data collection and result. Health condition is a time series of the whole life while the history data may not be complete. To deal with incomplete data, statistics learning provides several optimization mechanisms [31].

Imaging analysis

Medical imaging is a powerful gist for diagnose and treatment and has several formations such as X-ray scanning imaging, computed tomography, ultrasonic, magnetic resonance imaging, endoscope image. Besides direct shot, medical imaging shows different physical properties of the body tissue presenting 2D or 3D shape and texture to determine the focus.

Although medical imaging is a projection of the real human body, doctors can distinguish the abnormality by vision and experience. AI training process learns the judgement mechanism to obtain auto or semi-auto recognition of structure. Intelligent imaging uttermost excavates the valid information from the image. Ahead of training, AI establishes a transformation in which multi-scaled and weighted characteristics are taken for evaluation [32,33]. It may have hundreds of parameters to fit. Supervised learning trains labeled data and unsupervised learning targets on the properties of the data and net. Besides normality, segmentation, classification, main medical imaging reports are to be obtained by artificial intelligent algorithms which recognize the structures and properties embedded in the image. The intelligent imaging system will be the collection of various AI models collaborating the desired model.

Integrated diagnoses and treatment

In hospitals, diagnose and treatment may be given at the same time or separately and the treatment may continue for a long time. The integrated diagnose and treatment system collects the medical data including history, tests, imaging., *et al*. and outputs situation analysis, medical analysis and treatment consultation.

One symptom corresponds to various illnesses and the same in the other way, one disease has distinctive symptoms. The diversity also presents on etiology analysis. Therefore, we have unlike treatments with different feasibility and even the same therapy may have distinctive instruction for different patient. The system shows democratic medical attitude by training data from various sources and sets up multi-solution mechanism.

For the multi-solution system, training data and process will be specially designed. It keeps running by feeding new data and obtains optimization model. It is similar to find practical ways between two destinations with new constructions. It is the advantage of intelligent system to update upon the new data and renovation.

Conclusions

Definitely with the development of education, science and technology, life will be easier and longer and medical care will become simplified and intelligentized. In this paper, we discussed the

blueprint of mobile health and medical care platform applying AI mechanism built upon cloud construction of data and computing. The system not only assists persons to prevent/recover from illness and clinics to cure patients, but also provides academic and medical advances to replenish health knowledge and health recording software and community for sharing experience and discussion. No matter for medicine or individual, confirming the cause of disease and learning precaution are more important than therapy. And learning various simple, practical and efficient treatments is more desired than taking medicine. Health is in mind better than in clinics.

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