ZKG INTERNATIONAL ISSN: 2366-1313

APPLICATION OF MACHINE LEARNING IN THE FIELD OF MEDICAL CARE

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ABSTRACT

These years, with artificial intelligence and machine learning becoming the hotspot of research, several applications have emerged in each of these areas. It exists not only as a kind of academic frontier but also something close to our life. In this trend, the combination of medical care and machine learning becomes more and more tighter. The proposal of its main idea also greatly alleviated the existing situation of unbalanced medical distribution and resources strain. This paper summarizes some application of machine learning and auxiliary tumor treatment in the process of medical resource allocation, and puts forward some new methods of application to realize it closer to human life in the era of artificial intelligence and the explores a good situation of mutual combination of medical industry and computer industry, which is benefit both.

I. INTRODUCTION

Machine learning (ML) is a science which aims to make machine capable of learning. Machine learning returned to the public's vision after the famous competition between Alpha Go of Google and the Go player Li Sedol, ending with the score 4:1 in 2015. And this event made machine learning more well know among people even among those who were not familiar to computer science and it has caused intense debate in related field. Actually, although machine learning is a young branch of AI, it is not a new subject. ML is broadly defined as the application of certain computer algorithms to a set of data known to the event outcomes, and the ability to learn to training data and predict new data based on learning outcomes. Its core is induction and summary instead of deductive. Early in the medium of 1950s, Samuel, a computer scientist of United States, designed a chess program that could learn by itself through continuous play. This program shows people the ability of machine at the first time, meanwhile, the unpredictable potential of machine to learn came into people's sight. However, as the research continued, machine learning entered a period of cooling off. Until 1970s, it staged a comeback gradually. And during this period of continuous research and development, until today, machine learning has become an important subject including data mining, pattern recognition, natural language processing and so on. It has also become a core of AI. In today's society, medical care problems have become a hot topic, and problems such as the unbalance and insufficient allocation of medical resources has become increasingly apparent. In this situation, the application of ML has become the unavoidable trend in the current development of medical care. As early as 1972, the scientists in the University of Leeds in the UK has been trying to use artificial intelligence (ANN) algorithms to judge abdominal pain. Now, more and more researchers are committed to the combination of ML and medical care. The methods of pathological diagnosis of tumors,

ISSN: 2366-1313

lung cancer, etc. by ML has gradually entered the field of vision. Some companies, such as Alibaba, Amazon, and Baidu have established their own research team working for it. This introduction of ML in medical care has greatly saved medical resources and provided a new way for citizens to see a doctor and facilitate people's lives. At the same time, the demand of people also provides a new impetus for the research and development of ML, with promoting its continuous improvement.

II. LITERATURE SURVEY

1) Journal of Medical Imaging and Health Informatics ISSN

AUTHORS: **Dr. Eddie Yin-Kwee NG , Singapore.**

Journal of Medical Imaging and Health Informatics (JMIHI) is a medium to disseminate novel experimental and theoretical research results in the field of biomedicine, biology, clinical, rehabilitation engineering, medical image processing, bio-computing, D2H2, and other health related areas. As an example, the Distributed Diagnosis and Home Healthcare (D2H2) aims to improve the quality of patient care and patient wellness by transforming the delivery of healthcare from a central, hospital-based system to one that is more distributed and home-based. Different medical imaging modalities used for extraction of information from MRI, CT, ultrasound, X-ray, thermal, molecular and fusion of its techniques is the focus of this journal.

2)Computer-aided diagnosis of malignant or benign thyroid nodes based on ultrasound images.

AUTHORS: **Qin Yu, Tao Jiang, Aiyun Zhou, Lili Zhang, Cheng Zhang & Pan Xu**

The objective of this study is to evaluate the diagnostic value of combination of artificial neural networks (ANN) and support vector machine (SVM)-based CAD systems in differentiating malignant from benign thyroid nodes with gray-scale ultrasound images. Two morphological and 65 texture features extracted from regions of interest in 610 2D-ultrasound thyroid node images from 543 patients (207 malignant, 403 benign) were used to develop the ANN and SVM models. Tenfold cross validation evaluated their performance; the best models showed accuracy of 99% for ANN and 100% for SVM. From 50 thyroid node ultrasound images from 45 prospectively enrolled patients, the ANN model showed sensitivity, specificity, positive and negative predictive values, Youden index, and accuracy of 88.24, 90.91, 83.33, 93.75, 79.14, and 90.00%, respectively, the SVM model 76.47, 90.91, 81.25, 88.24, 67.38, and 86.00%, respectively, and in combination 100.00, 87.88, 80.95, 100.00, 87.88, and 92.00%, respectively. Both ANN and SVM had high value in classifying thyroid nodes. In combination, the sensitivity increased but specificity decreased. This combination might provide a second opinion for radiologists dealing with difficult to diagnose thyroid node ultrasound images.

3)Liver segmentation from CT images using a sparse priori statistical shape model (SP-SSM)

AUTHORS: Xuehu Wang ,Yongchang Zheng ,Lan Gan,Xuan Wang,Xinting Sang,Xiangfeng Kong,Jie Zhao

This study proposes a new liver segmentation method based on a sparse a priori statistical shape model (SP-SSM). First, mark points are selected in the liver a priori model and the original image. Then, the a priori shape and its mark points are used to obtain a dictionary for the liver boundary information. Second, the sparse coefficient is calculated based on the correspondence between mark points in the original image and those in the a priori model,

ISSN: 2366-1313

and then the sparse statistical model is established by combining the sparse coefficients and the dictionary. Finally, the intensity energy and boundary energy models are built based on the intensity information and the specific boundary information of the original image. Then, the sparse matching constraint model is established based on the sparse coding theory. These models jointly drive the iterative deformation of the sparse statistical model to approximate and accurately extract the liver boundaries. This method can solve the problems of deformation model initialization and a priori method accuracy using the sparse dictionary. The SP-SSM can achieve a mean overlap error of 4.8% and a mean volume difference of 1.8%, whereas the average symmetric surface distance and the root mean square symmetric surface distance can reach 0.8 mm and 1.4 mm, respectively.

III. SYSTEM ANALYSIS

EXISTING SYSTEM:

In present systems there is hardly any medical service available in remote locations. Persons needing medical services often need to travel long distances. Even in urban areas the service is sometimes not available immediately. Patients and doctors are hardly to communicate with each others.And also patients had to wait for long time in order to communicate to the doctor.This main concern has to do with the confidentiality of the data. There is also concern about non-confidential data however such Systems that deal with these transfers are often referred to as Health Information Exchange.

DISADVANTEGES:

- Data Acquisition. **Machine Learning** requires massive data sets to train on, and these should be inclusive/unbiased, and of good quality.
- Time and Resources. ...
- Interpretation of Results. ...
- High error-susceptibility.

PROPOSED SYSTEM

In today's society, medical care problems have become a hot topic, and problems such as the unbalance and insufficient allocation of medical resources has become increasingly apparent. In this situation, the application of ML has become the unavoidable trend in the current development of medical care. As early as 1972, the scientists in the University of Leeds in the UK has been trying to use artificial intelligence (ANN) algorithms to judge abdominal pain. Now, more and more researchers are committed to the combination of ML and medical care. The methods of pathological diagnosis of tumors, lung cancer, etc. by ML has gradually entered the field of vision. Some companies, such as Alibaba, Amazon, and Baidu have established their own research team working for it. This introduction of ML in medical care has greatly saved medical resources and provided a new way for citizens to see a doctor and facilitate people's lives. At the same time, the demand of people also provides a new impetus for the research and development of ML, with promoting its continuous improvement.

ADVANTEGES:

- Identifying Diseases and Diagnosis
- Drug Discovery and Manufacturing
- Medical Imaging Diagnosis.
- Personalized Medicine.
- Machine Learning-based Behavioral Modification.
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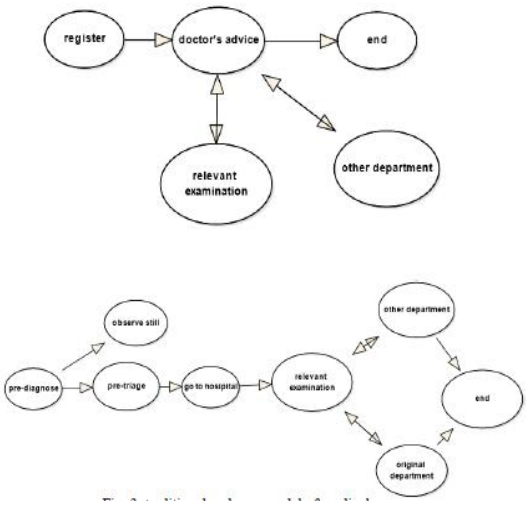
- Smart Health Records.
- Clinical Trial and Research.
- Crowdsourced Data Collection.

ISSN: 2366-1313

SYSTEM ARCHITECTURE



IV. IMPLEMENTATION:

MODULES:

- Doctor.
- Patient.
- Admin
- Machine learning

MODULES DESCRIPTION:

Doctor:

The Doctor can register the first. While registering he required a valid doctor email and mobile for further communications. Once the doctor registers, then the admin can activate the customer. Once the admin activates the customer then the customer can login into our system. After login he can see the view-patient data. based on patient symptoms, the doctor will give the precautions and he will give the doctor treatment.

Patient:

The Doctor can register the first. While registering he required a valid patient email and mobile for further communications. Once the patient registers, then the admin can activate the patient. Once the admin activates the patient then the patient can login into our system. After login he can provide symptoms. based on patient symptoms, the doctor will give the precautions and he will give the doctor treatment.

Admin:

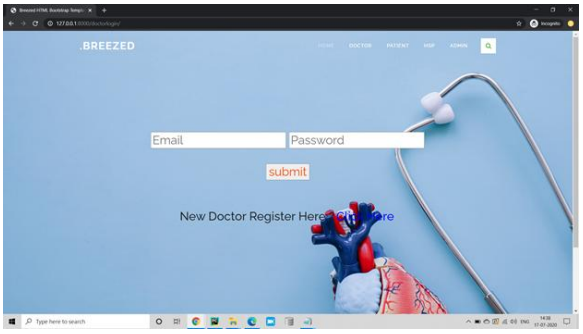
Admin can login with his credentials. Once he logs in he can activate the doctors. The activated user only login in our applications. Once he logs in he can activate the patients. . The admin can add new data to the dataset. So this data user can perform the testing process.admin can get predictions svm algorithm and also get the prediction from the decision tree.

Machine learning:

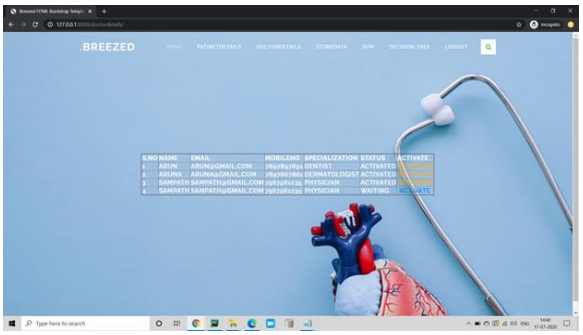
Machine learning refers to the computer's acquisition of a kind of ability to make predictive judgments and make the best decisions by analyzing and learning a large number of existing data. The representation algorithms include deep learning, artificial neural networks, decision trees, enhancement algorithms and so on. The key way for computers to acquire artificial intelligence is machine learning. Nowadays, machine learning plays an important role in various fields of artificial intelligence. Whether in aspects of internet search, biometric identification, auto driving, Mars robot, or in American presidential election, military decision assistants and so on, basically, as long as there is a need for data analysis, machine learning can be used to play a role.

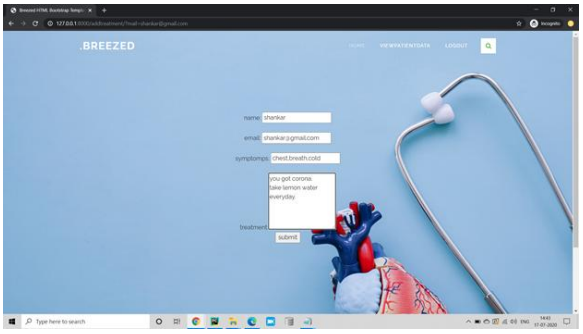
ISSN: 2366-1313

V. SCREEN SHOTS



doctor details:





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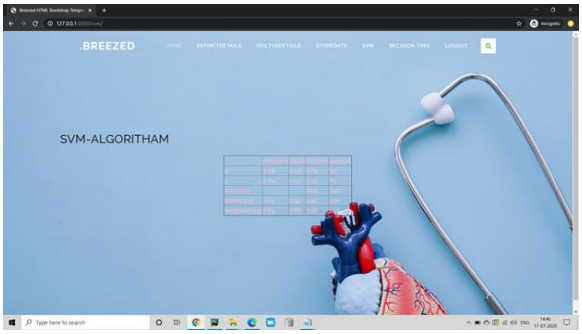
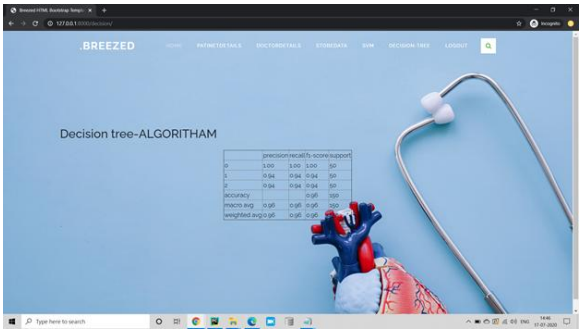
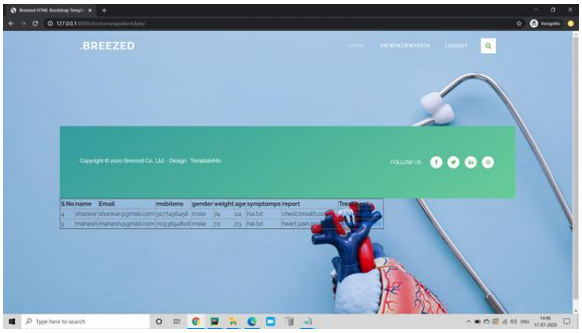


Decision:





VI. CONCLUSION

This article reviews the main methods of machine learning, and summarizes several representative applications after understanding the history of machine learning in the medical field and its current application. The typical ideas and algorithms are summarized. At the same time, the improvement method based on machine learning in the process of visiting is proposed. However, this does not mean that ML is perfect. Whether in terms of technology, ethic or law, it has certain problems. The solution of

these problems requires technicians and legal personnel. Working together, and how to strike a balance between manpower and machine is also a problem that everyone of us must face.

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ISSN: 2366-1313