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A Survey on Machine Learning Approach for Canine Disease Detection Algorithm

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ABSTRACT

In recent times Machine Learning has been successfully utilized in diagnosing diseases for humans using various algorithms. In the account of diseases caused to animals like dogs, it can be implemented with analysis through developing diagnostic tools comprise of Big Data Analytics and Deep Learning algorithms. Human beings lacked information about the treatment of dogs, so this has to done through a veterinary framework and they provide traditional treatment of their pet dogs. Though life science is correlated with technology through a part of the neural network; a framework of diagnosis tool is designed with this phenomenon.

Key words: Big Data, Convolutional Neural Network, Machine Learning, Veterinary medical diagnosis framework.

1. INTRODUCTION

Machine learning techniques are tremendously used in the medical field throughout the decade with an improved idea for all frameworks. Disease detection is an application that is achieved to an extent in the medical field. Diseases related to human beings are being studied thoroughly using this field while diseases like, canine diseases are kept aside a bit. A dog is said as men best friend, and traditionally humans keep it as a pet. [1] The reason for keeping dogs as pets may be different for humans but they will care and provide proper space, diet, and health care for their pets. [2] Issues related to the health of these pets are to be a concern when we deal it with the society, owner handling the dogs as pet assume the healthcare tend for certain diseases are mild and they traditionally treat them rather consult it with a veterinary doctor or facilities. Treating infected dogs by own without knowing common dog diseases and awareness of appropriate treatment make worse condition. [3] This changeover from traditional methodology to an expert methodology using different machine learning techniques and the mechanism is focused through the research presented as a survey in this paper.

In [3] expert system to diagnosis common canine diseases is proposed which is based on data analysis. The proposed system set rules to diagnose several types of common diseases viz. distemper, leptospirosis, Glaucoma, Colitis, Kennel Cough, Parvo Virus, and Jaundice. The current scenario of medical diagnosis system with different techniques are dependent on data mining using machine learning and algorithms like Machine Learning Algorithm SVM, Naive Bayes, BPA data mining and neural network are used to predicate the Swine Flu disease which is based on several attributes leads to a description of different algorithms. [4]. Diagnosis of multiple diseases in human beings is done by using a Biomedical expert system based on a generic relational model, which assures a real-time treatment. Doctors as well as their personnel assistants in disease diagnosis use the system for practice and training purposes as well. Currently, the expert system encompasses 31 different symptom categories and a total of 166 symptoms under it to diagnose 30 specified common human diseases. The system has been tested on a close data set and recognition efficiency is 100% [5]. For the treatment of diseases cause to dogs and other animals survey is performed which includes the study of diseases using machine learning techniques. Deep learning uses large artificial neural network layers which have interconnected nodes that can rearrange themselves as and when new information comes in. This technique allows the computers to self-learn on their own without the need for human programming. In particular, a kind of model called a deep Convolutional Neural Network (CNN) can achieve reasonable performance on hard visual recognition tasks -- matching or exceeding human performance in some domains. Inspired by the way biological nervous systems, such as the brain, process information.

The convolutional-neural-networks are great for capturing local information (e.g. neighbor pixels in an image or surrounding words in a text) as well as reducing the complexity of the model (faster training, needs fewer samples, reduces the chance of overfitting). There are several Artificial Neural Networks (ANN) architectures including Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN) e.g. LSTM and GRU, Autoencoders, and Deep Belief Networks. A CNN, in specific, has one or more layers of convolution units. A convolution unit receives its input from multiple units from the previous layer which together creates proximity. It enables computers to identify

every single data of what it represents and learn patterns due to which the input units (that form a small neighborhood) share their weights.

New York-Presbyterian Hospital prepares an algorithm to compare the machine learning algorithms on the Disease-Symptom Knowledge data set of patients admitted during 2004. Based on this analysis the most accurate algorithm is used in the system to achieve the reliability which concluded as Naive Bayes and Apriori are highly useful for disease diagnosis on the given data set. [4]

A system with the capability to generate output results by selecting an answer from submitted answers. This diagnosis system will be able to recognize a dog's diseases that were developed based on the forward chaining inference process. Knowledge Engineering (KE) methodology is proposed with a forward chaining methodology to matches the facts for the perfect treatment. [5]

An emphasis on overly broad notions of generalizability as it pertains to applications of machine learning in health care can overlook situations in which machine learning might provide clinical utility. [6] In [7] Techniques like Image Classification is used to identify the diseases. Images that are planted for supervised learning complete techniques are accompanied by different numbers of the training set and models to compare the treatment.

A model of animal disease diagnosis expert system from the perspective of animal disease diagnosis is proposed in [8] based on the Support vector machine (SVM) with the properties of the established principle of structural risk minimization and strong ability of generalization. In [8] it is attempted to make use of Strong generalization property to resolve the difficulty of the rapid diagnosis which are complex and have diverse symptoms of animal diseases. The model can be carried out animal diseases diagnosis more accurately, rapidly on the condition of small samples as per results.

In [9] the suite of machine learning algorithms and tools that are used for the analysis of diseases and decision-making process accordingly that highlights the advantages and disadvantages of different algorithms such as SVM, Naïve Bayes, FT, and RS Theory. It was observed that these algorithms provide enhanced accuracy of different diseases. A suite of tools that are developed in the community of AI which is useful for the analysis of such problems and also provides an opportunity for the improved decision-making process can be taken into consideration.

Diagnosis of diseases using KNN and neural network which are Machine learning algorithms along with PCA that helped in increasing the accuracy for which experimentation has been applied on the real images of the EUS infected fish images dataset. Automatically detects or diagnoses the Fish EUS disease. Machine Learning algorithms do not apply to different feature Descriptors is a noticed problem herein. [10]

In [11] CNN is used for the classification of the input animal images and also compares the overall recognition accuracy of the PCA, LDA, LBPH, and SVM. The proposed CNN was evaluated on the created animal database. The experimental result shows that the LBPH algorithm provides better results than BCA, LDA, and SVM for a large training set. On the other hand, SVM is better than PCA and LDA for small training data set. The obtained experimental results of the performed experiments show that the proposed CNN gives the best recognition rate for a greater number of input training images (accuracy of about 98 %).

The idea of deep learning architecture is proposed in [12] which is used in the health care domain for the diagnosis of diseases. In this first, analyze and categorize the needs of health seekers and ask for manifested symptoms for disease prediction. Then the user will search for their query. Then the query gets processed to give a prediction of disease to the user or health seekers. Here the concept of hidden layers is getting used. The biggest stumbling block of the automatic health system is disease inference. So if the communication between doctors that are added in this system is not done then there is the same need for manual data updating as in the existing system. So, data updating also depends on doctor communication.

CNN used to distinguish trabecular bone structure or lung diseases involves subtle changes in texture-type patterns, which are quite different from everyday photos of cats and dogs. The terminology of deep learning causes black box for medical tasks. [13]

2. PROPOSED METHODOLOGY

Diagnosis technique of these diseases based on physical symptoms the animal exhibits and as a trial and putting the light towards research in this study Machine Learning techniques is applied. An algorithm implemented using machine learning that can detect disease based on symptoms can help pet owners, health care professionals, hospitals, and any individual to quickly check whether a dog is suffering from a disease or not and seek the expert advice of doctors only when it is needed.

Vast amounts of clinical data from veterinary hospitals across the country such as images, sound, and text are proposed to be used to apply Big data analytics formulation combined with Deep learning algorithms for learning multiple levels of representation and abstraction which will enable the model to make accurate decisions for dog diagnosis.

The convolution units are especially beneficial as:

- They reduce the number of units in the network (since they are many-to-one mappings). This means, there are fewer parameters to learn which reduces the chance of overfitting as the model would be less complex than a fully connected network.
- They consider the context/shared information in small neighborhoods. This future is very important in many

applications such as image, video, text, and speech processing/mining as the neighboring inputs (eg pixels, frames, words, etc) usually carry related information.

As of now to implement CNN using machine learning techniques Big Data analytics formulation will be structured systematically to carry out the limits further for the proposed model and analysis with the traditional model will be carried out for understanding its behavior and standardization. Big data analytics algorithms will be developed and implemented for these diagnosis models for its advantages of analysis properties of variant and dynamic data of various types.

3. CONCLUSION

An idea of recent algorithms available for detection and diagnosis of different canine diseases can be concluded with a measured difference between CNN and conventional NNs. CNN is inspired by retinal fields in the vision system. In a simple word, CNN is an integration of biological vision and neural system. CNN is a complex architecture that takes considerably more time to train the neurons. As a remarkable classification of accuracy and the rate of object recognition becomes very high. Through a series of iterations and inference analysis, insight is gained from big data analytics. From the insight, informed decisions can be made. Thus CNN can be used for early detection of diseases in canines or remote areas through image recognition techniques and symptoms of different parameters. This reduces the risk and in minor cases, there is no need to contact the veterinary.

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