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Analyzing Covid'19 diseases from Ultrasound Image Report using Natural Language Processing compared with Novel Conditional Random Filed Algorithm

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Improving the quality of ultrasound report in image for Covid'19 disease detection using deep learning in novel Conditional random fields (CRFs) Algorithm over natural language processing (NLP) Algorithm. A Novel Conditional Random Fields Algorithm (NCRFA) is pattern recognition and structured prediction algorithm and a branch of deep learning. This algorithm should be able to improve accuracy compared to the natural language processing algorithm. The data set needed for ultrasound report for disease prediction is acquired from the Juypter. Analysis, design for various proposed algorithm is natural language processing and deep learning application are performed for conditional random fields and natural language processing algorithms. In this tested data sets are imported in two algorithms for enhance and framework. Those testing size are calculated various statistical power test for different t and f test are calculated in two groups and 400 data used in each algorithm. Results: The final output are obtained in convex and linear in ultrasound image report for supplied process. The statistical package for the social sciences programmer is generate the process. There is apparent between NCRFA and its accuracy, which is 87.50%, 81.17%, p= 0.04 ($P<0.05$), NLP algorithm that provide accurate value. According to the findings, the conditional random fields have a more processing exact the natural language processing.

Keywords: Covid'19 , Deep Learning, Disease, Health, Novel Conditional Random Fields, Natural Language Processing, Ultrasound image report.

1. Introduction

Ultrasound imaging, also known as sonography, is a diagnostic medical procedure that uses high-frequency sound waves to produce images of the inside of the body. The images are then displayed on a computer screen.in convex and linear in ultrasound image. It has been a very important technique for covid'19 detection to reduce the most of risk to ionizing radiation in recent years [1]. Reduce the noise in ultrasound imaging is a challenging task mainly used for

reducing noise in ultrasound images for some noise affects several kinds of systems in ultrasound image framework its more problematic. In recent decades several algorithms have been proposed in literature with main purpose of reducing noise in ultrasound images [2]. Recently, the human health care system conducted some research in ultrasound imaging applications to remove blurry noise from images that are affected by random noise during convex, linear, and transmission. The blurriest images produce incorrect results for doctors and biomedical engineers when attempting to extract a fine physical exam report for patients.[3]. Natural language processing is a translation of machine with two complement each other in neural machine translation has advantage of deep learning which is suitable for high dimension in natural language processing algorithm [4].

More than 100 articles have been published on ResearchGate. In health care service providers collects patients experience data and examined various knowledge and user behaviour to identify and improving the treatment of covid'19 patients. In this paper used to detect automatic Chinese ultrasound report of covid'19 disease using ultrasound image report method to detect the virus and avoid radiation for X-ray or CT images. Moreover, we also investigate the conditional random algorithm to reduce the noise and improve the accuracy [5]. Deep learning as widely used to classify the ultrasound image report in the medical field. Various extraction of images methods and classify and reduce noise in ultrasound image using natural language processing compared to conditional random filed algorithms. Covid'19 pandemic some challenge in young children, elderly and mentally ill person [6]. An artificial intelligent and deep learning are used to detect covid'19 pandemic diagnosis and analysis the data in critical role [7]. Coronavirus disease, one of the most spreader disease in the 21st century it's easy to find out testing [8].

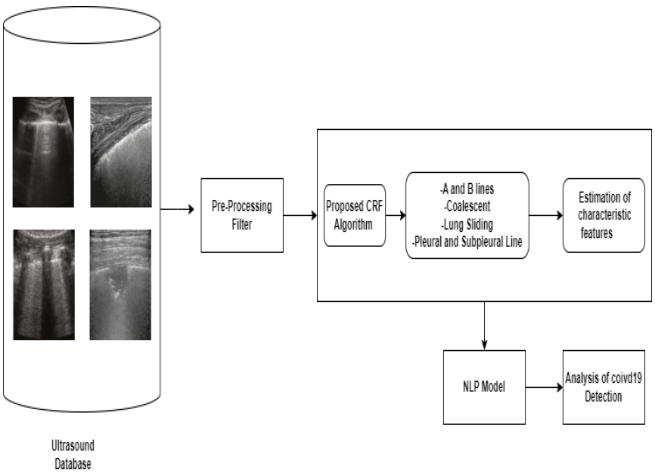

Fig. 1 Workflow of proposed system for COVID-19 detection from Ultrasound images using conditional random filed algorithm.

The challenge with the previous natural language processing algorithm is its lack of accuracy. In order to detect covid'19 among the available resources, a novel conditional random field algorithm with the name of NCRFA alternatively uses to find the disease in ultrasound report. The major contribution to develop an NCRFA Algorithm to improve processing speed.

2. Materials and Methods

The proposed study is being carried out in Chennai at the Saveetha Institute of Medical and Technical Sciences' Department of Computer Science and Engineering's deep learning lab. The pre-test analysis was completed by keeping power analysis at eighty percentage, threshold at 0.05%, and guarantee break at 95%.

Group 1: Natural Language Processing Algorithm

Natural Language Processing (NLP) algorithms are being increasingly used in the medical field to automate the analysis of ultrasound reports. NLP algorithms are able to identify patterns in ultrasound reports, thus allowing them to recognize abnormal findings and detect diseases or abnormalities. This can be particularly beneficial in the field of radiology, where the timely diagnosis is of the utmost importance [9]. NLP algorithms are able to work with the human-generated data present in ultrasound reports, such as text and images, and provide a more comprehensive analysis and interpretation.

$$P(w_i|w_{i-n+1}, \dots, w_{i-1}) \qquad (1)$$

An n-gram model predicts the probability of a word given the previous n-1 words.

$$P(w_i|w_{i-n+1}, \dots, w_{i-1}) = \text{softmax}(Wh_i + b) \qquad (2)$$

Where h_i hidden state capturing the context up to i-1, and W and b are learned parameters.

$$P(C|X) = \frac{P(c)P(x|c)}{P(x)} \qquad (3)$$

Here, C is the class, and $x = (x_1, x_2, \dots, x_n)$ are the features.

This technology can be used to identify abnormalities in the ultrasound report, detect disease, and provide an accurate diagnosis based on the data. It can also be used to identify patterns in the data to help distinguish between normal and abnormal findings. NLP algorithms can also be used to automate the creation of ultrasound reports. By using the patterns identified in the data, the algorithms can generate a report that accurately describes the findings and provides the necessary information for diagnosis. This automation can significantly reduce the time it takes to generate a report, thus speeding up the diagnosis process. Overall, NLP algorithms are proving to be a powerful tool for the analysis of ultrasound reports. By automating the process, they can improve the accuracy.

Step 1: Discover all the images names in entities

- Load 'tokenized' Lucene index store containing dictionary into memory
- For each token extracted by the annotator
  - Check the valid lookup token
  - If 'yes' check for terms matching the 'first word' field of the Lucene index
  - If 'match found', check remaining n-1 permuted token for a match

Step 2: For each NE discovered in Step 1, define the 'chunk' for attribute template filling, where a 'chunk' can be:

(1) A sentence - if one, and only one, NE is contained in one sentence

(2) A phrase (portion of a sentence)-if many NE within the same 'chunk' in Step 3

(3) Two adjacent sentences - if (1) from above is true and there are attributes contained in a sentence which immediately follows (1).

Group 2: Conditional Random Filed Algorithm

The Conditional Random Field (CRF) algorithm is a powerful tool for predicting the outcome of Covid-19 ultrasounds. This algorithm is able to analyze ultrasound images and provide an accurate report of the patient's condition. The CRF algorithm is able to accurately detect abnormalities and provide an accurate prediction of the patient's condition. In order to make a prediction, the algorithm considers the patient's size, the type of ultrasound, and the patient's medical history. This algorithm is particularly useful for Covid-19 ultrasounds because it is able to detect even the most subtle changes in the patient's condition. It can provide early detection of changes in the patient's blood tests and other indicators, which can help to diagnose the condition and provide treatment accordingly. The algorithm can also be used to accurately predict the long-term outcome of the patient.

$$p(y|x) \qquad (1)$$

A CRF defines a conditional probability distribution Statistical Analysis $p(y|x)$ over label sequences y given an observation sequence x.

$$f_k(y_i, y_{i-1}, X, i) \qquad (2)$$

CRFs use feature functions that depend on the current label y_i, the previous label y_{i-1}, the observation sequence X, and the position i in the sequence.

$$w = (w_1, w_2, \ldots\ldots, w_k) \qquad (3)$$

The model is parameterized by weights W for each feature function.

$$(y, x) = \sum_{i=1}^{n} \sum_{k=1}^{K} w_k f_k(y_{i,} y_{i-1,} X, i) \qquad (4)$$

For a given label sequence y and observation sequence x, the score

$$p(Y|X) = \frac{\exp\,(\mathrm{Score}(y, x))}{Z(x)} \qquad (5)$$

Where Z(x) is the normalization factor (also known as the partition function), defined as:

$$Z(x) = \sum_{y'} \exp\,(\mathrm{Score}(y', x)) \qquad (6)$$

Where Z(x) is the normalization factor also known as partition function.

The analysis was carried out using IBM Statistical package for the social sciences v26.0.1 statistical software. IBM SPSS is a data analysis statistical software application. The data is transformed into arrays after it has been standardized. The necessary number of clusters is observed, examined, and the available algorithms are obtained. The error rate and processing speed of the NCRF algorithm decreased as the number of tasks increased. Different data set,

task size is an independent variable, whereas task bandwidth and size are dependent variables. The independent T-Test is used to evaluate the research.

3. Results and Discussion

Figure 1 compares the results of the NCRF and NLP algorithms' predictions of values to the actual values. A table 1 display the mean accuracy of NCRF is 87.50 and Natural Language Processing Algorithm is 81.17 T-Test for comparison for conditional St. Error Mean (1.23765) and Natural Language Processing Algorithm (2.78195).Table 2 appears the results of a random sample trial. Confidence intervals for the dataset are set to 95% using the Independent sample T-Test (Novel Conditional Random Field appears to good perform than Natural Language Processing). The variation in processing validates between the CRF and NLP innovation has been demonstrated, and the T test for equality means has revealed a similar mean variation of 4.6 and a similar std difference. The NLP innovation 95% confidence interval is 0.6697. Following the test, the significance is 0.00. Because of the significant difference in variance, the CRF is superior.

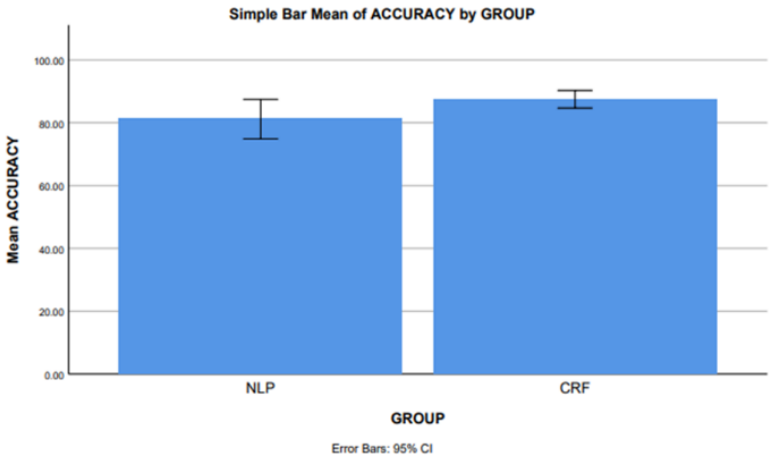

Fig. 2 NCRF vs NLP on the X axis, Mean accuracy on the Y axis. The confidence interval is 95%. The mean accuracy of the NCRF algorithm is 87.50%, while the existing NLP algorithm is 81.17%. The NCRF precision has a mean perfection than the NLP algorithm.

The both algorithms are compared with each other in the terms of accuracy. The algorithms are analyzed differently with respect to the ultrasound images. The NCRF out performs the NLP Algorithm by a significant difference.

Table 1. The mean accuracy of NCRF is 87.50 and Natural Language Processing Algorithm is 81.17 T-Test for comparison for conditional Std.Error Mean (1.23765) and Natural Language Processing Algorithm (2.78195).

Algorithms	Number	Mean	Std.Dev	Std.Err Mean
NCRF	200	87.5070	3.91380	1.23765
NLP	200	81.1770	8.79731	2.78195

The understanding of the study's finding indicates that the Conditional random field Algorithm outperforms the natural language processing algorithm in terms of accuracy. The significant value for the algorithms is 0.04. Novel Conditional Random Algorithm is 87.50% accurate, while max-min algorithm is just 81.17% accurate. Similar discoveries about the improving the accuracy on ultrasound image report.

The research work in this article conditional random field (CRF) algorithm for finding the ultrasound image detection. By doing so, aim to create a system that can accurately prediction the coronavirus of ultrasound report and save the human life earlier finding the disease. To train the model, it will pre-process the ultrasound image by label the text splitting convex and linear that the NLP can understand [10]. The detection of covid'19 has become an important issue in recent years, as corona cases are increasingly day to day. As a result, a number of techniques have been developed to identify covid'19 disease, with the goal of helping patients make more informed decisions [12]. The main advantage of this article is to various contrast the various affected- or unaffected features proposed in the literature for detecting covid'19 ultrasound image report [13]. The review of the existing literature on this topic provides a comprehensive analysis of the main features proposed for disease diagnosis, including their strengths and limitations [15]. Our analysis will provide valuable insights into the current state of research on ultrasound image covid'19 detection and can help guide future work in this area [11].

Table 2. The significance of the independent sample T test on the NLP algorithm and the Perceptual Linear Prediction algorithm is 0.04 ($p<0.05$).

Accuracy				95% Credible Interval	
	Sig	F	T	Lower Bound	Upper Bound
Equal Variance assumed	10.919	0.004	-2.079	12.72697	.06697
Equal Variance not assumed	10.919	0.004	-2.079	12.72697	.27887

Limitations in NCRF algorithm that the ultra-image quality that is very low or not possible to shows the right outputs. This type of algorithm is profusely used for medical Professionals to check the patient ultrasound image quality. Future research should focus on time consumption for ultrasound image report improvement for providing feedback to physicians and patients.

4. Conculsion

According to the study's findings, the NCRF algorithm is more accurate than the NLP algorithm in ultrasound image reports for detecting covid'19 disease and in health care applications. The NCRF algorithm correctly detected covid'19 detection in 87.50% of the cases, whereas the NLP algorithm correctly detected pathological voices in only 81.17% of the cases. As a result, the NNLP algorithm is more accurate and reliable to find covid'19 disease using ultrasound image for health care applications.

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