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Impact of multi-model machine learning approach prediction of Covid-19

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Abstract - A present study was to analyzed the "Impact of multi-model machine learning approach predication of Covid-19." Materials and Methods has been used to a cluster sample from secondary source. A data was taken 250 Covid- 19 simple from cross-sectional online survey was conducted for A.N.C.H. Gaya, in the month of August 2020. Both of the simple size the age range of 25 to 65 years and including interns were enrolled in the study. The study was approved by the ministry of India and Arogya Setu application and medical institutional ethics committee. Online informed consent was obtained from each participant and the information was gathered using a google form administered open ended questionnaire (5 items) to the participants. Out of 500 participants from A.N.C.H. Gaya, while 250 participated and filled the questionnaire completely. All the data were collected digitally and analyzed for the results.

Keywords - Machine Learning Approach, Aarogya Setu, Ensemble learning, and Covid-19.

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INTRODUCTION

Infection with Corona Virus Disease-19 (COVID-19), which causes an acute respiratory syndrome, can be fatal. China 'WUHAN' is said to be the origin of the virus, which has spread around the world since 2019 December. Following the WHO report, more than a hundred million individuals have been affected since the 7th of March 2021, with more than 2.5 million deaths. The cytokine storm caused by the SARS-CoV-2 virus in certain infected people causes damage to the lungs, heart, gastrointestinal tract, and other organs. This incident can result in a slew of complications, including death. This virus can cause dysphonia in any area of the body, including the larynx (voice box). This has had a huge impact on civilian communications during the COVID-19 epidemic.

Social distancing of 1.6 meters to 3 meters is recommended to control the rapid spreading of COVID-19 cases. The stigmatization, more than the lethal nature of the virus, is preventing individuals from going to medical laboratories for testing purposes, according to medical professionals. In these conditions, establishing a mechanism for early diagnosis of this disease has become a tremendous problem. COVID-19's speech-based detection is, in reality, a simpler and safer method of detecting threats.

Corona Virus has been primarily hosted on the intra-nasal, bronchial, and lung systems of a human body. In Symptomatic patients, COVID-19 often severely impairs the upper and lower respiratory tract. Since the respiratory tract plays an intricate role in voice production, impairment in its functions must cause changes in the voice signal produced. The goal is to find these changes, quantify them and use them for COVID-19 Prediction. Early detection of COVID-19 followed by immediate treatment can potentially reduce lung invasion and decrease fatality. In this chapter, an investigation on the classification of COVID-affected and healthy audio samples of different English phonemes has been made. Phoneme-based smeared Buzzwords '/t//r//n/', and '/t//r//n//g//l/', have been proposed, which may help the clinicians for effective and faster detection of the disease at a primary stage. The extracted features are fed into state-of-the-art Machine Learning classifiers to examine the performance of the proposed buzzwords. Generalized Additive Model provides the highest accuracy of 97.22% for the buzzword '/t//r//n//g//l/'.

So the standard databases are used, for baseline spectral feature extraction. The feature set includes the baseline perceptual features such as spectral centroid, spectral crest, spectral decrease, spectral entropy, spectral flatness, spectral flux, spectral

kurtosis, spectral roll-off point, spectral skewness, spectral slope, spectral spread, harmonic-to-noise ratio, and pitch.

Machine Learning- Machine Learning based classification techniques have been compared here for disease classification based on these features. A statistical speech spectrum parameters with Machine Learning based classification methods are used in to use speech as a bio-factor for COVID-19 diagnosis. It is known that physiological changes cause statistical changes in the spectral properties of speech that may be determined by performing the short-time Fourier Transform (STFT). The next step is to categorize spectral signals as originating from an affected individual or not using machine learning-based classification techniques. In this study, speech audio samples from healthy and "asymptomatic" positive persons were used. The authors demonstrated that when comparing the audio signals of COVID-19-positive patients to the speech audio samples of healthy individuals, the RMS error distribution fitting is larger. The performance assessment metrics of five cutting-edge Machine Learning classification algorithms have also been examined and provided.

Machine Learning frameworks are progressively being employed in healthcare. The capacity of Machine Learning algorithms to extract meaning from data and predict outcomes is utilized in illness prediction. Machine Learning is being utilized in lung disease research to find answers to complicated challenges. Machine Learning models are also utilised to address challenges in the medical area utilising data in the case of coronavirus illness. Machine Learning techniques and mathematical models are used to estimate the number of infected persons and the likely period when the coronavirus will be eradicated in China.

The utilization of Machine Learning in the battle against coronavirus is critical since it will aid in the early detection of coronavirus. In the case of the coronavirus, it is important to define the spread of information via social media. The success of a CT picture segmentation and classification is largely reliant on the quality of the classifier employed as well as data preparation difficulties. Numerous studies have demonstrated that utilizing different data with the same classifier yields different results, and vice versa. In CT imaging applications, a variety of classifiers have been utilized. ANN, Bayesian classifiers, back-propagation NN, probabilistic NN, linear vector quantization and SVM are among the classifiers. The machine and DL methodologies were shown to be highly valued procedures for evaluating tremendous, highly dimensioned clinical texture features. Observations of the CT or X-Ray of COVID-19 sufferers are analogous to other uncommon pathogens of esophageal cancer. Thus, the machine and DL procedures could make it easier for COVID-19 to be automated against many scenarios of bronchitis.

COVID-19 relative prognosis also covers medicinal conditions or phagocytic sinusitis. Traditional strategies were utilized for the evaluation of COVID 19 lung scans, include hybrid, VGG-16, ResNet, InceptionNetV3, MobileNetV2, Xception, CNN and compressed InceptionNet. Incredible findings have been provided by the implementation of such strategies on X-rays. The fact that X-rays are widely obtainable and cheap makes this observation vitally useful. ML methodologies are employed for this intention, in certain ways they vary greatly. For example, DL algorithms probably require a lot of labeled data to prove tentatively. But, a significant amount of sample generated by participants would be used by learning algorithms. In addition, strong tools are needed for deep NNs. In contrast, computer vision wants to be concisely marked by participants, DL provides advanced functionality itself, requiring greater time for training. Computer vision divides tasks into manageable portions and then merges the findings towards one later part while deep NNs fix complications by using end-to-end fundamentals.

Numerous reports successfully treated COVID-19 sick people by applying Machine Learning approaches instead of by locating the spatial information through TL. The various statistical tools are highly recognized and they benefit from strong learning speed. Preprocessing is an important phase towards limiting the effects of the depth map in CT portions and removing noise.

The empirical result was also significantly increased image segmentation and morphological operations. Image augmentation and quantization are some of the most widely utilized techniques of pre-processing phase. Domain adaptation was one of the most modern techniques in the study involved. It means that design expertise on a massive dataset is used (the pre-trained version) and that it is transferred to a different dilemma. This is quite beneficial in environments such as radiography, in which the quantity of observations tagged is confined. Earlier researches have shown favorable results in the field of radiography for domain adaptation strategies. The pre-trained InceptionV3 has yielded better reliability in COVID-19 prognosis amongst those investigations involved. Rahman et.al. apply a unique machine learning technique i.e. Stacking CNN Model to discover COVID-19 (symptomatic and asymptomatic) individuals from the comfort of their own homes, through the cough and breath sounds. The proposed methodology has been showcased by the authors, in which eight competent CNN models i.e. Resnet101, Resnet18, Resnet50, DenseNet201, Mobilenetv2, Efficient Net B0, InceptionV3, and Efficient Net B7) were used for training purpose, and a meta-learner classifier has been used to train a logistic regression-based model for the final prediction.

The work presented in provides a hybrid architecture for efficient detection and diagnosis of COVID-19 from cough samples using several

Machine Learning methods. The use of the genetic algorithm in conjunction with Machine Learning approaches improves the accuracy of this structure.

The findings- demonstrated that the hybrid (Genetic Algorithm- Machine Learning) strategy outperforms Machine Learning techniques such as Logistic Regression (LR), Linear Discriminant Analysis (LDA), KNN, Decision tree regression (CART), Naïve Bayes (NB), and SVM on several assessment criteria. The suggested approach is expected to effectively assist clinicians in making appropriate medical decisions based on the COVID-19 analysis.

Speech-based COVID-19 Classification-

Solving pattern recognition and classification problems in diagnosing diseases has been fervently revolutionized since the penetration of Machine Learning and Deep learning techniques. Corona Virus has been primarily hosted on the intra-nasal, bronchial, and lung systems of the human body, and therefore audio analysis of speech segments from infected samples could potentially indicate respiratory, articulatory, and breathing aberrations as compared with a healthy speech sample. Speech-based audio detection of COVID-19 would not only be non-invasive and cost-friendly but can be performed with huge flexibility and portability from any location through a voice recorder and more conveniently a web-based or a mobile-based application, adhering to social distancing norms. Speech-based disease recognition has gained immense admiration in recent times predominantly in diagnosing neurodegenerative diseases affecting regular speech patterns.

OBJECTIVES

Development of Machine Learning model for COVID-19 detection from the Phoneme analysis of speech signal.

METHODS

A 250 *cluster sample from secondary source to* multi-model machine learning approach predication of Covid-19*. A data was taken Covid- 19 cross-sectional online survey was conducted for A.N.C.H. Gaya, in the month of August 2020. Both simple size age range of 25 to 65 years and including interns were enrolled in the study. The study was approved by the ministry of India and Arogya Setu application and medical institutional ethics committee. Online informed consent was obtained from each participant and the information was gathered using a google form administered open ended questionnaire (5 items) to the participants. Out of 500 participants from A.N.C.H. Gaya, while 250 participated and filled the questionnaire completely.*

HYPOTHESIS

To analysed the multi-model machine learning approach predication of Covid-19.

RESULTS

In order to test the hypothesis that a multi-model machine learning approach predication of Covid-19. This portion presents the efficiency of the feature extraction and multi-model classification framework by implementing with the help of the efficiency of severity classification using the fused deep and handcrafted features is compared for different classifiers: LDA, AdaBoost, KNN, SVM and modified Inception regarding the precision, recall, f-measure and accuracy. For these classifiers, the default parameters are used for training and no additional optimization strategies are applied.

Accuracy- It is the percentage of proper categorization of infection severity levels over the total amount of cases tested. A multi-model machine learning approach is a result where the classifier properly categorizes the COVID-19 samples as COVID-19. FP is a result where the classifier improperly categorizes the COVID-19 samples as non-COVID-19. FN is a result where the classifier improperly categorizes the non-COVID-19 samples as COVID-19 patients. A result where the classifier properly categorizes the non-COVID-19 cases as non-COVID-19. The accuracy results of different classifiers with fused features for COVID-9 infection severity level classification. Both *participated and filled the questionnaire* and fill *cross-sectional online survey of* multi-model machine learning approach *was conducted for A.N.C.H. Gaya, in the month of August 2020 and were* computed table-1 below:

Comparison of Accuracy for Different Classifiers using Fused Feature Vectors

FE Models	LDA	AdaBoost	Liner SVM	KNN	Cubic SVM	Modified Inception
Xception	70.68	73.21	74.31	75.51	76.71	79.93
MobileNet V2	73.97	75.42	76.63	77.81	79.21	83.15
InceptionV3	77.11	78.73	79.81	81.61	84.13	84.83
ResNet18	80.52	81.91	83.51	87.36	87.34	88.42
DenseNet201+ Handcrafted features	85.33	87.61	90.93	94.21	96.53	98.32

Table-1 show that 95.5% of the respondent were aware of the of Aarogya Setu app, whereas 4.5% of students were unaware. 70.50% students had installed Aarogya Setu app on their smart phones. 80.70% participants were well versed with the use of Aarogya Setu application. 93.10% knew about risk of contracting COVID-19. About 58.30% students were aware of e-pass facility provided by the app, whereas 41.70% of students were not aware of these features. Seventy-eight percent of participants had knowledge about the vicinity of COVID-19 positive patients in their paths through this app. 79.30% participants aware of self-testing tool in Aarogya Setu app 89.70% participants were aware about application of guiding the user that if contacted COVID-19 positive and how to self-isolate

and what to do if the symptoms develop. Ninety percent of participants knew as that Aarogya Setu app gives information about total COVID-19 patients all over the India. 200 percent of participant found this app is useful, whereas 4% have no in favour of it, moreover about 27% participant did not know about the app. On asking about app recommendation 87% gave positive response for recommending the app to their friends and family.

CONCLUSIONS

Overview of speech-based COVID-19 identification utilizing Machine Learning algorithms, as well as its current relevance and accompanying issues. It also carefully lays out the study aims, the rationale for conducting the inquiry, and its scope. Each chapter includes a summary of the study that was done there as well as the contribution that was made. the findings exhibited that the Machine Learning algorithms been using modified inception achieves the maximum accuracy of classifying the fused deep and handcrafted features extracted from the segments of lung CT images compared to all other classifiers. Therefore, the patients who have the severe stage of infections are identified and diagnosed immediately to recover from the COVID-19 effectively.

REFERENCE

1. Masum, A. K. M., Khushbu, S. A., Keya, M., Abujar, S., & Hossain, S. A. (2020). COVID-19 in Bangladesh: a deeper outlook into the forecast with prediction of upcoming per day cases using time series. Procedia Computer Science, 178, 291-300.

2. Alamo, T., Reina, D. G., Mammarella, M., & Abella, A. (2020). Covid-19: Open-data resources for monitoring, modeling, and forecasting the epidemic. Electronics, 9(5), 827.

3. Alimadadi, A., Aryal, S., Manandhar, I., Munroe, P. B., Joe, B., & Cheng, X. (2020). Artificial intelligence and machine learning to fight COVID-19. Physiological genomics, 52(4), 200-202.

4. Al-Qaness, M. A., Ewees, A. A., Fan, H., & Abd El Aziz, M. (2020). Optimization method for forecasting confirmed cases of COVID-19 in China. Journal of Clinical Medicine, 9(3), 674.

5. Ardabili, S. F., Mosavi, A., Ghamisi, P., Ferdinand, F., Varkonyi-Koczy, A. R., Reuter, U., & Atkinson, P. M. (2020). Covid-19 outbreak prediction with machine learning. Algorithms, 13(10), 249.

6. Azarafza, M., Azarafza, M., & Tanha, J. (2020). COVID-19 infection forecasting based on deep learning in Iran, medRxiv.

7. Baldé, M. A. (2020). Fitting SIR model to COVID-19 pandemic data and comparative forecasting with machine learning. medRxiv.

8. Car, Z., Baressi Šegota, S., Andelić, N., Lorencin, I., & Mrzljak, V. (2020). Modeling the spread of COVID-19 infection using a multilayer perceptron. Computational and mathematical methods in medicine, 2020.

9. Dandekar, R., & Barbastathis, G. (2020). Quantifying the effect of quarantine control in Covid19 infectious spread using machine learning, medRxiv.

10. I\wendi, C., Bashir, A. K., Peshkar, A., Sujatha, R., Chatterjee, J. M., Pasupuleti, S., ... & Jo, O. (2020). COVID-19 patient health prediction using boosted random forest algorithm. Frontiers in public health, 8, 357.

11. Khan, S., Bashir, A. K., Iwendi, C., Gadekallu, T. R., & Deepa, N. (2020). A feature extraction based approach to detect Covid-19 related fake news. Appl Soft Comput.

12. Huang, C. J., Chen, Y. H., Ma, Y., & Kuo, P. H. (2020). Multiple-input deep convolutional neural network model for covid-19 forecasting in china. MedRxiv.

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