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Implementation Paper on Covid 19: Data Mining Approach for Diagnosis and Treatment

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Abstract: ***The outbreak of Severe Acute Respiratory Syndrome Coronavirus 31 2 (SARS-COV-2) has caused more than 2.5 million cases of Corona Virus Disease 32 (COVID-19) in the world so far, with that number continuing to grow. To control the 33 spread of the disease, screening large numbers of suspected cases for appropriate 34 quarantine and treatment is a priority. Pathogenic laboratory testing is the gold 35 standard but is time-consuming with significant false negative results. Therefore, 36 alternative diagnostic methods are urgently needed to combat the disease. Based 37 on COVID-19 radio graphical changes in CT images, we hypothesized that Artificial 38 Intelligence's deep learning methods might be able to extract COVID-19's specific 39 graphical features and provide a clinical diagnosis ahead of the pathogenic test, thus 40 saving critical time for disease control***
Keywords: COVID-19, Computed Tomography, Artificial Intelligence, Deep Learning, Diagnosis

I. INTRODUCTION

The corona virus infection, COVID-19 has surprised the world with its rapid spread, potential virulence, with potential profound overall impact on the lives of billions of people from both a safety and an economic perspective. As of this writing, there are approximately 93,158 confirmed cases of which 80,270 are in "Mainland China" with 3,198 deaths, a mortality rate of 3.4%

In the case of a new disease, such as the corona virus, datasets are just now being identified and annotated. There are very limited data sources as well as limited expertise in labeling the data specific to this new strain of the virus in humans. Accordingly, it is not clear that there are enough examples to achieve clinically meaningful learning at this early stage of data collection despite the increasingly critical importance of this software, especially given fears of a pandemic.

It is our hypothesis that AI-based tools can be rapidly developed leveraging the ability to modify and adapt existing AI models and combine them with initial clinical understanding to address the new challenges and new category of COVID-19. Our goal is to develop deep-learning based automated CT image analysis tools and demonstrate that they can enable differentiation of corona virus patients from those who do not have the disease to provide support in the detection, measurements, and tracking of disease progression.

In this paper, we propose a machine-learning model that predicts a positive SARS-CoV-2 infection in a RT-PCR test by asking eight basic questions. The model was trained on data of all individuals in Israel tested for SARS-CoV-2 during the first months of the COVID-19 pandemic. Thus, our model can be implemented globally for effective screening and prioritization of testing for the virus in the general population.

II. LITERATURE SURVEY

1) Effective screening of SARS-CoV-2 enables quick and efficient diagnosis of COVID-19 and can mitigate the burden on healthcare systems. Prediction models that combine several features to estimate the risk of infection have been developed. These aim to assist medical staff worldwide in triaging patients, especially in the context of limited healthcare resources. We established a machinelearning approach that trained on records from 51,831 tested individuals (of whom 4769 were confirmed to have COVID-19). The test set contained data from the subsequent week (47,401 tested individuals of whom 3624 were confirmed to have COVID-19). Our model predicted COVID-19 test results with high accuracy using only eight binary features: sex, age ≥60 years, known contact with an infected individual, and the appearance of five initial clinical symptoms. Overall, based on the nationwide data publicly reported by the Israeli Ministry of Health, we developed a model that detects COVID-19 cases by simple features accessed by asking basic questions. Our framework can be used, among other considerations, to prioritize testing for COVID-19 when testing resources are limited

2) In this Paper they try to control the spread of the COVID-19, screening large numbers of suspected 55 cases for appropriate quarantine and treatment measures is a priority. Pathogenic 56 laboratory testing is the gold standard but is time-consuming with significant false 57 negative results. Therefore, alternative diagnostic methods are urgently needed to 58 combat the disease. We hypothesized that Artificial Intelligence's deep learning 59 methods might be able to extract COVID-19's specific graphical features and 60 provide a clinical diagnosis ahead of the pathogenic test, thus saving critical time. 61 We collected 1,065 CT images of pathogen-confirmed COVID-19 cases along with 62 those previously diagnosed with typical viral pneumonia. We modified the Inception 63 transfer-learning model to establish the algorithm. The internal validation achieved 64 a total accuracy of 89.5% with specificity of 0.88 and sensitivity of 0.87. The 65 external testing dataset showed a total accuracy of 79.3% with specificity of 0.83 66 and sensitivity of 0.67. In addition, in 54 COVID-19 images that first two nucleic 67 acid test results were negative, 46 were predicted as COVID-19 positive by the 68 algorithm, with the accuracy of 85.2%. Our study represents the first study to apply 69 artificial intelligence to CT images for effectively screening for COVID-19

3) In this initial exploratory work, we show the capabilities of AI to assist in the efforts to accurately detect and track the progression or resolution of the Coronavirus. This is the first report to our knowledge in the literature of software specifically developed to detect, characterize and track the progression of COVID19. Rapidly developed AI-based automated CT image analysis tools can achieve high accuracy in the detection of Coronavirus positive patients as well as quantification of disease burden. Utilizing the deep-learning image analysis system developed, we achieved classification results for Coronavirus vs Non-coronavirus cases per thoracic CT studies of 0.996 AUC (95%CI: 0.989-1.00) on datasets of Chinese control and infected patients. Two possible working points are: 98.2% sensitivity, 92.2% specificity (high sensitivity point); 96.4% sensitivity, 98% specificity (high specificity point). For Coronavirus patients the system outputs quantitative opacity measurements and a visualization of the larger opacities in a slice-based "heat map" or a 3D volume display. A suggested "Corona score" measures the progression of patients over time.

4) Our findings may be used to refine national public health guidelines on self-isolating individuals whose symptoms are suggestive of COVID-19. The current policy in the Netherlands is that people with mild respiratory symptoms self-isolate and household members of people with fever are requested to self-quarantine. Based on our findings, this could be expanded with general non-respiratory symptoms or anosmia. Our detailed report of early symptoms among HCW tested for SARS-CoV-2 identified that general non-respiratory symptoms and anosmia were strongly associated with test positivity. While our prediction models would not justify presumptive SARS-CoV-2 diagnosis without molecular confirmation, findings may contribute to a targeted screening strategy which may be of value in settings with limited availability of testing materials.

III. SYSTEM DESIGN

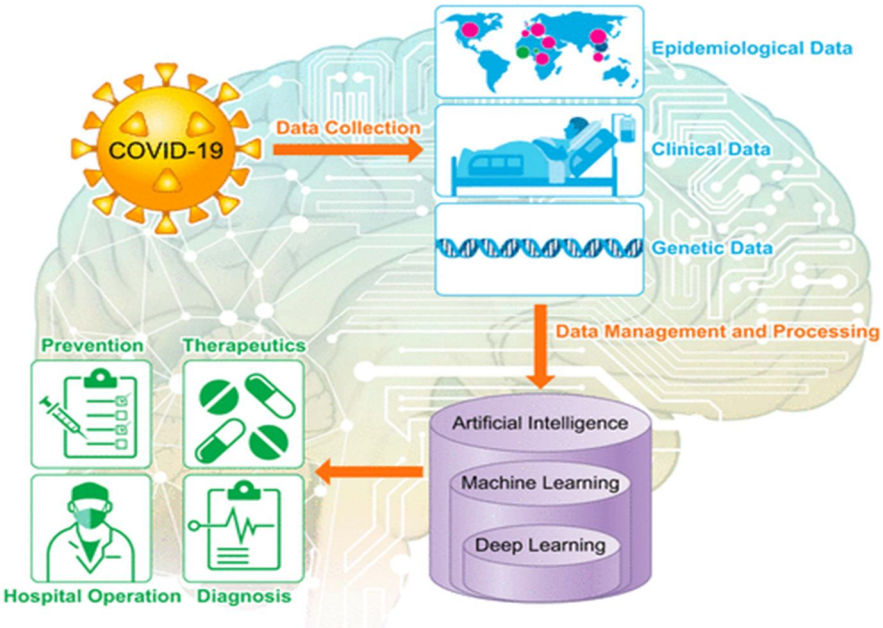
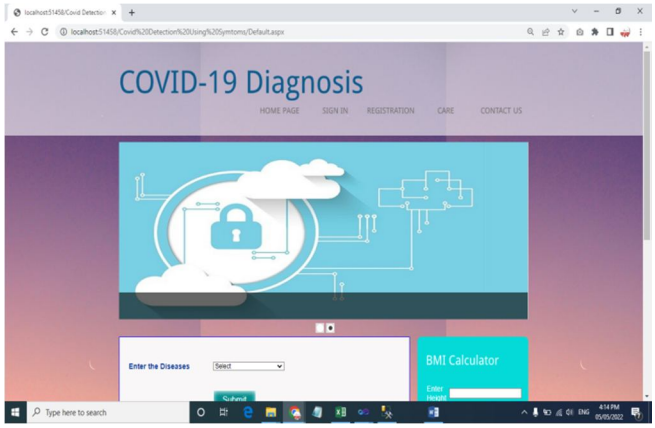


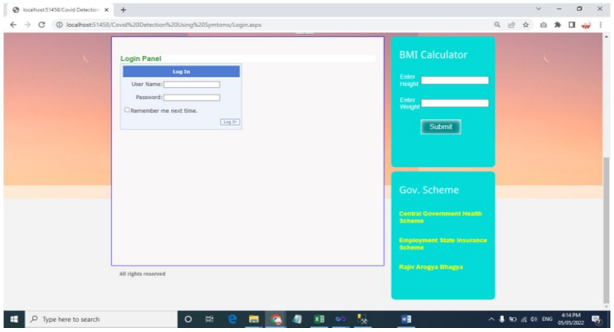
Fig : COVID-19 diagnosis based on symptoms

IV. SYSTEM SNAP SHOTS

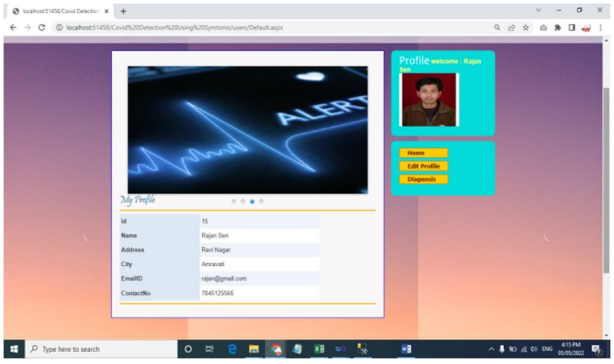
A. *Home Page*



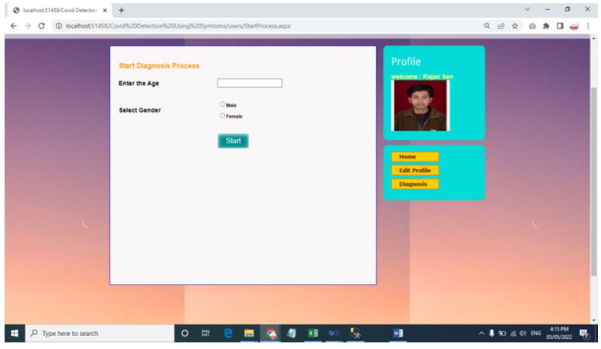
B. *Login*



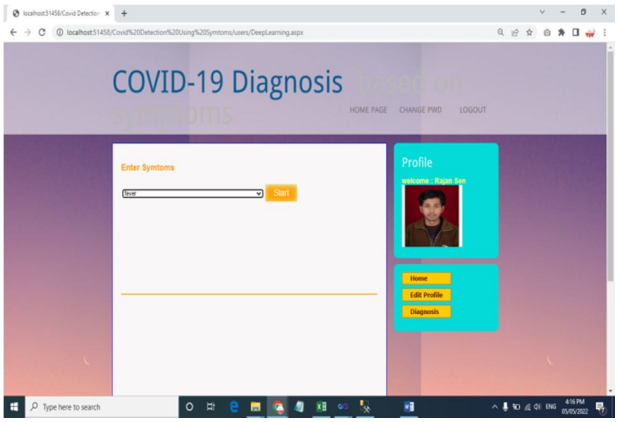
C. *User Dashboard*



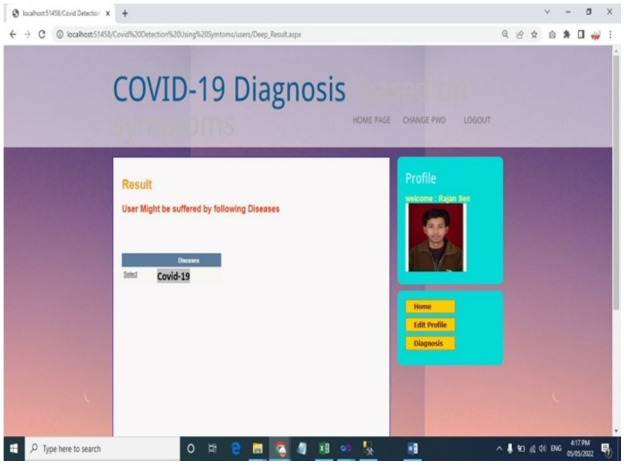
D. *Start Diagnosis Process*



E. Symptoms Selection



F. Result Page



V. MODULES

1) *Login Page:* This is the first page of the project. User can login from this page with username and password. If in case user forgot his password then he get new password from the forget password button. This facility is provided in our project. After getting new password user can login successfully.
2) *New user Registration:* By this new user can register himself. After registration user has given login Id and password with this user login to the system.
3) *User Panel:* User can login with their user Id and password. After Login User can have 2 options to detect covid-19. User can either upload x-ray of chest User can upload the details symptoms which is ask by system Later confirmation is given by system.
4) *Admin Panel:* Admin can login with user Id and password Admin can see details of tested patients. Admin can update the symptoms information accordingly.

VI. CONCLUSION

Thus we conclude system which may be used to refine national public health guidelines on self-isolating individuals whose symptoms are suggestive of COVID-19. Based on our findings, this could be expanded with general non-respiratory symptoms. Hence we have successfully completed Our detailed report of early symptoms among HCW tested for SARS-CoV-2 identified that general non-respiratory symptoms and anosmia were strongly associated with test positivity. While our prediction models would not justify presumptive SARS-CoV-2 diagnosis without molecular confirmation, findings may contribute to a targeted screening strategy which may be of value in settings with limited availability of testing materials

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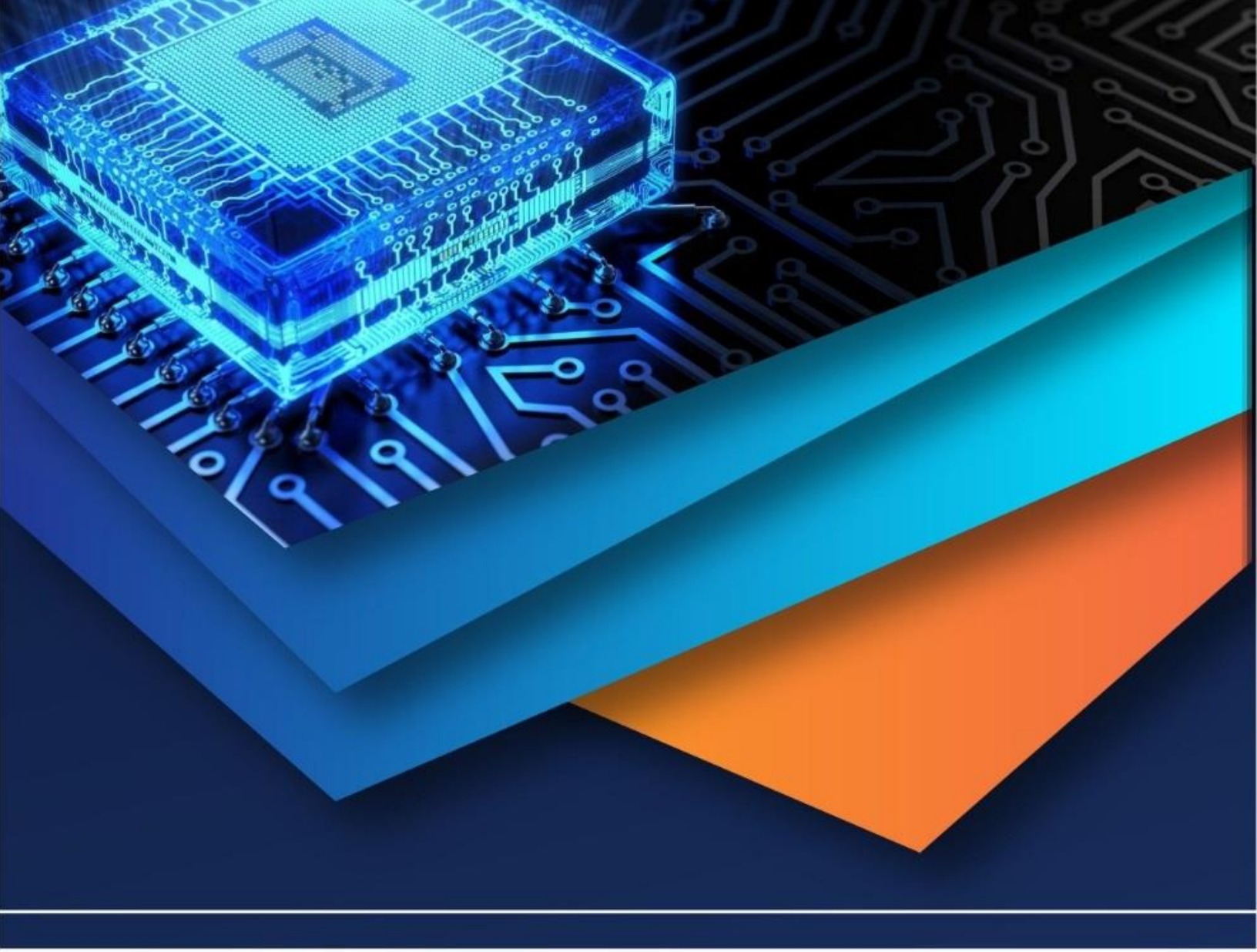

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