

ADVANCED MACHINE LEARNING

PROJECT SUMMARY

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Project Topic: - A Deep Learning based Approach for Detection and Classification of COVID-19 on CT-scans using U-Net model.

Objective: - To inculcate the development of a deep learning model for the prediction of whether a person is affected with COVID-19 by analysing his/her CT-scan data. (<https://imagingcovid19ai.eu/>)

Dataset: - COVID & non-COVID lung CT-scans

Dataset Source: - Kaggle (<https://www.kaggle.com/luisblanche/covidct>)

The images are collected from COVID19-related papers from medRxiv, bioRxiv, NEJM, JAMA, Lancet, etc. CTs containing COVID-19 abnormalities are selected by reading the figure captions in the papers.

Dataset Description: - The total dataset is primarily divided into 2 parts, namely, 349 COVID lung CT-scan(that are positive for COVID-19) and 397 non-COVID lung CT-scan dataset(that are negative for COVID-19).

Technology to be Used: -

1. Python
2. U-Net Model
3. Deep Convolutional Neural Network

Proposed Model summary: -

There is an increasing interest in the role of imaging for diagnosis of COVID-19. Accurate and fast diagnosis of COVID-19 suspected cases plays a crucial role in timely quarantine and medical treatment. Developing a deep learning-based model for automatic COVID-19 detection on chest CT-scan is helpful to counter the outbreak of SARS-CoV-2. A deep learning-based system is being proposed to detect COVID-19 using CT-scan dataset.

For each patient, the lung region will be segmented using a pre-trained UNet then the segmented lung region will be fed into a deep neural network to predict the probability of COVID-19. The proposed work will provide a faster way to identify COVID-19 patients, which is beneficial to control the outbreak of COVID-19.

Proposed Model Highlights: -

- Accurate and fast diagnosis of infection in a large number of patients
- Manual read of a CT scan can take up to 15 minutes, our model would be able to analyse the images in 10 seconds
- Support clinical decision making and improve workflow efficiency
- Sensitivity of chest CT to diagnose COVID-19 has been reported as high and hence, increases the value of our proposed work