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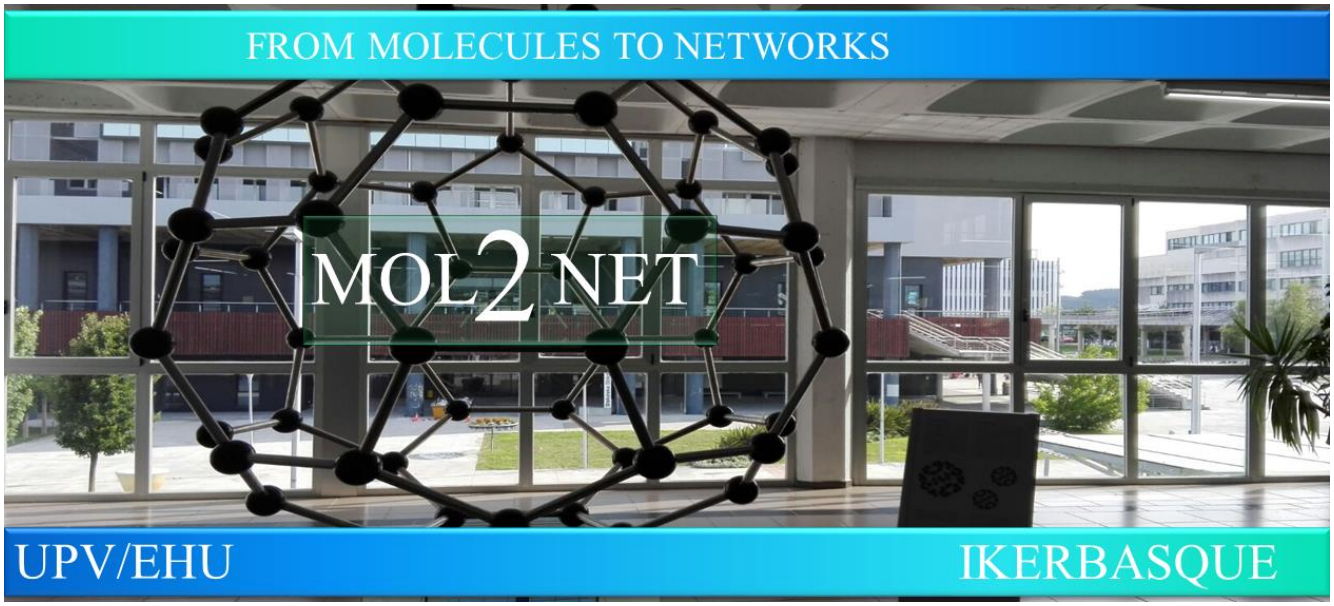

Applications of machine learning and artificial intelligence for Covid-19 (SARS-CoV-2) pandemic

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Abstract.

During the recent global urgency, scientists, clinicians, and healthcare experts around the globe keep on searching for a new technology to support in tackling the Covid-19 pandemic. The evidence of Machine Learning (ML) and Artificial Intelligence (AI) application on the previous epidemic encourage researchers by giving a new angle to fight against the novel Coronavirus outbreak. Different applications of Machine Learning on COVID-19 will be discussed.

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On the one hand, Ong *et al.* [1] did a research on the use of Machine Learning to develop an effective and safe vaccine against this highly contagious disease caused by the SARS-CoV-2 coronavirus. They used the Vaxign reverse vaccinology tool and the newly developed Vaxign-ML machine learning tool to predict COVID-19 vaccine candidates. Moreover, by investigating the entire proteome of SARS-CoV-2, six proteins, including the S protein and five non-structural proteins (nsp3, 3CL-pro, and nsp8-10) were predicted to be adhesins, which are crucial to the viral adhering and host invasion. They noticed that nsp3 protein has not been tested in any coronavirus vaccine studies and was selected for further investigation. The nsp3 was found to be more conserved among SARS-CoV-2, SARS-CoV, and MERS-CoV than among 15 coronaviruses infecting human and other animals.

On the other hand, Mondal *et al.* [2] performed a scoping review on AI for COVID-19 using preferred reporting items of systematic reviews and meta-analysis (PRISMA) guidelines. The methodology they used consisted of doing literature search for relevant studies published from 1 January 2020 till 27 March 2021. A full-text review of 440 articles was done based on the keywords of AI, COVID-19, ML, forecasting, DL, X-ray, and Computed Tomography (CT). Finally, 52 articles were included in the result synthesis of this paper. Firstly, different ML regression methods were reviewed in predicting the number of confirmed and death cases. Secondly, a comprehensive survey was carried out on the use of ML in classifying COVID-19 patients. Thirdly, different datasets on medical imaging were compared. And finally, the performance results of different research papers were compared to evaluate the effectiveness of DL methods on different datasets. The results showed that residual neural network (ResNet-18) and densely connected convolutional network (DenseNet 169) exhibit excellent classification accuracy for X-ray images, while DenseNet-201 has the maximum accuracy in classifying CT scan images.

Lastly, Lalmuanawma *et al.* [3] reviewed the role of AI and ML as one significant method in the arena of screening, predicting, forecasting, contact tracing, and drug development for SARS-CoV-2 and its related epidemic. They executed a selective assessment of information on the research article on the databases related to the application of ML and AI technology on Covid-19. They noticed that the ongoing development in AI and ML has significantly improved treatment, medication, screening, prediction, forecasting, contact tracing, and drug/vaccine development process for the Covid-19 pandemic and reduce the human intervention in medical practice. However, most of the models are not deployed enough to show their real-world operation, but they are still up to the mark to tackle the SARS-CoV-2 epidemic.

To conclude, it is seen that ML and DL are useful tools in assisting researchers and medical professionals in predicting, screening and detecting COVID-19.

References

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