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A Novel Approach for Automatic Detection of the Coronavirus Disease from CT Images Using an Optimized Convolutional Neural Network

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Abstract: *To speed up the diagnosis of covid19 virus disease, an automatic automated approach for classifying computed tomography images of the chest is presented. The Automatic Detection Coronavirus Optimized Convolutional Neural Network (ADECOCNN) is a proposed convolutional neural network model for dividing infected, non-infected, and other pulmonary disease patients. The ADECO-CNN-optimized CNN model can categorise CT images with 99.99 % accuracy, 99.96 % sensitivity, 99.92 % precision, and 99.97 % specificity, according to extensive testing. CT imaging of the chest is highly recommended in the early detection of disease since it determines the amount and nature of the lesion. It also evaluates alterations that aren't obvious on X-rays of the chest. The shape, quantity, distribution, density, and accompanying symptoms of a lesion are all examined using CT imaging. Chest CT imaging can serve as a critical early warning indicator of being a COVID-19 carrier and can be extremely useful for patients who are experiencing any COVID-19-related symptoms.*

Keywords: Convolutional Neural Network (CNN), COVID, Computed Tomography (CT) Images, Deep Learning, etc.

REFERENCES

[1] Saima Sadiq , and Muhammad Umer "COVID-19: Automatic Detection of the Novel Coronavirus Disease From CT Images Using an Optimized Convolutional Neural Network" IEEE Transactions on Industrial Informatics (Volume: 17, Issue: 9, Sept. 2021)
[2] Song et al., "Emerging 2019 novel coronavirus (2019-nCoV) pneumonia," Radiology, vol. 295, no. 1, pp. 210–217, 2020.
[3] C. Huang et al., "Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China," Lancet, vol. 395, no. 10223, pp. 497–506, 2020.
[4] F. Yu, L. Du, D. M. Ojcius, C. Pan, and S. Jiang, "Measures for diagnosing and treating infections by a novel coronavirus responsible for a pneumonia outbreak originating in Wuhan, China," Microbes Infection, vol. 22, no. 2, pp. 74–79, Mar. 2020, doi: 10.1016/j.micinf.2020.01.003.
[5] M. Qian, Q. Yi, F. Qihua, and G. Ming, "Understanding the influencing factors of nucleic acid detection of 2019 novel coronavirus," Chin J. Lab Med., vol. 10, pp. 1–7, 2020.
[6] M. Abdel-Basset, V. Chang, and R. Mohamed, "HSMA_WOA: A hybrid novel slime mould algorithm with whale optimization algorithm for tackling the image segmentation problem of chest x-ray images," Appl. Soft Comput., vol. 95, 2020, Art. no. 106642. http://www.sciencedirect.com/science/article/pii/ S1568494620305809
[7] L. T. Phan et al., "Importation and human-to-human transmission of a novel coronavirus in Vietnam," New England J. Med., vol. 382, no. 9, pp. 872–874, 2020.
[8] Y.-H. Jin et al., "A rapid advice guideline for the diagnosis and treatment of 2019 novel coronavirus (2019-nCoV) infected pneumonia," Mil. Med. Res., vol. 7, no. 1, pp. 1–23, 2020, doi: 10.1186/s40779-020-0233-6.
[9] Y. Fang et al., "Sensitivity of chest CT for COVID-19: Comparison to RTPCR," Radiology, vol. 296, no. 2, pp. E115–E117, 2020, Art. no. 200432.
[10] X. Xie, Z. Zhong, W. Zhao, C. Zheng, F. Wang, and J. Liu, "Chest CT for typical 2019-nCoV pneumonia:

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Relationship to negative RT-PCR testing," Radiology, vol. 296, no. 2, pp. E41–E45, 2020, Art. no. 200343.
[11] M. Abdel-Basset, V. Chang, H. Hawash, R. K. Chakrabortty, and M. Ryan, "FSS-2019-nCov: A deep learning architecture for semi-supervised fewshot segmentation of COVID-19 infection," Knowl.-Based Syst., vol. 212, 2021, Art. no. 106647. [Online]. Available: http://www.sciencedirect.com/ science/article/pii/S0950705 120307760
[12] J. Zhang, Y. Xie, Y. Li, C. Shen, and Y. Xia, "COVID-19 screening on chest x-ray images using deep learning-based anomaly detection," IEEE Trans. Med. Image., vol. 40, no. 3, pp. 879–890, Mar. 2021, doi: 10.1109/TMI.2020.3040950.
[13] L. Li et al., "Artificial intelligence distinguishes COVID-19 from community acquired pneumonia on chest CT," Radiology, vol. 296, no. 2, pp. E65–E71, 2020, Art. no. 200905.
[14] J. P. Cohen, P. Morrison, and L. Dao, "COVID-19 image data collection," 2020, arXiv:2003.11597.
[15] A. Bernheim et al., "Chest CT findings in coronavirus disease-19 (COVID19): Relationship to duration of infection," Radiology, vol. 295, no. 3, pp. 685–691, 2020, Art. no. 200463.
[16] M. Umer, S. Sadiq, M. Ahmad, S. Ullah, G. S. Choi, and A. Mehmood, "A novel stacked CNN for malarial parasite detection in thin blood smear images," IEEE Access, vol. 8, pp. 93 782–93 792, 2020.
[17] M. V. Moreno et al., "Applicability of big data techniques to smart cities deployments," IEEE Trans. Ind. Informat., vol. 13, no. 2, pp. 800–809, Apr. 2017.
[18] M. Abdel-Baset, V. Chang, and A. Gamal, "Evaluation of the green supply chain management practices: A novel neutrosophic approach," Comput. Ind., vol. 108, pp. 210–220, 2019.
[19] B. Huang et al., "Deep reinforcement learning for performance-aware adaptive resource allocation in mobile edge computing," Wireless Commun. Mobile Comput., vol. 2020, pp. 1–17, 2020, Art. no. 2765491.
[20] V. Chang, "Computational intelligence for medical imaging simulations," J. Med. Syst., vol. 42, no. 1, pp. 1–12, 2018, doi: 10.1007/s10916-017- 0861-x.
[21] X. Li, Y. Wang, B. Zhang, and J. Ma, "PSDRNN: An efficient and effective HAR scheme based on feature extraction and deep learning," IEEE Trans. Ind. Informat., vol. 16, no. 10, pp. 6703–6713, Oct. 2020.
[22] B. Naik, M. S. Obaidat, J. Nayak, D. Pelusi, P. Vijayakumar, and S. H. Islam, "Intelligent secure ecosystem based on metaheuristic and functional link neural network for edge of things," IEEE Trans. Ind. Informat., vol. 16, no. 3, pp. 1947–1956, Mar. 2020.
[23] M. Ma and Z. Mao, "Deep convolution-based LSTM network for remaining useful life prediction," IEEE Trans. Ind. Informat., vol. 17, no. 3, pp. 1658–1667, Mar. 2021.
[24] F. Shan et al., "Abnormal lung quantification in chest CT images of COVID-19 patients with deep learning and its application to severity prediction," Med. Phys., 2020, doi: 10.1002/mp.14609.
[25] S. Wang et al., "A deep learning algorithm using CT images to screen for corona virus disease (COVID-19)," MedRxiv, pp. 1–17, 2020, doi: 10.1007/s00330-021-07715-1.
[26] A. Narin, C. Kaya, and Z. Pamuk, "Automatic detection of coronavirus disease (COVID-19) using x-ray images and deep convolutional neural networks," 2020, arXiv:2003.10849.
[27] E. Soares, P. Angelov, S. Biaso, M. H. Froes, and D. K. Abe, "SARS-CoV-2 CT-Scan dataset: A large dataset of real patients CT scans for SARS-CoV-2 identification," Medrxiv, pp. 1–8, 2020, doi: 10.1101/2020.04.24.20078584.
[28] K. Simonyan and A. Zisserman, "Very deep convolutional networks for large-scale image recognition," in Proc. 3rd International Conference Learn. Representations, 2015. ://iclr.cc/archive/www/doku.php% 3Fid=iclr2015: main.html
[29] C. Szegedy et al., "Going deeper with convolutions," in Proc. IEEE Conf. Comput. Vis. Pattern Recognit., 2015, pp. 1–9.
[30] K. He, X. Zhang, S. Ren, and J. Sun, "Deep residual learning for image recognition," in Proc. IEEE Conf. Comput. Vis. Pattern Recognit., 2016, pp. 770–778.