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Artificial Intelligence Detects and Distinguishes COVID-19 Pneumonia from Community Acquired Pneumonia in Children on Chest CT

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Purpose: To evaluate the performance of an automatic unified model that combined a pre-trained deep learning segmentation model, radiomic feature extraction and machine learning methods for classifying coronavirus disease 2019 (COVID-19) versus community acquired pneumonia (CAP) in children based on computed tomography (CT).

Method: This retrospective study included children with COVID-19 (n = 34) and CAP (n = 70). The CT scans were collected from two children hospitals in China. A pre-trained deep learning segmentation model was used to segment pneumonia lesion on which the radiomic features were extracted. Four classifiers: logistic regression (LR), K nearest neighbours (KNN), random forest (RF) and support vector machine (SVM) were trained and evaluated with leave-one-out cross-validation approach and diagnostic performance was assessed by the area under the receiver operating characteristic curve (AUC), sensitivity, specificity and accuracy.

Results: Pneumonia lesions were segmented and detected in 29 out of 34 COVID-19 cases and 65 out of 70 CAP cases through the segmentation network. Among all the classifiers, random forest reached the highest AUC of 0.996, with sensitivity of 0.862 and specificity of 1.00.

Conclusion: This unified model can accurately detect COVID-19 and differentiate it from non-COVID-19 community acquired pneumonia in children.

Keywords: COVID-19, child, chest CT, radiomics, machine learning, deep learning, pneumonia differentiation.

Biography

CMC LEADER more than 20 years' pharmaceutical industry experience with expertise on small molecule CMC product development. Deep understanding of compound development essence through successfully managing CMC development of multiple project and moving compound from NME, to FIH, POC and late stage development.

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