David McCombs, Eugene Goryunov, Dina Blikshteyn and Roy Falik in Bloomberg Law: 'COVID Testing and Patentability'

March 8, 2021 David McCombs, Dina Blikshteyn

PRACTICES Intellectual Property, Patents

In September 2020, a team of MIT researchers published a paper in the IEEE Open Journal of Engineering in Medicine and Biology, testing the hypothesis that coronavirus carriers—even asymptomatic ones—could be accurately detected using artificial intelligence (AI) based on only a phone recording of a forced cough.

If this hypothesis is correct, the COVID-19 test can be accessible to people worldwide. This is because it can be programmed into a mobile application, which can then be installed by millions of people on their smartphones. Once installed, people can use their smartphones to take a test from the comfort of their home and quickly determine whether they are likely to test positive or negative for the virus. There is no doubt that this invention is valuable, accessible, and easy to use. But is this invention patentable?

MIT Study

In the MIT study, a convolutional neural network (CNN) model was used to develop a process for predicting whether the cough came from a COVID-19 or non-COVID-19 carrier. First, an audio of a person's cough is recorded. The recorded audio is then divided into chunks and analyzed for indicative points or biomarkers in the audio spectrum. The biomarkers are subsequently passed to three different pre-trained 50-layer residual CNN (ResNet50) networks, each designed to analyze a different biomarker: one for the vocal cords, one for the lungs and respiratory tract, and one for sentiment or mood. The outputs of the ResNet50 networks are aggregated and a binary COVID/No-COVID decision is generated.

The key feature of the MIT study's model is its use of the ResNet50 networks. These networks are pre-trained to analyze voice recordings to detect Alzheimer's disease. Importing the pre-trained networks into the COVID-19 detection model provides several benefits. First, using a pre-trained model means that the COVID-19 detection already has a heuristic for decision-making, meaning the COVID-19 detection model requires less training and only fine-tuning. Second, using a pre-trained model can help the accuracy of the new network by increasing the saliency of information that may have not been apparent in the novel use. Think of it as the new model saying, “Oh! I never would have thought of it like that.”

The MIT team's COVID-19 study demonstrates remarkable results. The sensitivity of the algorithm—a measure of false negatives or, in other words, how good the test is at accurately detecting real cases—is 98.5% and the specificity of the algorithm—a measure of false positives or, in other words, how good the test is at not over-diagnosing—is 94.2%. For asymptomatic subjects, the sensitivity rose to 100% and the specificity fell to 83.2%.

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