

Abstract—As the COVID-19 pandemic continued, rapid non-invasive testing became essential. In this REU project, we use audio waveform signatures of breathing and coughing to determine whether COVID-19 can be diagnosed. More specifically, we determine breathing and coughing audio features and use machine learning algorithms to develop diagnostics for COVID-19. The non-invasive rapid and remote testing benefits of this approach relative to existing nose swab, saliva, and blood testing make this method attractive for deployment on smart phones. Challenges include possible distorted or low-quality audio samples, availability of reliable labeled (ground truth) data, confusability with other respiratory diseases, and lack of baseline (healthy) audio recordings for comparison to suspected pathological cases. We are exploring various machine learning algorithms including convolutional neural networks (CNNs), convolutional recurrent neural networks (CRNNs), and graph convolutional recurrent neural networks (GCRNNs). We implemented these algorithms in python and comparative results in terms of performance and computational complexity have been obtained.