

Automated COVID-19 Detection Using Machine Learning

Team Members:

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Date of Meeting:

08/27 - 3:30 PM

09/03 - 3:30 PM

Goal and Motivation:

The COVID-19 pandemic has underscored the need for effective and innovative diagnostic tools. A web-based application that analyzes cough audio to predict COVID-19 infection can offer a convenient and non-invasive screening method, potentially aiding early detection and reducing healthcare burdens.

Approach (Key Features of the System):

The user can record their coughs and receive predictions on their COVID-19 infection status. This feature not only provides real-time feedback but also aids in maintaining a history of the user's infection status, making it a non-invasive and cost-effective tool for early screening. By tracking this data over time, the user can monitor their health status without the immediate need for a healthcare provider.

The web app design prioritizes ease of use, ensuring anyone can navigate it effortlessly and check their COVID-19 status at any time. Other aspects of the website will include details about the research and development of the ML model

The user can view a week-long progress chart, making it easier to visualize changes in their infection status over time. This feature helps determine when a user is recovering and no longer symptomatic, or still infected. The user-friendly layout ensures that navigating the web app is straightforward.

Users can access their data at any time, providing continuous access to their COVID-19 status history. This eliminates the need to wait for a healthcare provider for early detection and offers users a convenient and effective way to monitor their health

Novel Features/Functionalities:

The web app not only predicts COVID-19 infections based on cough recordings but can also track the progression of the user's condition over time. By analyzing daily recordings, the user can observe trends in their symptoms, making it easier to determine when medical intervention is necessary. This continuous monitoring feature offers a more personalized health-tracking experience.

Algorithms and tools (Potentially useful algorithms and software tools):

Convolutional Neural Network (CNN)

- A neural network architecture with the potential for good performance for this classification task. This will take in cough audio as input and output a COVID-19 infection prediction.

Flask, Django, React

- Common web development frameworks. To be researched and further redefined for selection. This will handle the back end of the website and data transference.

TensorFlow, Numpy, Pandas

- Common python frameworks and tools that will help in manipulating data and creating the neural network model.

Technical Challenges:

All team members have limited experience in website application development, which is a necessary component of the final product.

The dataset should be developed using a machine learning algorithm, a convolutional neural network (CNN) was suggested. Research must be done to ensure that a CNN can be developed appropriately.

Different frameworks/architectures may be better suited for this task which would require additional research to learn and understand.

Milestone 1 Tasks (Sep 30):

- Pick framework (web)
- Pick framework (ML)
 - Research sound classification
 - Audio to image conversion
- Design ML workflow (Beginning to end)
- Design web workflow & high-level design
 - User interactions SSD
- Develop a testing plan for ML
- Develop a testing plan for Web
- Becoming familiar with CNN and RNN
 - RNN for potential future predictions (infection outlook)
- Becoming familiar with web-dev

Milestone 2 Tasks (Oct 28):

- Refine ML workflow
- Begin feature engineering on dataset
- Begin working on web framework front end
- Begin working on web framework back end

Milestone 3 Tasks (Nov 25):

- Begin ML testing
- Begin web testing
 - Integrating base ML model with web using a Neural Network (NN) framework

Task Matrix for Milestone 1:

Task	<i>Rodrigo</i>	<i>Emma</i>	<i>Lamine</i>
Pick web framework	Pick web framework	Learn about selected framework	Learn about selected framework
Pick ML framework	Group decision for base framework	Group decision for base framework	Group decision for base framework
Become familiar with ML	Learn and familiarize with ML	Learn and familiarize with ML	Learn and familiarize with ML
Become familiar with web-dev	Research web-dev	Research web-dev	Research web-dev
Research sound classification	Research sound classification	Research sound classification	Research sound classification
Required research	Different alternatives for audio as input data	Different audio to image conversion techniques	Feature engineering
Design ML workflow (beginning to end)	Design 25%	Design 50%	Design 25%
User interaction (SSD)	Develop 25%	Develop 25%	Develop 50%
Develop a testing plan for ML and web	Develop 33%	Develop 33%	Develop 33%

Approval from Faculty Advisor

"I have discussed with the team and approved this project plan. I will evaluate the progress and assign a grade for each of the three milestones."

Signature _____

Date _____