Milestone 4

1. Covid19 Audio Cough Classification
Emma Conti - econti2020@my.fit.edu
Lamine Deen - ldeen2016@my.fit.edu
Rodrigo Alarcon - ralarcon2019@my.fit.edu
Audrey Eley - aeley2020@my.fit.edu
2. Faculty Advisor: Dr. Nematzadeh Zahra znematzadeh@fit.edu
3. Client: Dr. Nematzadeh Zahra, Florida Tech College of Engineering and Science: Department of Electrical Engineering and Computer Science

4. **Milestone 4 Matrix**

Task	Rodrigo	Emma	Lamine	Audrey	Notes
1. Finish cleaning data	25%	25%	25%	25%	Data is completely cleaned, script has been made to separate unusable data
2. ML testing and refinement of framework	0%	50%	50%	0%	CNN is being refined, ResNet50 model has been developed
3. Web testing	50%	0%	0%	50%	User form is working, users can make recordings on the website
4. Integrating Base ML Model with Web Using a Neural Network Framework	25%	25%	25%	25%	ResNet50 model has been given to the web team to integrate

5. Discussion (at least a few sentences, ie a paragraph) of each accomplished task (and obstacles) for the current Milestone:

- Task 1:

Data included a variety of audio records that were inaccurately listed as cough recordings. In order to attain results with any level of accuracy, the dataset needed to be completely cleaned before testing could re-commence. Once all audio files were listened to, it was necessary to take this information and pass it through a script to remove all audio files, mel spectrograms, and stored metadata that are no longer being used so the new final dataset can be used for testing.

- Task 2:

Once cleaning the dataset has been completed, it is imperative to begin testing again to see where the weaknesses in our CNN model are. Based on the results, we will adjust the hyperparameters as needed. With the cleaning of the dataset, minimal preprocessing should be needed compared to the amount that had been completed for prior tests.

One problem to account for may be overfitting due to the shrinking size of our dataset. There are ways to account for this in both datasets, but ResNet50 may perform better due to having alternative sources for pretraining, whereas our CNN only has access to our own dataset.

At this point there are two CNN models working for this dataset, our own personal one and the ResNet50 model. The results will continue to be compared so our CNN can be optimized.

- Task 3:

The generic Django user model has been modified to accept additional information which will be used in tandem with the audio recordings to generate covid status predictions. This change has also been made accordingly throughout the webapp to reflect on the admin page of the website.

- Task 4:

Web app integration tests will begin with the ResNet50 model and may transfer to our CNN at a later time.

6. Discussion (at least a few sentences, ie a paragraph) of contribution of each team member to the current Milestone:

Rodrigo Alarcon

This milestone consisted primarily of working on the User model of the website. The generic Django model only allows for limited user information and cant be changed. In order to save additional user details, along with the audio recordings when they work, a custom user model had to be created and swapped with the existing standard model. To do this, I began with modifying the existing Users app within the website. This controls the logic for user authentication, but is also the base layer where the user model can be defined. Django works similarly to a MVC where in this case, the user model definition lives in the models.py file within the Users app. This model extends an AbstractUser which allows for the additional information

to be saved and is also the initial location where we would declare any additional information that we want. The forms.py file must also be altered to accept the additional information when creating a new account. The current dilemma lies in the database where everything is being saved. The local version of the website will save users without a problem, but since the connection to the database through appliku is still causing issues, creating an account on the live version still leads to an error. Once the database connection is fixed, the audio recording functionality will become the main concern to ensure we can properly save and playback recordings.

Emma Conti

Cleaned ¼ of the dataset. Put all incorrectly labeled dataset files into the shared google sheet. This spreadsheet can then be used to clean out both the metadata as well as the files. Set up the ResNet50 model. Trained the ResNet50 model on the imagenet dataset because that is a pre-recognized ResNet50 Model. This allows for a transfer of learned information from imagenet to better transfer how to access the mel spectrograms that are being evaluated for our dataset. This will also allow for a faster training set than training only from our data and prevents overfitting and robustness which are issues we may encounter with our own CNN. Something that will also help with any possible issues with overfitting will be freezing the ResNet50 mode. Freezing helps specifically with overfitting, which is a problem we already anticipated we may run into with having such a small dataset. The Mel Spectrograms will all be cropped to a size of 224 by 224, which is standard for ResNet50. All pre-processing is the same for both our developed CNN and the ResNet50 model. To ensure training is used effectively the ResNet50 model's last layer is replaced with a layer from our CNN. The ResNet50 model has been passed along to use in web app integration.

Lamine Deen

Worked on training CNN with cleaned data.

Audrey Eley

Also cleaned ¼ of the audio recording dataset. Labeled files as usable or unusable in shared, collaborative Google sheets file. Made a secondary file (in shared Drive) with the labels assigned to the corresponding file names for the audio recordings. Worked to debug the audio recording and classification sub-app for the version of the web application that is on Github. Unfortunately, after many hours of debugging, I still have not managed to get it to be fully functional. Something is still wrong with the pipeline of receiving/recording audio to classifying it. I am trying to figure out what the exact problem is, and I will keep debugging until it is functional.

7. Plan for the next Milestone 5 (Task Matrix)

Task	Rodrigo	Emma	Lamine	Audrey
1. ML Testing and refinement of framework	Test using benchmark model (ResNet50) and initial testing from our model. Continue to improve the ML model. Determine which improvement strategies to implement based on testing results.			
2. Web testing	Continue developing and testing web application. Push local changes to live site. Fully connect database.			
3. Integrating WebApp and CNN	Determine what may need to change within the web framework to better accommodate and suit the CNN. Add trained baseline model to WebApp. Debug current issues with classification in WebApp.			

8. Discussion (at least a few sentences, ie a paragraph) of each planned task for the next Milestone or

- Task 1: Improve results from both ResNet50 testing set as well as with our own CNN. If results have not improved to an acceptable standard with our developed CNN, we will transition to using the ResNet 50 model in our implementation for the WebApp.
- Task 2: The audio recording feature will be completed and the user interface will be completed so all information is saved correctly.
- Task 3: The pipeline of uploading/recording audio to in-app classification will be fully functional. Initial testing will be completed using the ResNet 50 model integrated into the final WebApp. This will help see if results are being attained correctly

9. See Faculty Advisor Feedback Below

10. Meeting Date: February 27th, 2025

11. Faculty Advisor feedback on each task for the current Milestone 4

- Task 1: Students need to work on data preprocessing
    - Find the minimum length of the audio (one cough) and do the same for the rest of the data

- Task 2: Find the number of healthy, symptomatic, and covid 19 data point

- Task 3: Modify the CNN architecture
    - Add three more layers, and change the input values for each layer (32, 64, 128, …)

- Task 4: Check the performance

- Task 5: Fix the issues related to web testing.

Faculty Advisor Signature: _____ Date: _____

Evaluation by Faculty Advisor

Faculty Advisor: detach and return this page to Dr. Chan (HC 209) or email the scores to pkc@cs.fit.edu

Score (0-10) for each member: circle a score (or circle two adjacent scores for .25 or write down a real number between 0 and 10)

Rodrigo	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Emma	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Lamine	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Audrey	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10

Faculty Advisor Signature: _____ Date: _____