



Development of React Native Artificial Intelligence Approach to Classify Respiratory Sounds

İbrahim Kaan DEMİRCİ 21828404

Supervisor

Prof. Dr. Uğur BAYSAL

Hacettepe University Department of Electrical and Electronics Engineering



Introduction

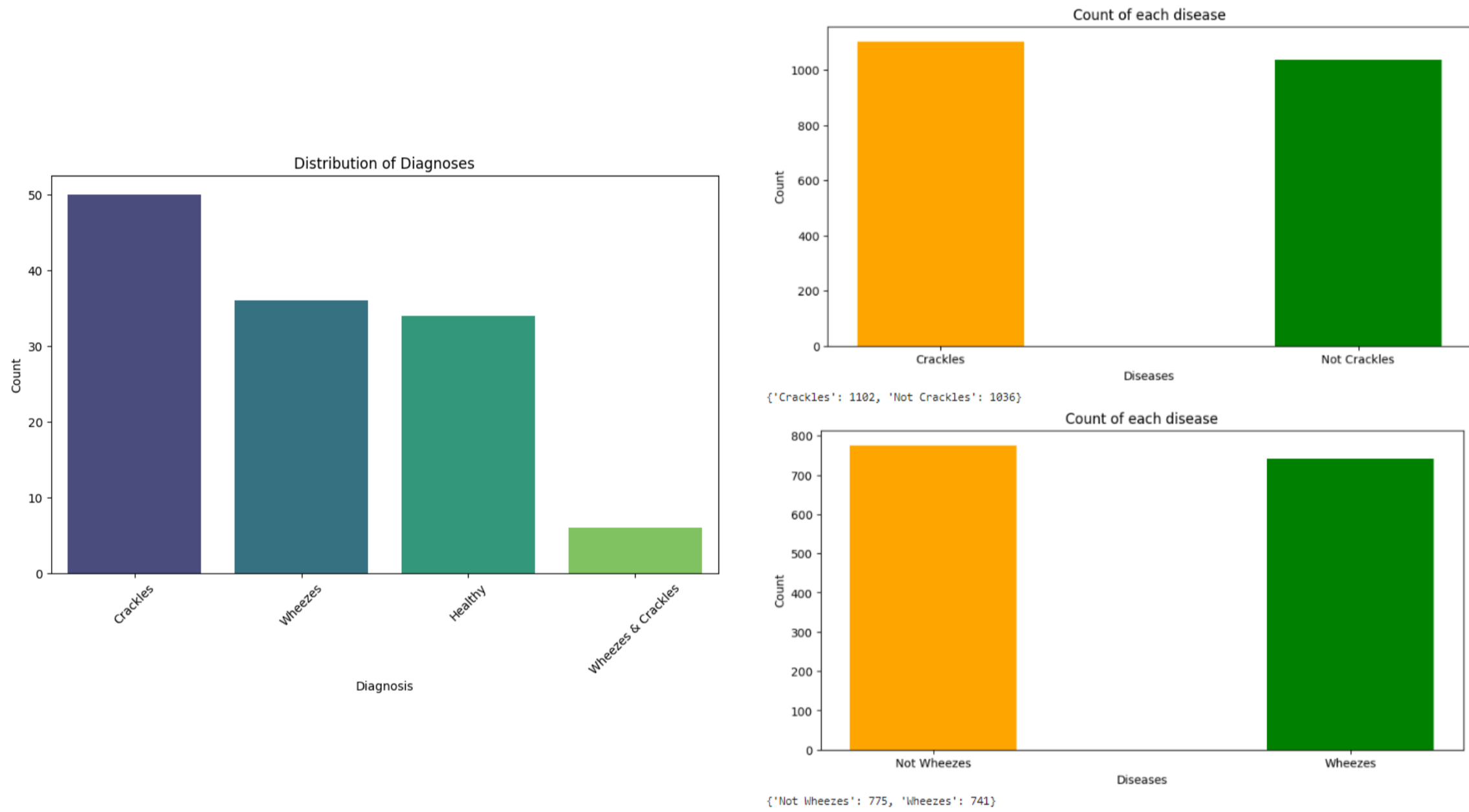
◇ According to the data shared by the World Health Organization, it is stated that Chronic Obstructive Pulmonary Disease (COPD) is in the 3rd place among the top 10 causes of death and lower respiratory infections is in the 4th place. Respiratory diseases are frequently seen in society and it is very important to diagnose these diseases quickly and accurately.

◇ The aim of this project is to develop an artificial intelligence model that will classify the respiratory sounds used when diagnosing patients as "crackle", "wheeze", "healthy", "both" and to integrate this artificial intelligence model into the mobile application.

Artificial Intelligence Architecture

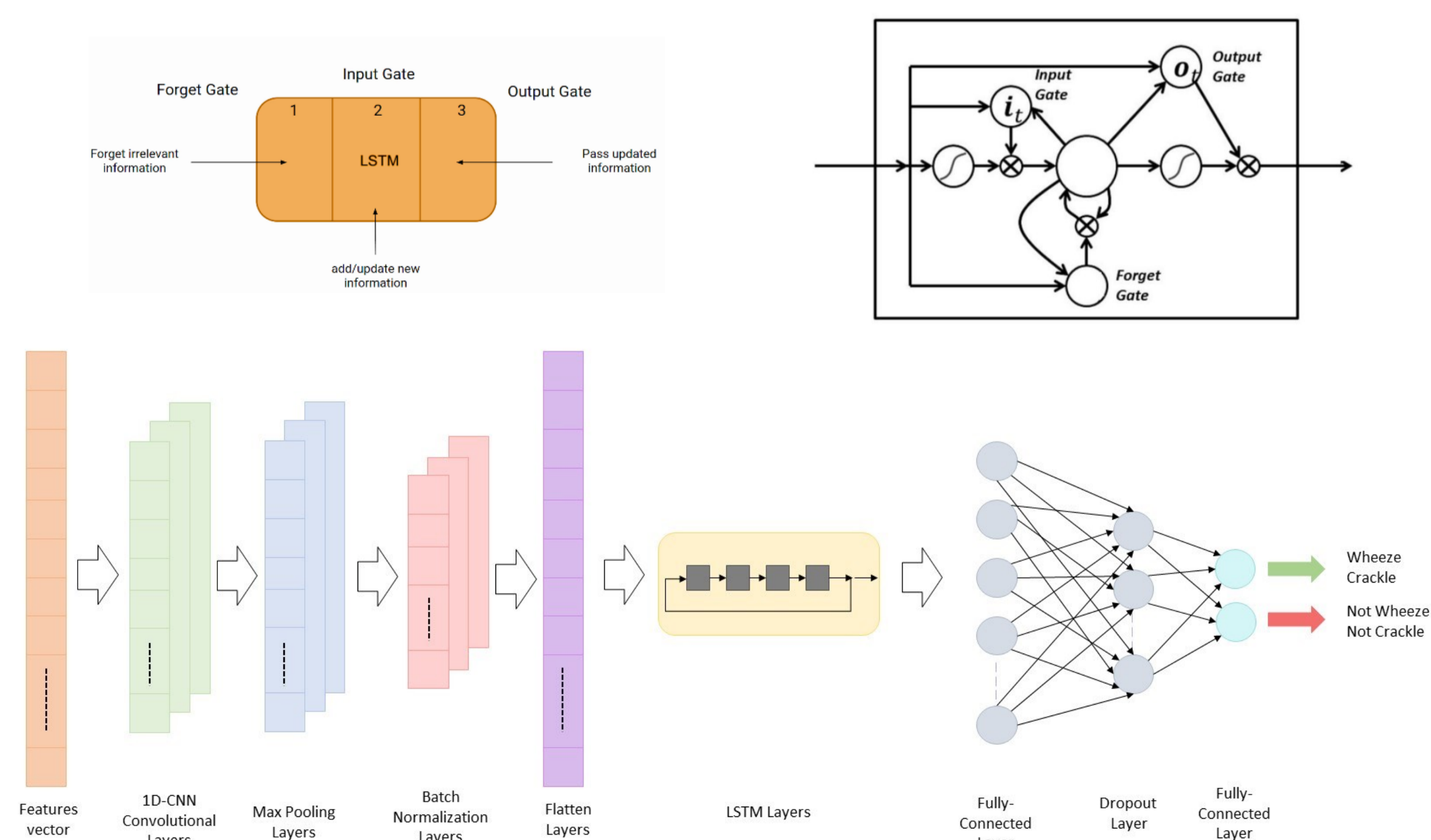
Data Preprocessing

- Methods such as adding noise, shifting, stretching, and pitch shifting were used to data augmentation.



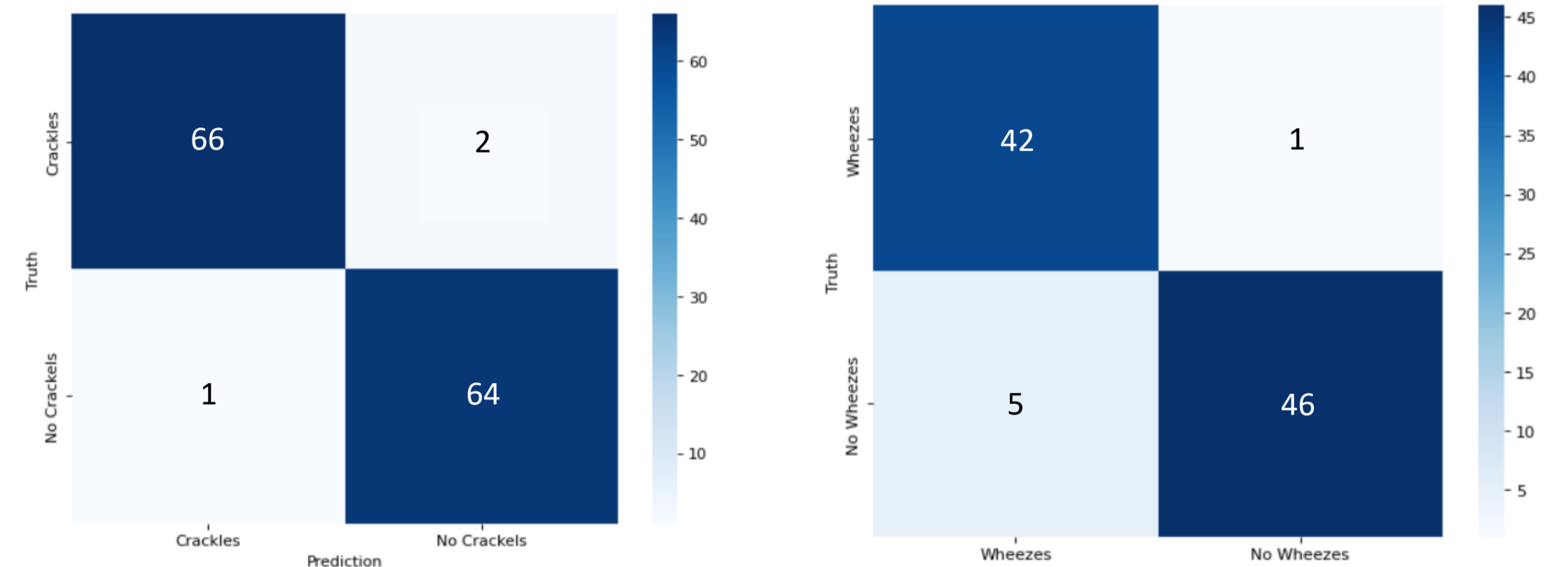
Hybrid CNN-LSTM model

- CNN and LSTM models were used together. 1-D convolution was used and then pooling was done. Afterwards, the LSTM model was added.
- LSTM includes a memory cell and a control mechanism. The memory cell serves to store information for an extended period, allowing the network to capture long-term dependencies more effectively.



Model Results

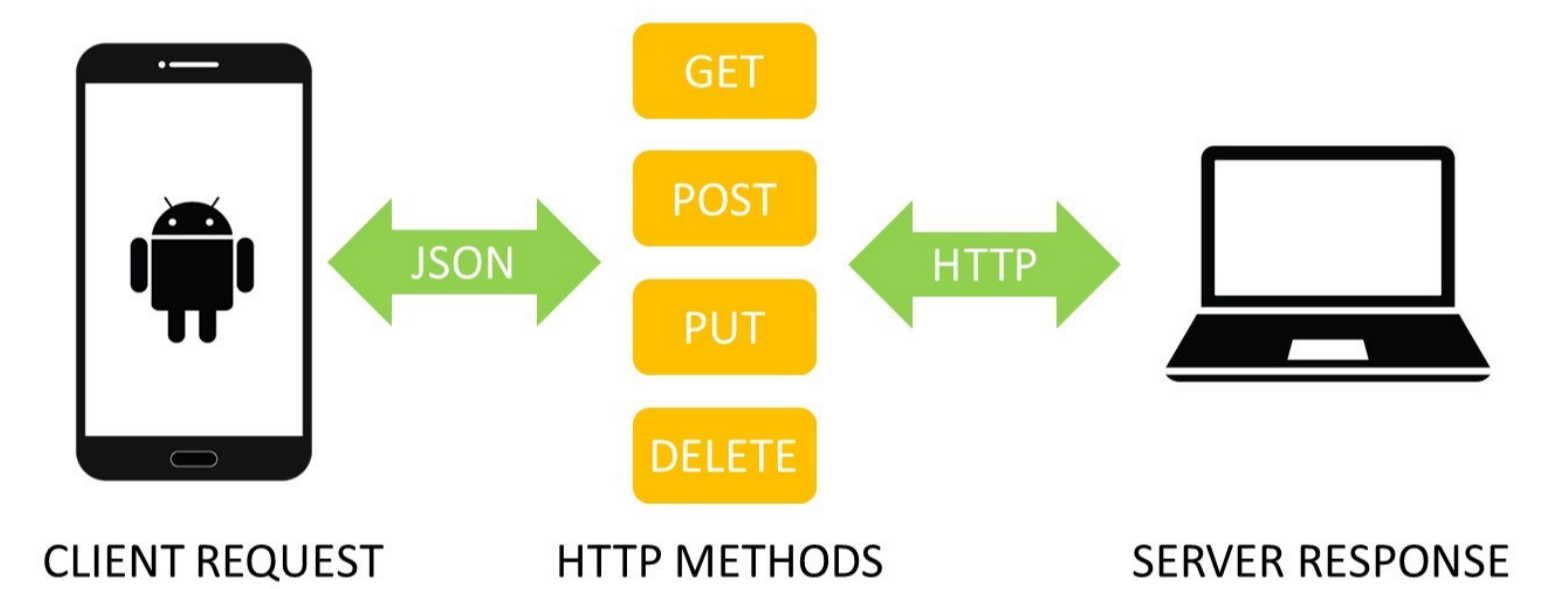
◇ The confusion matrices formed after training are shown in the figures below.



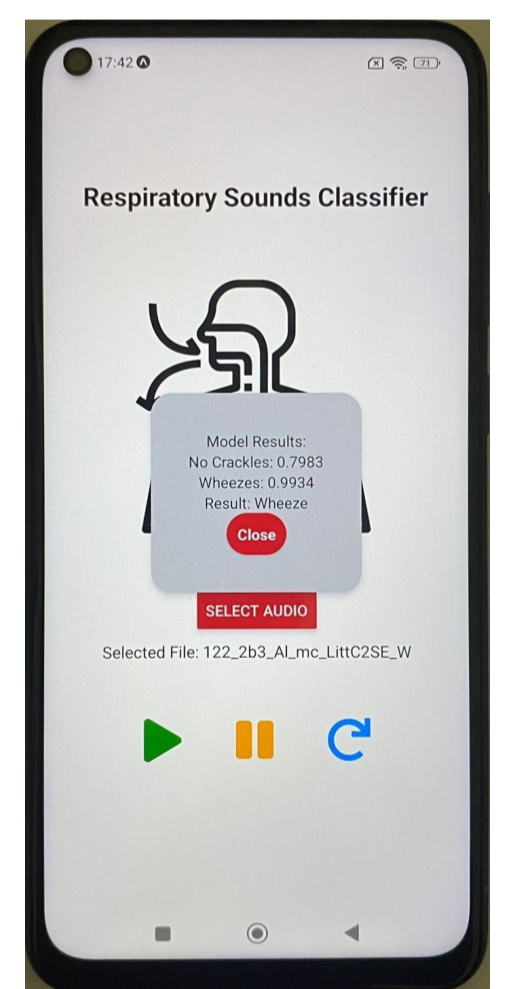
Mobile Application

◇ The android application, which will receive the data to be analyzed from the user and present the results to the user, is designed in React Native framework.

◇ The data receiving from the user was directed to the computer that made predictions using the ML model with the Rest API created using Flask, and was presented back to the user after the necessary operations were performed.



◇ Expo is a React Native-based framework and offers developers an easy way to quickly create mobile app prototypes. A prototype was created using Expo Cli.



References

- ◇ "The top 10 causes of death," <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>, accessed: 2023-12-31.
- ◇ Hochreiter, Sepp, and Jürgen Schmidhuber. "Long short-term memory." *Neural computation* 9.8 (1997): 1735-1780.

Acknowledgements

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