Computer Vision Lab
Project guidelines

Objective:
The objective of the project component of this lab is to demonstrate your ability to apply the knowledge and techniques learned during this course. Although as a first stage course, the project may consist of implementation of a given algorithm, you are strongly encouraged to propose your own model and to demonstrate its effectiveness in improving the performance, comparing performances of different approaches, and discussing the pros and cons of each approach. These factors will be helpful to get good marks.

Team formation:
Each project team will consist of four students, team size may vary only if discussed and approved. It is expected each team member will contribute equal amount of efforts in the project. (Team formation is based on sequential roll numbers, as attached file).

Project evaluation

1. **Presentation** (max 10 minutes or 10 slides): Each project is to be presented during the last lab or as per further communication. The presentation will include: Objective, introduction, Proposed method/algorithm, results, conclusion and references.
2. **Project Report** (max 10 pages): Each team must submit a final project report (only electronic version).
3. **Deliverables**: a zip file with all the source codes, presentation, and the report. You will have to upload this zip file through MS-team against the assignment created for the project.
   Make sure you have properly referred and acknowledge all content and codes that you obtained elsewhere.

Project Evaluation criteria

1. Workload and completeness 50%
2. Effectiveness of the task and novelty 10%
3. Presentation 20%
4. Project report clarity 20%

Format of Final Report *(A template is attached)*

- Introduction (Problem statement, Motivation) [Max 2 Page]
- Literature review [Max ½ page]
- Proposed methodology (Block diagram of the method, Algorithm) [Max 3 page]
- Results (Experimental setup-parameter values used in the experiment, performance metrics-(accuracy, sensitivity, specificity, etc.) and results) [max 2 Page]
- Conclusion (A brief writeup about observation on the obtained results) [max ½ page]
- A table listing tasks performed in the project and the percentage contributions by each team member of individual tasks, as well as the overall project. All team members must sign this table.

COMPUTER VISION LAB

PROJECT REPORT

On

Project Name

Submitted By:
StudentName (RollNumber)
StudentName (RollNumber)
StudentName (RollNumber)
StudentName (RollNumber)

Submitted To:
Dr. Puneet Kumar Jain

Department of Computer Science and Engineering
NATIONAL INSTITUTE OF TECHNOLOGY ROURKELA

APRIL, 2024

TABLE OF CONTENTS

Project-1: Five-class classification of heart sound signals using the discrete wavelet transform features.

Introduction: Cardiac auscultation, a diagnostic technique involving the analysis of heart sounds, is crucial in assessing cardiac health. Electronic stethoscopes, capable of recording heart sounds digitally, produce phonocardiograms (PCG) which carry vital information about heart function and health. Researchers and clinicians can effectively study and diagnose various heart disorders by leveraging signal processing and machine learning techniques on PCG signals.

Task: You are provided with a dataset of heart sound recordings from the Yaseen Khan Dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the heart sound signals into five categories: 1 normal and 4 abnormal(AS,MVP,MS,MR).

Dataset Description (Yaseen Khan Dataset): A comprehensive database encompassing heart sound signals (PCG signals) from diverse sources has been curated and comprises five distinct categories. These categories include one normal category and four abnormal categories, facilitating the classification of heart sound signals into normal and abnormal classes. The signals in this dataset are sampled at a frequency of 8000Hz.

Dataset Details:

Total Categories: 5 (1 normal (100), 4 abnormal (400 each 100))

Sampling Frequency: 8000Hz

Link for dataset:

https://drive.google.com/drive/folders/1rYQ0eYXr18Xbpg0LWfTVNPqObL9pgKah?usp=sharing

References:

GitHub Repository: https://github.com/yaseen21khan/Classification-of-Heart-Sound-Signal-Using-Multiple-Features-/blob/master/README.md

Project-2: Five-class classification of heart sound signals using the short-term Fourier transform features.

Introduction: Cardiac auscultation, a diagnostic technique involving the analysis of heart sounds, is crucial in assessing cardiac health. Electronic stethoscopes, capable of recording heart sounds digitally, produce phonocardiograms (PCG), which carry vital information about heart function and health. By leveraging signal processing and machine learning techniques on PCG signals, researchers and clinicians can effectively study and diagnose various heart disorders.

Task: You are provided with a dataset of heart sound recordings from the Yaseen Khan Dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify heart sound signals into five categories: 1 normal and 4 abnormal(AS, MVP, MS, MR).

Dataset Description (Yaseen Khan Dataset): A comprehensive database encompassing heart sound signals (PCG signals) from diverse sources has been curated and comprises five distinct categories. These categories include one normal category and four abnormal categories, facilitating the classification of heart sound signals into normal and abnormal classes. The signals in this dataset are sampled at a frequency of 8000Hz.

Dataset Details:

Total Categories: 5 (1 normal (100), 4 abnormal (400 each 100))

Sampling Frequency: 8000Hz

Link for dataset:

https://drive.google.com/drive/folders/1rYQ0eYXr18Xbpg0LWfTVNPqObL9pgKah?usp=sharing

References:

GitHub Repository: https://github.com/yaseen21khan/Classification-of-Heart-Sound-Signal-Using-Multiple-Features-/blob/master/README.md

Project-3: Five-class classification of heart sound signals using the continuous wavelet transform features.

Introduction: Cardiac auscultation, a diagnostic technique involving the analysis of heart sounds, is crucial in assessing cardiac health. Electronic stethoscopes, capable of recording heart sounds digitally, produce phonocardiograms (PCG), which carry vital information about heart function and health. Researchers and clinicians can effectively study and diagnose various heart disorders by leveraging signal processing and machine learning techniques on PCG signals.

Task: You are provided with a dataset of heart sound recordings from the Yaseen Khan Dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the heart sound signals into five categories: 1 normal and 4 abnormal(AS, MVP, MS, MR).

Dataset Description (Yaseen Khan Dataset): A comprehensive database encompassing heart sound signals (PCG signals) from diverse sources has been curated and comprises five distinct categories. These categories include one normal category and four abnormal categories, facilitating the classification of heart sound signals into normal and abnormal classes. The signals in this dataset are sampled at a frequency of 8000Hz.

Dataset Details:

Total Categories: 5 (1 normal (100), 4 abnormal (400 each 100))

Sampling Frequency: 8000Hz

Link for dataset:

https://drive.google.com/drive/folders/1rYQ0eYXr18Xbpg0LWfTVNPqObL9pgKah?usp=sharing

References:

GitHub Repository: https://github.com/yaseen21khan/Classification-of-Heart-Sound-Signal-Using-Multiple-Features-/blob/master/README.md

Project-4: Five-class classification of ECG signals using the discrete wavelet transform features.

Introduction: Electrocardiography (ECG) classification is pivotal in cardiovascular medicine, aiding clinicians in diagnosing and managing heart conditions. Through various classification systems, healthcare professionals categorise ECG findings, enabling accurate diagnoses and treatment decisions. Understanding key terminology and recognising deviations from normal waveforms are crucial skills in ECG interpretation.

Dataset Description (PTB-XL, a large publicly available electrocardiography dataset): The PTB-XL ECG dataset is a large dataset of 21799 clinical 12-lead ECGs from 18869 patients of 10 second length. A sample code is given how to read a signal with its header name, how to convert it into spectrogram or scalogram image. There are 2 csv file: ptbxl_database and scp_statements. You need to aggregate these two csv file(code is given) for adding the label (diagnostic_superclass of scp_statements is mapped inside ptbxl_database with scp_codes).

- Extract 12 leads separately. Use deep learning models. Find their accuracy, specificity, and sensitivity. (accuracy benchmark is (0.95)
- Use 4 leads(2,4,6,12) combinely. Use deep learning models. Find their accuracy, specificity, and sensitivity. (accuracy benchmark is (0.95)
- Do binay classification(1 normal(0), 4 abnormal(1))

Dataset Details:

Total Categories: 5 (1 normal, 4 abnormal)
Sampling Frequency: 100Hz

Link for dataset: The dataset, along with associated source code and documentation, is publicly accessible on GitHub. For further details regarding the dataset and its utilization, interested parties can refer to the GitHub repository at https://physionet.org/content/ptb-xl/1.0.3/

References:

GitHub Repository: https://github.com/helme/ecg_ptbxl_benchmarking

Project-5: Five-class classification of ECG signals using the continuous wavelet transform features.

Introduction: Electrocardiography (ECG) classification is pivotal in cardiovascular medicine, aiding clinicians in diagnosing and managing heart conditions. Through various classification systems, healthcare professionals categorize ECG findings, enabling accurate diagnoses and treatment decisions. Understanding key terminology and recognizing deviations from normal waveforms are crucial skills in ECG interpretation.

Dataset Description (PTB-XL, a large publicly available electrocardiography dataset): The PTB-XL ECG dataset is a large dataset of 21799 clinical 12-lead ECGs from 18869 patients of 10 second length. A sample code is given how to read a signal with its header name, how to convert it into spectrogram or scalogram image. There are 2 csv file: ptbxl_database and scp_statements. You need to aggregate these two csv file(code is given) for adding the label (diagnostic_superclass of scp_statements is mapped inside ptbxl_database with scp_codes).

- Extract 12 leads separately. Use deep learning models. Find their accuracy, specificity, sensitivity. (accuracy benchmark is (0.95)
- Use 4 leads(2,4,6,12) combinely. Use deep learning models. Find their accuracy, specificity, sensitivity. (accuracy benchmark is (0.95)
- Do binay classification(1 normal(0), 4 abnormal(1))

Dataset Details:

Total Categories: 5 (1 normal, 4 abnormal)
Sampling Frequency: 100Hz

Link for dataset: The dataset, along with associated source code and documentation, is publicly accessible on GitHub. For further details regarding the dataset and its utilization, interested parties can refer to the GitHub repository at https://physionet.org/content/ptb-xl/1.0.3/

References:

GitHub Repository: https://github.com/helme/ecg_ptbxl_benchmarking

Project-6: Five class classification of ECG signals using the short term fourier transform features.

Introduction: Electrocardiography (ECG) classification is pivotal in cardiovascular medicine, aiding clinicians in diagnosing and managing heart conditions. Through various classification systems, healthcare professionals categorize ECG findings, enabling accurate diagnoses and treatment decisions. Understanding key terminology and recognizing deviations from normal waveforms are crucial skills in ECG interpretation.

Dataset Description (PTB-XL, a large publicly available electrocardiography dataset): The PTB-XL ECG dataset is a large dataset of 21799 clinical 12-lead ECGs from 18869 patients of 10 second length. A sample code is given how to read a signal with its header name, how to convert it into spectrogram or scalogram image. There are 2 csv file: ptbxl_database and scp_statements. You need to aggregate these two csv file(code is given) for adding the label (diagnostic_superclass of scp_statements is mapped inside ptbxl_database with scp_codes).

- Extract 12 leads separately. Use deep learning models. Find their accuracy, specificity, sensitivity. (accuracy benchmark is (0.95)
- Use 4 leads(2,4,6,12) combinely. Use deep learning models. Find their accuracy, specificity, sensitivity. (accuracy benchmark is (0.95)
- Do binay classification(1 normal(0), 4 abnormal(1))

Dataset Details:

Total Categories: 5 (1 normal, 4 abnormal)
Sampling Frequency: 100Hz

Link for dataset: The dataset, along with associated source code and documentation, is publicly accessible on GitHub. For further details regarding the dataset and its utilization, interested parties can refer to the GitHub repository at https://physionet.org/content/ptb-xl/1.0.3/

References:

GitHub Repository: https://github.com/helme/ecg_ptbxl_benchmarking

Project-7: Two class classification of heart sound signals using the discrete wavelet transform features.

Introduction: Cardiac auscultation, a diagnostic technique involving the analysis of heart sounds, is crucial in assessing cardiac health. Electronic stethoscopes, capable of recording heart sounds digitally, produce phonocardiograms (PCG) which carry vital information about heart function and health. By leveraging signal processing and machine learning techniques on PCG signals, researchers and clinicians can effectively study and diagnose various heart disorders.

Task: You are provided with a dataset of heart sound recordings from the PhysioNet 2016 dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the heart sound signals into two categories: normal and abnormal.

Dataset description: The PhysioNet 2016 Heart Sound Dataset comprises heart sound recordings stored in .wav format collected from 1415 individuals. These recordings include 750 instances of normal heart sounds and 665 instances of abnormal heart sounds. The dataset is sampled at a rate of 2000Hz.

Classes: The dataset is binary-classified, with two distinct categories: normal heart sounds and abnormal heart sounds.

Dataset link:
https://drive.google.com/drive/folders/1H06Sq4xPBH58304h10Qg_oqb7H8GwefD?usp=sharing

Reference: https://physionet.org/content/challenge-2016/1.0.0/

Project-8: Two class classification of heart sound signals using the continuous wavelet transform features.

Introduction: Cardiac auscultation, a diagnostic technique involving the analysis of heart sounds, is crucial in assessing cardiac health. Electronic stethoscopes, capable of recording heart sounds digitally, produce phonocardiograms (PCG) which carry vital information about heart function and health. By leveraging signal processing and machine learning techniques on PCG signals, researchers and clinicians can effectively study and diagnose various heart disorders.

Task: You are provided with a dataset of heart sound recordings from the PhysioNet 2016 dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the heart sound signals into two categories: normal and abnormal.

Dataset description: The PhysioNet 2016 Heart Sound Dataset comprises heart sound recordings stored in .wav format collected from 1415 individuals. These recordings include 750 instances of normal heart sounds and 665 instances of abnormal heart sounds. The dataset is sampled at a rate of 2000Hz.

Classes: The dataset is binary-classified, with two distinct categories: normal heart sounds and abnormal heart sounds.

Dataset link:
https://drive.google.com/drive/folders/1H06Sq4xPBH58304h10Qg_oqb7H8GwefD?usp=sharing

Reference: https://physionet.org/content/challenge-2016/1.0.0/

Project-9: Two class classification of heart sound signals using the short term fourier transform features.

Task: You are provided with a dataset of heart sound recordings from the PhysioNet 2016 dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the heart sound signals into two categories: normal and abnormal.

Introduction:

Dataset description: The PhysioNet 2016 Heart Sound Dataset comprises heart sound recordings stored in .wav format collected from 1415 individuals. These recordings include 750 instances of normal heart sounds and 665 instances of abnormal heart sounds. The dataset is sampled at a rate of 2000Hz.

Classes: The dataset is binary-classified, with two distinct categories: normal heart sounds and abnormal heart sounds.

Dataset link:
https://drive.google.com/drive/folders/1H06Sq4xPBH58304h10Qg_oqb7H8GwefD?usp=sharing

Reference: https://physionet.org/content/challenge-2016/1.0.0/

Project-10: Three class classification of lung sound signals using the discrete wavelet transform features.

Introduction: Lung auscultation, a diagnostic technique involving the analysis of lung sounds, is pivotal in evaluating respiratory health. Electronic stethoscopes, equipped to record lung sounds digitally, produce lung sound signals. These signals encapsulate essential information about lung function and respiratory conditions. By harnessing advanced signal processing algorithms and machine learning methodologies on lung sounds, researchers and healthcare professionals can efficiently analyze and diagnose a myriad of respiratory disorders. This interdisciplinary approach holds significant promise in enhancing our understanding of pulmonary health, facilitating early detection of respiratory abnormalities, and guiding personalized treatment strategies for patients with lung-related ailments.

Task: You are provided with a dataset of lung sound recordings from the ICBHI 2017 dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the lung disease from lung sound signals into three categories: normal, COPD, and Pneumonia.

Dataset description: A comprehensive database encompassing lung sound signals from diverse sources has been curated, comprising three distinct categories. These categories include one normal category and two abnormal categories, facilitating the classification of respiratory disorders into normal and abnormal classes. The signals in this dataset are sampled at a frequency of 4000Hz.

Classes: The dataset is multi-classified, with three distinct categories: Healthy (68), COPD (94), and Pneumonia (74).

Dataset link:
https://drive.google.com/drive/folders/16ocAnflkx6kCnMr7RdpKslfWfOEHP3vD?usp=sharing

References: Rocha BM et al. (2019) "An open access database for the evaluation of respiratory sound classification algorithms" Physiological Measurement 40 035001

Project-11: Three class classification of lung sound signals using the continuous wavelet transform features.

Task: You are provided with a dataset of lung sound recordings from the ICBHI 2017 dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the lung disease from lung sound signals into three categories: normal, COPD, and Pneumonia.

Introduction: Lung auscultation, a diagnostic technique involving the analysis of lung sounds, is pivotal in evaluating respiratory health. Electronic stethoscopes, equipped to record lung sounds digitally, produce lung sound signals. These signals encapsulate essential information about lung function and respiratory conditions. By harnessing advanced signal processing algorithms and machine learning methodologies on lung sounds, researchers and healthcare professionals can efficiently analyse and diagnose a myriad of respiratory disorders. This interdisciplinary approach holds significant promise in enhancing our understanding of pulmonary health, facilitating early detection of respiratory abnormalities, and guiding personalized treatment strategies for patients with lung-related ailments.

Dataset description: A comprehensive database encompassing lung sound signals from diverse sources has been curated, comprising three distinct categories. These categories include one normal category and two abnormal categories, facilitating the classification of respiratory disorders into normal and abnormal classes. The signals in this dataset are sampled at a frequency of 4000Hz.

Classes: The dataset is multi-classified, with three distinct categories: Healthy (68), COPD (94), and Pneumonia (74).

Dataset link:
https://drive.google.com/drive/folders/16ocAnflkx6kCnMr7RdpKslfWfOEHP3vD?usp=sharing

References: Rocha BM et al. (2019) "An open access database for the evaluation of respiratory sound classification algorithms" Physiological Measurement 40 035001

Project-12: Three class classification of lung sound signals using the short term fourier transform features.

Task: You are provided with a dataset of lung sound recordings from the ICBHI 2017 dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the lung disease from lung sound signals into three categories: normal, COPD, and Pneumonia.

Introduction: Lung auscultation, a diagnostic technique involving the analysis of lung sounds, is pivotal in evaluating respiratory health. Electronic stethoscopes, equipped to record lung sounds digitally, produce lung sound signals. These signals encapsulate essential information about lung function and respiratory conditions. By harnessing advanced signal processing algorithms and machine learning methodologies on lung sounds, researchers and healthcare professionals can efficiently analyze and diagnose a myriad of respiratory disorders. This interdisciplinary approach holds significant promise in enhancing our understanding of pulmonary health, facilitating early detection of respiratory abnormalities, and guiding personalized treatment strategies for patients with lung-related ailments.

Dataset description: A comprehensive database encompassing lung sound signals from diverse sources has been curated, comprising three distinct categories. These categories include one normal category and two abnormal categories, facilitating the classification of respiratory disorders into normal and abnormal (COPD, Pneumonia) classes. The signals in this dataset are sampled at a frequency of 4000Hz.

Classes: The dataset is multi-classified, with three distinct categories: Healthy (68), COPD (94), and Pneumonia (74).

Dataset link:
https://drive.google.com/drive/folders/16ocAnflkx6kCnMr7RdpKslfWfOEHP3vD?usp=sharing

References: Rocha BM et al. (2019) "An open access database for the evaluation of respiratory sound classification algorithms" Physiological Measurement 40 035001

Project-13: Two class classification of lung sound signals using the discrete wavelet transform features.

Task: You are provided with a dataset of lung sound recordings from the KAUH dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the lung disease from lung sound signals into two categories: normal, abnormal.

Introduction: Lung auscultation, a diagnostic technique involving the analysis of lung sounds, is pivotal in evaluating respiratory health. Electronic stethoscopes, equipped to record lung sounds digitally, produce lung sound signals. These signals encapsulate essential information about lung function and respiratory conditions. By harnessing advanced signal processing algorithms and machine learning methodologies on lung sounds, researchers and healthcare professionals can efficiently analyze and diagnose a myriad of respiratory disorders. This interdisciplinary approach holds significant promise in enhancing our understanding of pulmonary health, facilitating early detection of respiratory abnormalities, and guiding personalized treatment strategies for patients with lung-related ailments.

Dataset description: A comprehensive database encompassing lung sound signals from diverse sources has been curated, comprising three distinct categories. These categories include one normal category and one abnormal categories, facilitating the classification of respiratory disorders into normal and abnormal classes. The signals in this dataset are sampled at a frequency of 4000Hz.

Classes: The dataset is binary-classified, with two distinct categories: normal (226), abnormal (239).

Dataset link: https://drive.google.com/drive/folders/1bjrkTl3OE91pyyYz9Mf0AFCi-QUpHNJ_?usp=sharing

References: https://data.mendeley.com/datasets/jwyy9np4gv/3

Project-14: Two class classification of lung sound signals using the continuous wavelet transform features.

Task: You are provided with a dataset of lung sound recordings from the KAUH dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the lung disease from lung sound signals into two categories: normal, abnormal.

Introduction: Lung auscultation, a diagnostic technique involving the analysis of lung sounds, is pivotal in evaluating respiratory health. Electronic stethoscopes, equipped to record lung sounds digitally, produce lung sound signals. These signals encapsulate essential information about lung function and respiratory conditions. By harnessing advanced signal processing algorithms and machine learning methodologies on lung sounds, researchers and healthcare professionals can efficiently analyze and diagnose a myriad of respiratory disorders. This interdisciplinary approach holds significant promise in enhancing our understanding of pulmonary health, facilitating early detection of respiratory abnormalities, and guiding personalized treatment strategies for patients with lung-related ailments.

Dataset description: A comprehensive database encompassing lung sound signals from diverse sources has been curated, comprising three distinct categories. These categories include one normal category and one abnormal categories, facilitating the classification of respiratory disorders into normal and abnormal classes. The signals in this dataset are sampled at a frequency of 4000Hz.

Classes: The dataset is binary-classified, with two distinct categories: normal (226), abnormal (239).

Dataset link: https://drive.google.com/drive/folders/1bjrkTl3OE91pyyYz9Mf0AFCi-QUpHNJ_?usp=sharing

References: https://data.mendeley.com/datasets/jwyy9np4gv/3

Project-15: Two class classification of lung sound signals using the short term fourier transform features.

Task: You are provided with a dataset of lung sound recordings from the KAUH dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the lung disease from lung sound signals into two categories: normal, abnormal.

Introduction: Lung auscultation, a diagnostic technique involving the analysis of lung sounds, is pivotal in evaluating respiratory health. Electronic stethoscopes, equipped to record lung sounds digitally, produce lung sound signals. These signals encapsulate essential information about lung function and respiratory conditions. By harnessing advanced signal processing algorithms and machine learning methodologies on lung sounds, researchers and healthcare professionals can efficiently analyze and diagnose a myriad of respiratory disorders. This interdisciplinary approach holds significant promise in enhancing our understanding of pulmonary health, facilitating early detection of respiratory abnormalities, and guiding personalized treatment strategies for patients with lung-related ailments.

Dataset description: A comprehensive database encompassing lung sound signals from diverse sources has been curated, comprising three distinct categories. These categories include one normal category and one abnormal categories, facilitating the classification of respiratory disorders into normal and abnormal classes. The signals in this dataset are sampled at a frequency of 4000Hz.

Classes: The dataset is binary-classified, with two distinct categories: normal (226), abnormal (239).

Dataset link: https://drive.google.com/drive/folders/1bjrkTl3OE91pyyYz9Mf0AFCi-QUpHNJ_?usp=sharing

References: https://data.mendeley.com/datasets/jwyy9np4gv/3

Project-16: Two class classification of Paediatric heart sound signals using the short term fourier transform features.

Task: You are provided with a dataset of heart sound recordings from the Paediatric heart sound dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the Paediatric heart sound signals into two categories: normal and abnormal.

Introduction: Heart sounds refer to the sounds produced by the heart during contraction and relaxation. Heart sounds can help doctors determine whether a patient has heart disease or other problems. This study collected heart sound data from children aged 1 day to 14 years using a smart stethoscope between 2020 and 2022. All participants who voluntarily participated in the study obtained informed consent from their parents or guardians.

Dataset description: This Dataset comprises Paediatric heart sound recordings stored in .wav format collected from 941 individuals. These recordings include 533 instances of normal heart sounds and 408 instances of abnormal heart sounds. The dataset is sampled at a rate of 4000Hz.

Classes: The dataset is binary-classified, with two distinct categories: normal heart sounds (533) and abnormal heart sounds (408).

Dataset link:
https://drive.google.com/drive/folders/1ySpZKuNWVN5FtJpK74V7zividHPK4h6P?usp=sharing

Reference: **https://pubmed.ncbi.nlm.nih.gov/38194403/**

Project-17: Two class classification of Paediatric heart sound signals using the continous wavelet transform features.

Task: You are provided with a dataset of heart sound recordings from the Paediatric heart sound dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the Paediatric heart sound signals into two categories: normal and abnormal.

Introduction: Heart sounds refer to the sounds produced by the heart during contraction and relaxation. Heart sounds can help doctors determine whether a patient has heart disease or other problems. This study collected heart sound data from children aged 1 day to 14 years using a smart stethoscope between 2020 and 2022. All participants who voluntarily participated in the study obtained informed consent from their parents or guardians.

Dataset description: This Dataset comprises Paediatric heart sound recordings stored in .wav format collected from 941 individuals. These recordings include 533 instances of normal heart sounds and 408 instances of abnormal heart sounds. The dataset is sampled at a rate of 4000Hz.

Classes: The dataset is binary-classified, with two distinct categories: normal heart sounds (533) and abnormal heart sounds (408).

Dataset link:
https://drive.google.com/drive/folders/1ySpZKuNWVN5FtJpK74V7zividHPK4h6P?usp=sharing

Reference: **https://pubmed.ncbi.nlm.nih.gov/38194403/**

Project-18: Two class classification of Paediatric heart sound signals using the discrete wavelet transform features.

Task: You are provided with a dataset of heart sound recordings from the Paediatric heart sound dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the Paediatric heart sound signals into two categories: normal and abnormal.

Introduction: Heart sounds refer to the sounds produced by the heart during contraction and relaxation. Heart sounds can help doctors determine whether a patient has heart disease or other problems. This study collected heart sound data from children aged 1 day to 14 years using a smart stethoscope between 2020 and 2022. All participants who voluntarily participated in the study obtained informed consent from their parents or guardians.

Dataset description: This Dataset comprises Paediatric heart sound recordings stored in .wav format collected from 941 individuals. These recordings include 533 instances of normal heart sounds and 408 instances of abnormal heart sounds. The dataset is sampled at a rate of 4000Hz.

Classes: The dataset is binary-classified, with two distinct categories: normal heart sounds (533) and abnormal heart sounds (408).

Dataset link:
https://drive.google.com/drive/folders/1ySpZKuNWVN5FtJpK74V7zividHPK4h6P?usp=sharing

Reference: **https://pubmed.ncbi.nlm.nih.gov/38194403/**

Project-19: Two class classification of Pascal heart sound signals using the discrete wavelet transform features.

Task: You are provided with a dataset of heart sound recordings from the Paediatric heart sound dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the Paediatric heart sound signals into two categories: normal and abnormal.

Introduction: Cardiac auscultation, a diagnostic technique involving the analysis of heart sounds, is crucial in assessing cardiac health. Electronic stethoscopes, capable of recording heart sounds digitally, produce phonocardiograms (PCG) which carry vital information about heart function and health. By leveraging signal processing and machine learning techniques on PCG signals, researchers and clinicians can effectively study and diagnose various heart disorders.

Dataset description: This Dataset comprises Paediatric heart sound recordings stored in .wav format collected from 941 individuals. These recordings include 176 instances of normal heart sounds and 31 instances of abnormal heart sounds 93. The dataset is sampled at a rate of 4000Hz.

Classes: The dataset is binary-classified, with two distinct categories: normal heart sounds (31) and abnormal heart sounds (93).

Dataset link:
https://drive.google.com/drive/folders/1Z_s6UwXpsLPk4idPsbQoMWYsxRfeFVE8?usp=sharing

Reference: https://istethoscope.peterjbentley.com/heartchallenge/index.html

Project-20: Two class classification of Pascal heart sound signals using the short term fourier transform features.

Task: You are provided with a dataset of heart sound recordings from the Paediatric heart sound dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the Paediatric heart sound signals into two categories: normal and abnormal.

Introduction: Cardiac auscultation, a diagnostic technique involving the analysis of heart sounds, is crucial in assessing cardiac health. Electronic stethoscopes, capable of recording heart sounds digitally, produce phonocardiograms (PCG) which carry vital information about heart function and health. By leveraging signal processing and machine learning techniques on PCG signals, researchers and clinicians can effectively study and diagnose various heart disorders.

Dataset description: This Dataset comprises Paediatric heart sound recordings stored in .wav format collected from 941 individuals. These recordings include 176 instances of normal heart sounds and 31 instances of abnormal heart sounds 93. The dataset is sampled at a rate of 4000Hz.

Classes: The dataset is binary-classified, with two distinct categories: normal heart sounds (31) and abnormal heart sounds (93).

Dataset link:
https://drive.google.com/drive/folders/1Z_s6UwXpsLPk4idPsbQoMWYsxRfeFVE8?usp=sharing

Reference: https://istethoscope.peterjbentley.com/heartchallenge/index.html

Project-21: Two class classification of Pascal heart sound signals using the continuous wavelet transform features.

Task: You are provided with a dataset of heart sound recordings from the Paediatric heart sound dataset. Your task is to develop a 1D/2D convolutional neural network (CNN) model to classify the Paediatric heart sound signals into two categories: normal and abnormal.

Introduction: Cardiac auscultation, a diagnostic technique involving the analysis of heart sounds, is crucial in assessing cardiac health. Electronic stethoscopes, capable of recording heart sounds digitally, produce phonocardiograms (PCG) which carry vital information about heart function and health. By leveraging signal processing and machine learning techniques on PCG signals, researchers and clinicians can effectively study and diagnose various heart disorders.

Dataset description: This Dataset comprises Paediatric heart sound recordings stored in .wav format collected from 941 individuals. These recordings include 176 instances of normal heart sounds and 31 instances of abnormal heart sounds 93. The dataset is sampled at a rate of 4000Hz.

Classes: The dataset is binary-classified, with two distinct categories: normal heart sounds (31) and abnormal heart sounds (93).

Dataset link:
https://drive.google.com/drive/folders/1Z_s6UwXpsLPk4idPsbQoMWYsxRfeFVE8?usp=sharing

Reference: https://istethoscope.peterjbentley.com/heartchallenge/index.html

Code Snippet

```
import scipy.io.wavfile as wav
from scipy.signal import resample
import numpy as np
from scipy.signal import stft
import pywt

# Load sound file
sample_rate, data = wav.read('sound_file.wav')

# Resample
new_sample_rate = 44100
resampled_data = resample(data, int(len(data) * (new_sample_rate / sample_rate)))

# Applying Short-Time Fourier Transform (STFT)
frequencies, times, stft_data = stft(resampled_data, fs=new_sample_rate)

# Applying Continuous Wavelet Transform (CWT)
cwt_result = pywt.cwt(resampled_data, scales=np.arange(1, 128), wavelet='morl')

# Applying Discrete Wavelet Transform (DWT)
coeffs = pywt.wavedec(resampled_data, wavelet='haar', level=5)
```

Another approach….

```
import librosa
import numpy as np
import pywt

# Load sound file
data, sample_rate = librosa.load('sound_file.wav', sr=None)
```

```
# Resample
new_sample_rate = 44100
resampled_data = librosa.resample(data, sample_rate, new_sample_rate)

# Applying Short-Time Fourier Transform (STFT)
stft_data = librosa.stft(resampled_data, n_fft=1024)

# Applying Continuous Wavelet Transform (CWT)
cwt_result = pywt.cwt(resampled_data, scales=np.arange(1, 128), wavelet='morl')

# Applying Discrete Wavelet Transform (DWT)
coeffs = pywt.wavedec(resampled_data, wavelet='haar', level=5)
```