Classification of Ships

ICPS PROJECT

GROUP-12

Group Members

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Introduction

In this Project, we are going to implement Classification Techniques using Deep Learning Techniques using Deep Ship Dataset.

Abstract

Implementing ANN Classification Algorithm,CNN,Deep Random Forest Algorithm and do compare the Results given for the Deep Ship Dataset.

Dataset

The Dataset used in this Project is a Deep ship which records different conditions of the sea in different seasons by different category of ships.The Dataset has the data in audio(.wav) Format.

Data set link: https://github.com/irfankamboh/DeepShip

Objectives

- ANN with 1 hidden layer 64 and 128 neurons, 2 hidden layer with same neurons , compare with different combination of activation functions.
- Apply CNN Classification Algorithm.
- Apply Deep Forest Algorithm to the deep ship data to classify the ocean currents for the different vehicles.

Outcomes:

- Preprocessing the data and getting the ANN results.
- Comparing all the algorithms and giving an Comparison Table.

Work Done

Mid Review:-

- Installed the needed Dependencies for the project in Google Collab.
- Pre-processed the Data given in the Dataset using the Libraries like Keras, Tensor flow, Matplotlib , Librosa and other Required Libraries.

Final Review:-

- Applied the Classification Algorithms, and Found the Accuracy Rate of the given classification algorithms.
- Comparison between the Algorithms and Found the best Accuracy Model by giving a comparison table.
- Collab-Link:- https://colab.research.google.com/drive/1mzqOh7w6gFcRT-kQ-VGQRNbZBrLZr2Qh?authuser=1

Preprocessing

Procedure Implemented

Pre-Requisites:-

- Analysed the needed libraries to preprocess the Data given in the Dataset
- Loaded the Data from the Dataset into a Data frame by Constructing the a File path by taking the file name and folder path.
- Taken the class name into an array to specify each of the data from them.

PreProcessing:-

- Loaded the audio Data.
- Converted the audio into desired number of channels and mono to stereo and vice versa.
- Resampling all the audio files in different Categories to the same.
- Starting to apply the Algorithm Techniques.

CNN(Convolution Neural Network)

Procedure for Building the Model

- After Preprocessing the data, the data has been split into 80:20 for training and validation using random_split.
- Building the CNN model and it’s Architecture for the Required data.
- Looping the Training Procedure for all the data to Complete the Training Procedure.
- Validating the data after completion of training.

Results:

- Accuracy Rate given by the CNN model after completion of Training and validation is **44 percent**.

ANN(Artificial Neural Network)

Procedure for Building the Model

- After Preprocessing the data, The Dataset is given classes according to their types.
- Imported the Needed Libraries for Classification.
- Performed Feature extraction.
- Encoded the Categorial Data.
- Split the Dataset for Training and Validation and Testing.
- Applied ANN First hidden Layer with 64 and 128 neurons and also two hidden layers with 64 and 128 neurons.
- Build The Model according to the needed.
- Training is done following by Testing the ANN.
- Making the Confusion Matrix.
- Predicting the Test Results.
- Taking the Accuracy Rate, **The Accuracy Rate We got is 46 percent.**

Random Forest

Procedure for Building the Model

- After Preprocessing, The Libraries needed are imported to the Google Collab.
- After Having the Training and Test Data we can import Random Forest Classifier.
- After that, Set the n_estimators and maxdepth and random state values according to the values needed.
- We use Fit to make the model fit around the data.
- We Predict the Accuracy of the Model.

Results:

- Accuracy Rate given by the CNN model after completion of Training and validation is **0 percent** as the Dataset is very small to make decision tree and to follow the Algorithm Implementation.

Comparison Results

ANN vs CNN vs RF

ANN	CNN	RF
46 PERCENT	44 PERCENT	0 PERCENT

Results:

- By Applying the Different Classification Algorithms to the Deep-Ship DataSet, we have got these Results accordingly.
- In these Following, ANN has got the major Accuracy Rate among other Classification Algorithms.
- The Accuracy Rate is low because the Dataset contains very low amount of data to be used for Training and Validation.

Contributions

- **Bhaskar**: Preprocessing Data, CNN Algorithm Implementation and Validation.
- **Abhinandan Babu**: Preprocessing and ANN Algorithm Implementation and Validation.
- **Vignesh Prema**: Random Forest Algorithm Implementation with Bhanu and Snehith.
- **Snehith Kanikella**: Data Segregation for the Audio Classification Techniques and PPT.
- **Bhanu Teja**: Contribution with Abhi in Applying ANN Layers and Processing the Training Phase and Validation Phase.

References

- https://towardsdatascience.com/audio-deep-learning-made-simple-sound-classification-step-by-step-cebc936bbe5

- https://www.analyticsvidhya.com/blog/2021/08/beginners-guide-to-convolutional-neural-network-with-implementation-in-python/

- https://www.mltut.com/implementation-of-artificial-neural-network-in-python/

- https://stackabuse.com/random-forest-algorithm-with-python-and-scikit-learn/

Thank You