Audio Genre Classification

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AUDIO GENRE CLASSIFICATION

- Music is the art of arranging sound and noise together to create harmony, melody, rhythm, and expressive content. It is organized so that humans and sometimes other living organisms can express their current emotions with it.
- We all have our own playlist, which we listen to while traveling, studying, dancing, etc.
- In short, every emotion has a different genre

AGENDA

Outline:

- Problem Statement
- Project Overview
- Proposed Solution
- System Development Approach
- Algorithm and Deployment
- Result
- Conclusion

PROBLEM STATEMENT

Creating a system that can automatically categorise audio files into predetermined genres according to their audio characteristics. The goal of this system is analysis of the audio data that should be able to identify distinguishing characteristics between distinct genres.

PROJECT OVERVIEW

- ➔ Data is read and exploratory data analysis is performed
- ➔ Each Audio Data is Analyzed and plotted using Librosa Library
- ➔ A HeatMap is drawn for variables
- ➔ Data is preprocessed by performing encoding,MinMaxScaling
- ➔ Data is splitted for training and testing

PROJECT OVERVIEW(CONTD..)

- Different models such as K-neighbors classifier,Decision Tree Classifier,Random Forest,Logistic Regression,Cat Boost,Gradient Boost
- For the best model,Classification report and Confusion matrix are displayed
- Dataset is fitted into a simple neural network and accuracy is plotted

PROPOSED SOLUTION

- Many models are used to predict the audio genres and their accuracy is calculated
- One of the model is chosen to predict the audio genre
- Implement a simple neural network and predict the accuracy of the model
- Experiment with different Epoch values and tried to improve accuracy

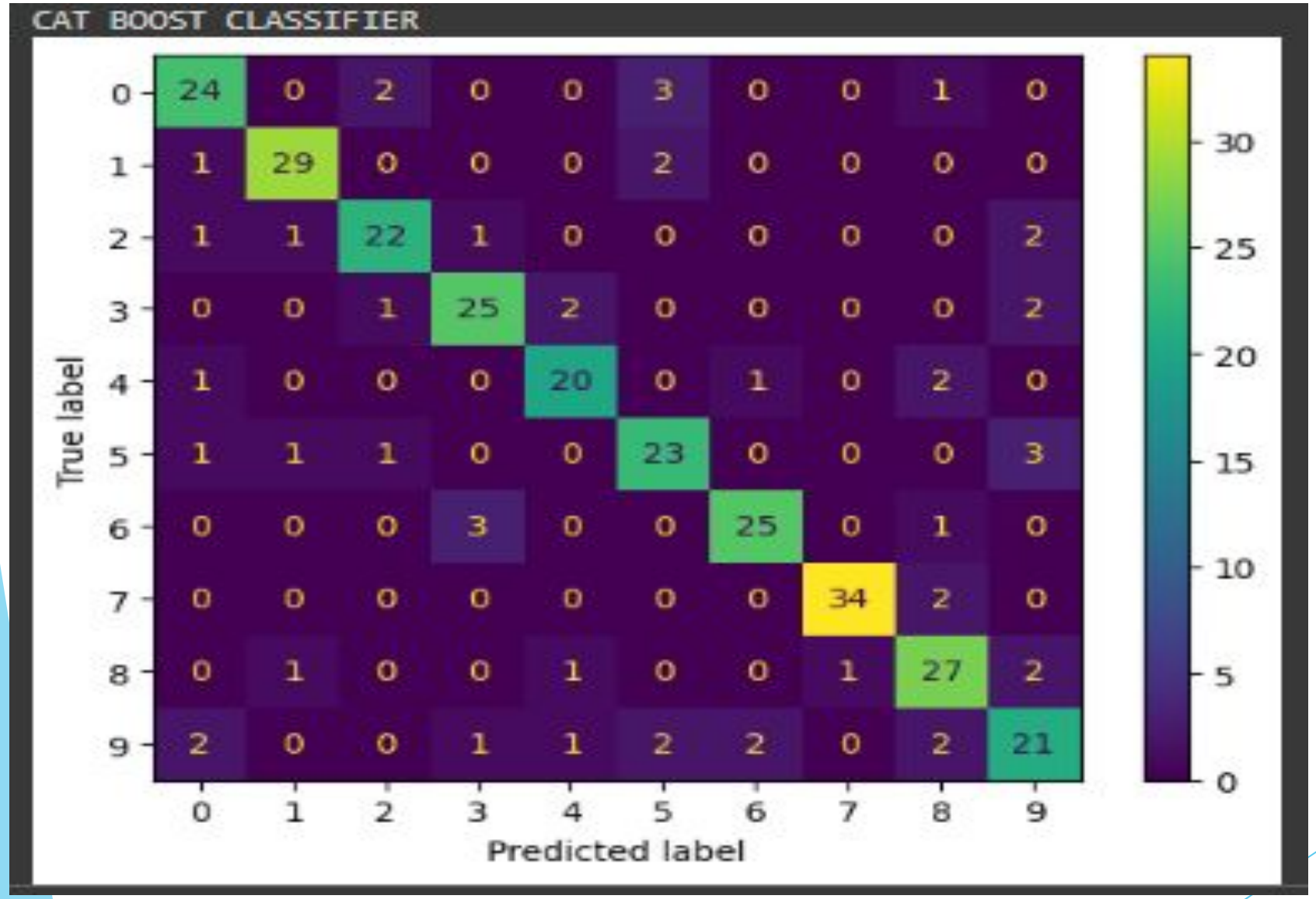
SYSTEM DEVELOPMENT APPROACH:

- This project is implement using Python
- Google Colab Platform is used for development,experimentation and documentation
- K-neighbors classifier,Decision Tree Classifier,Random Forest,Logistic Regression algorithms are imported from sklearn module.
- Cat Boost,Gradient Boost are imported from CatBoost Classifier,XGB Classifier
- Seaborn,Librosa,Matplotlib are used data visualization,including generating heatmap for variables & confusion matrix and plotting accuracy and error values

ALGORITHM &DEPLOYMENT

- Data Preparation:
  - 100 audio files for each genre is taken for pop,rock,etc.
  - These audio files are visualized using librosa and the images are saved
  - The image files are used to predict genre
- Model Building
  - Many different models such as K-neighbors classifier,Decision Tree Classifier,Random Forest,Logistic Regression,Cat Boost,Gradient Boost are used
  - Each algorithm's accuracy score is predicted
  - Best Algorithm is chosen , Confusion matrix and classification report is displayed
  - Simple Neural Network with a Sequential model is created and dataset is fitted into the model
  - Accuracy and Error scores are plotted

RESULTS


CAT BOOST CLASSIFIER
True label
Predicted label
0 1 2 3 4 5 6 7 8 9
24 0 2 0 0 3 0 0 1 0
1 29 0 0 0 2 0 0 0 0
1 1 22 1 0 0 0 0 0 2
0 0 1 25 2 0 0 0 0 2
1 0 0 0 20 0 1 0 2 0
1 1 1 0 0 23 0 0 0 3
0 0 0 3 0 0 25 0 1 0
0 0 0 0 0 0 0 34 2 0
0 1 0 0 1 0 0 1 27 2
2 0 0 1 1 2 2 0 2 21
30 25 20 15 10 5 0

RESULTS(CONTD..)

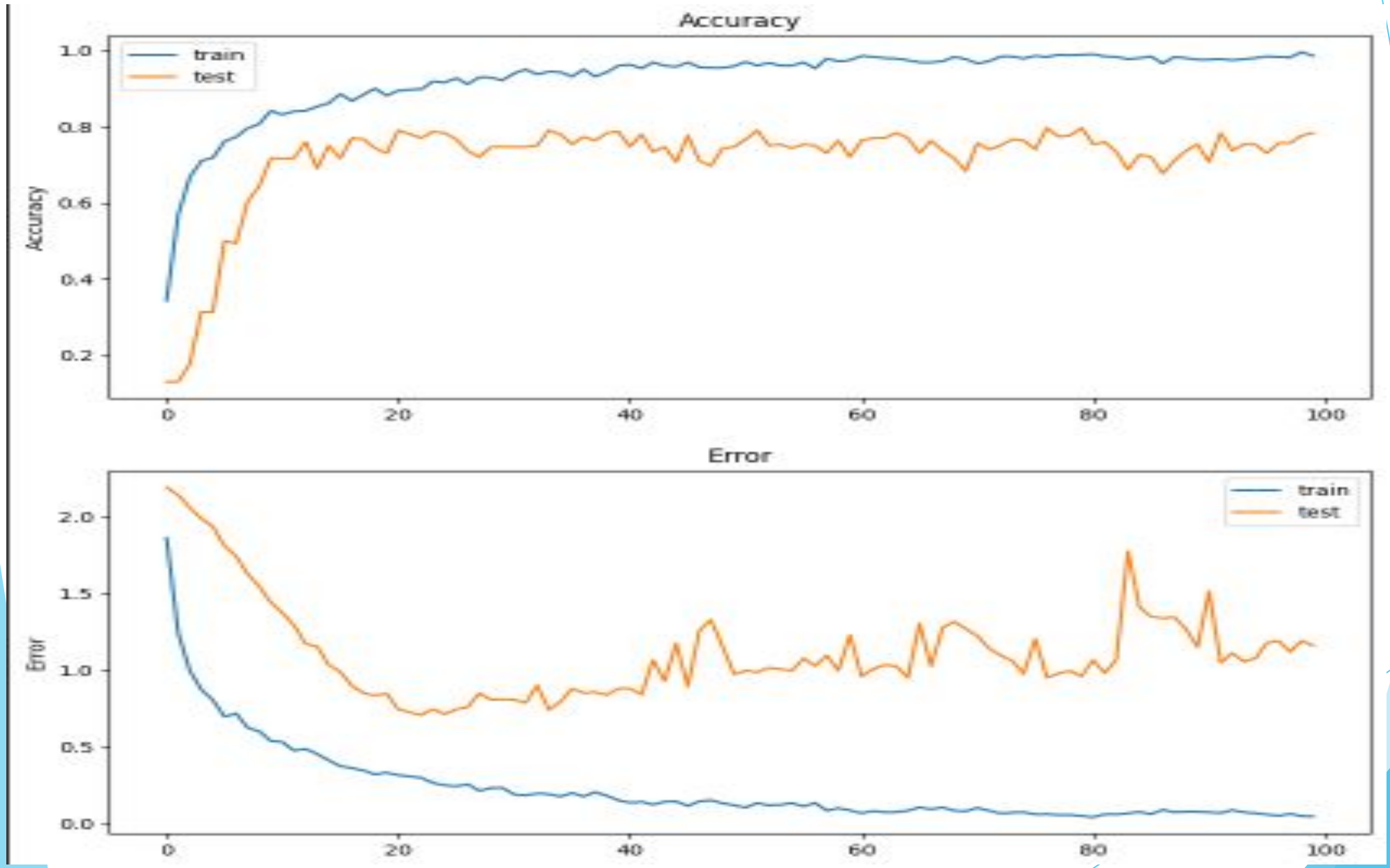
Random Forest 0.78
CatBoost 0.8333333333333334
XGBoost 0.7833333333333333
KNN 0.7033333333333334
Decision Tree 0.61
Logistic Regression 0.6733333333333333

RESULTS(CONTD..)

CAT BOOST

	precision	recall	f1-score	support
0	0.80	0.80	0.80	30
1	0.91	0.91	0.91	32
2	0.85	0.81	0.83	27
3	0.83	0.83	0.83	30
4	0.83	0.83	0.83	24
5	0.77	0.79	0.78	29
6	0.89	0.86	0.88	29
7	0.97	0.94	0.96	36
8	0.77	0.84	0.81	32
9	0.70	0.68	0.69	31
accuracy			0.83	300
macro avg	0.83	0.83	0.83	300
weighted avg	0.83	0.83	0.83	300

RESULTS(CONTD..)



CONCLUSION

Automatic audio genre classification has emerged as a powerful tool for music information retrieval and organization. By leveraging machine learning techniques, we can extract meaningful features from audio data and achieve high accuracy in classifying genres.This is used in Music Recommendation Systems, Content Based Music Search, Automatic Playlist generation