

Machine Learning Project Presentation


Title: Gender Classification by Voice



INDRAPRASTHA INSTITUTE *of*
INFORMATION TECHNOLOGY
DELHI

Group Members:

Arjun Mehra
Aryman Srivastava
Dheeraj
Khushdev Pandit



- Voice: used for human communication
- Why care about Gender Recognition using voice?
 - Audio categorization
 - Speech emotion recognition
 - Human to machine interaction
 - Security purposes
- Speech and voice recognition system can be used for gender identification.
- Example: Human Ear, models for Gender recognition system

Literature Review (1/2)



- Gender Recognition from Human Voice using Multi-Layer Architecture [\[1\]](#)
 - In this paper, author extracted features from the datasets in two layers and classified the gender with SVM and KNN
 - Researchers tried to find out the exact feature from the vocal cords and extract it from the voices using many methods and models.
 - The recognition rate of the machine depends on extracting the effective features from voice.

Literature Review (2/2)



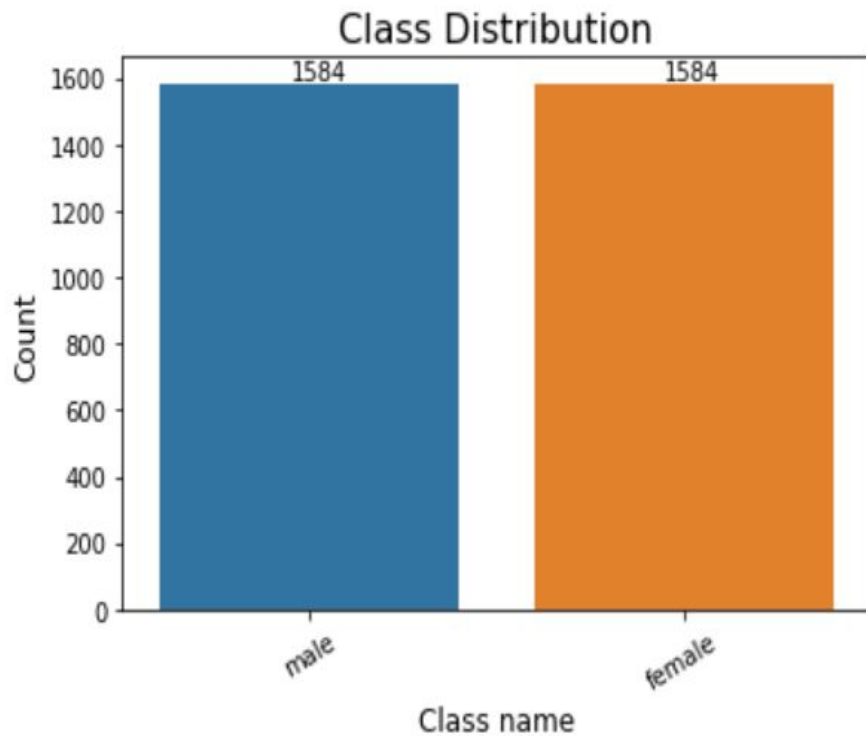
- Voice based Age, Accent and Gender Recognition [\[2\]](#)
 - In this reference paper that is solely based on the self labeled algorithm.
 - The main objective of gender recognition by speech is performed upon the usage of a new ensemble semi-supervised self-labeled algorithm.
 - The algorithm combines the individual predictions of three of the most known and consistent self-labeled methods i.e, Co-training, Self-training, and Tri-training making good use of the ensemble as base learner for the algorithm

Dataset description

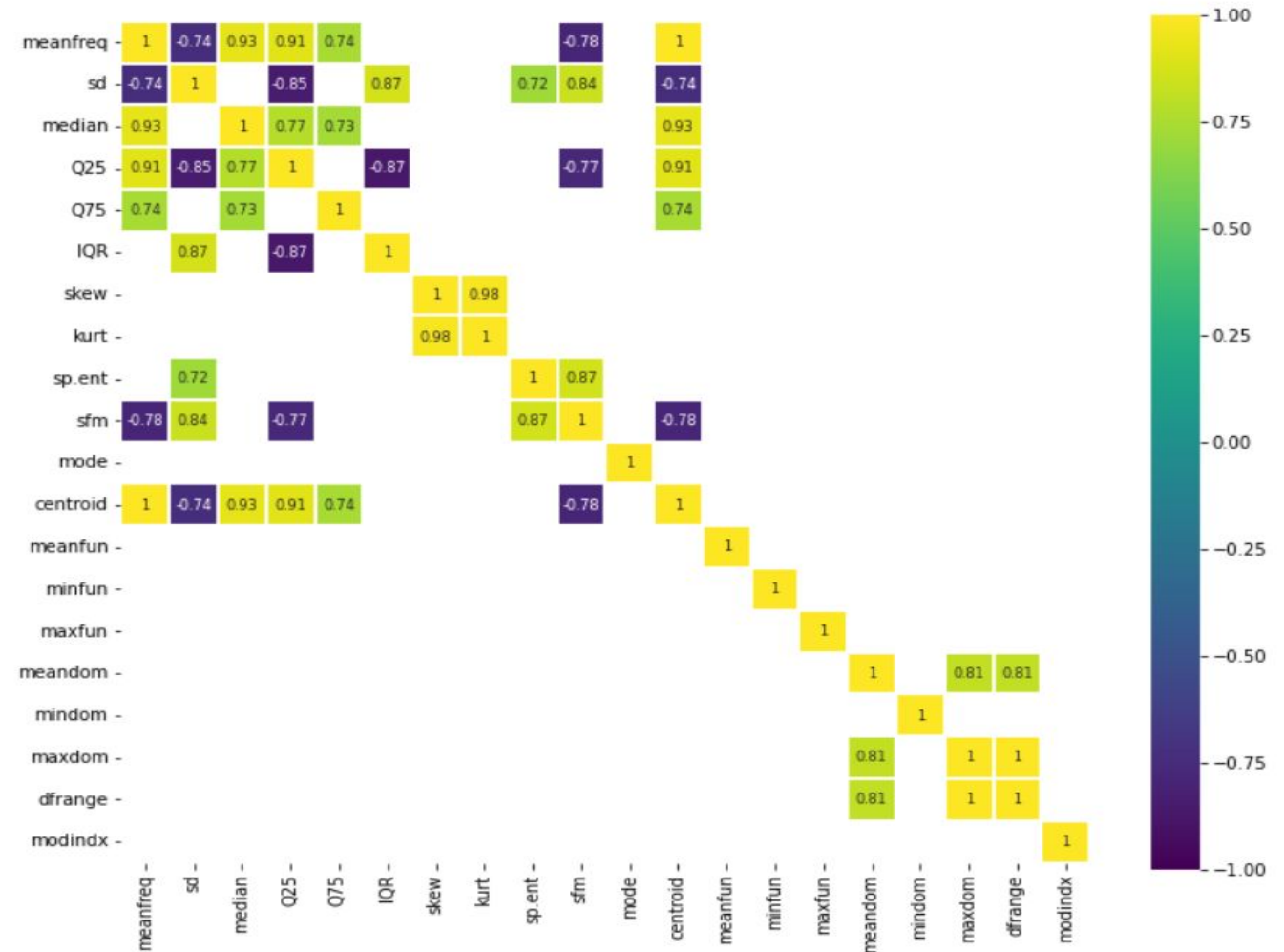


- We used voice dataset with voice of 3169 different people.
- Output labels were classified as male and female.
- Dataset have different voice attributes like:
 - mean frequency
 - standard deviation in frequency
 - median frequency, etc.
- We extracted 13 different voice features out of 20 using various visualizations techniques and manual testing.

Visualizations



Class Distribution for Output label



Heatmap for Highly correlated columns

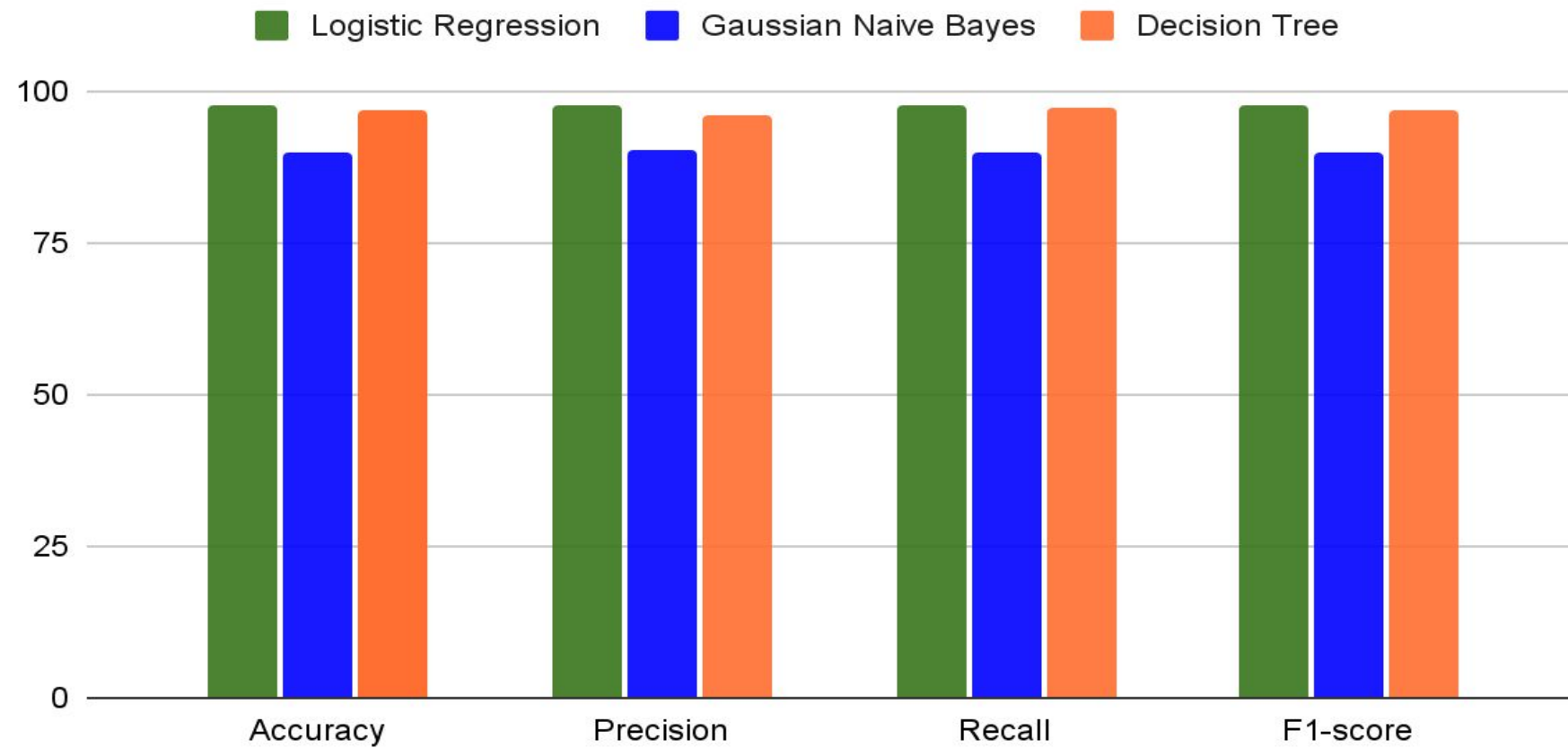
- We classified the gender of the speaker, using the selected voice attributes.
- Classified the voice of speaker as 'male' and 'female'
- For the classification purpose, three different model/methodologies were used.
 - Logistic Regression
 - Naive Bayes
 - Decision Tree



Results



Model Performance



Conclusions



- Logistic Regression provided best score for each of the metrics chosen to judge the model.
- Decision Tree that gave results comparable to Logistic Regression model, had
 - Depth = 10
 - Criterion = Gini
- Gaussian naive bayes also reported high accuracy, indicating that:
 - gaussian naive model is able to fit well into data
 - voice dataset has gaussian distribution for male and female

Timeline that we roughly followed is:

- Week 1-2: Data Collection
- Week 3-4: Pre-processing and Data Visualization
- Week 5: EDA, Feature Analysis, Heatmaps, PCA, TSNE
- Week 6: Feature Selection, Logistic Regression
- Week 7: Naive Bayes, Decision Tree
- Mid-sem Break: Report and PPT



Team member contributions



Arjun Mehra

- Data Collection and Analysis
- Naive Bayes Model
- PPT

Aryman Srivastava

- Exploratory Data Analysis
- Feature Selection
- Report

Dheeraj

- Data collection & Pre-processing
- Decision Tree model
- Report

Khushdev Pandit

- Pre-processing and Data Visualization
- EDA
- Logistic Regression model
- PPT

Thank You!

