Urban Sound Classification

Springboard DSC
Capstone Project 2

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Urban Sound Classification

- Automatically classify urban sound into categories
- Feature extraction process: Librosa
- Feature representation methods: Mfccs, Tonnetz, mel, chroma_stft
- Baseline modeling using Logistic Regression; Xgboost and Cnn used for extended analysis

Problem Statement & Goals

- Successfully extract data from audio files
- Find useful insights from data using visualization techniques
- Create a model that accurately label audio files into their respective class
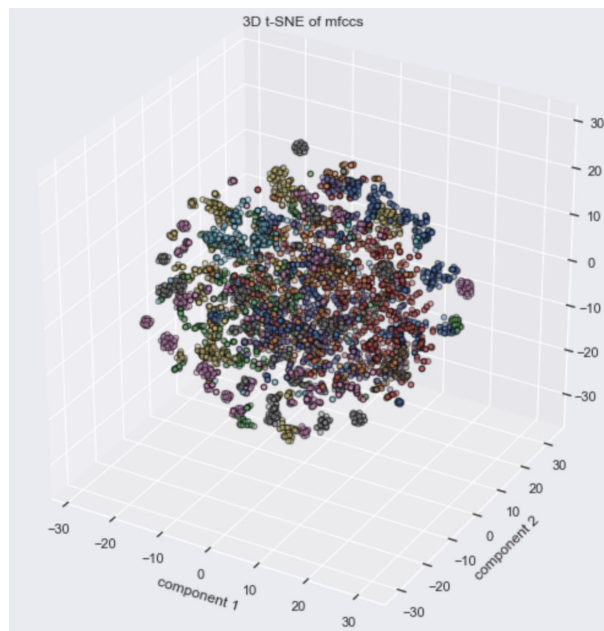
DATA

- The dataset is composed of 8732 labeled audio files
- Data was extracted from audio files using Librosa library and it was represented by following methods: Mfccs, Tonnetz, Chroma, mel and contrast
- Training data frame has 5435 rows and 196 columns
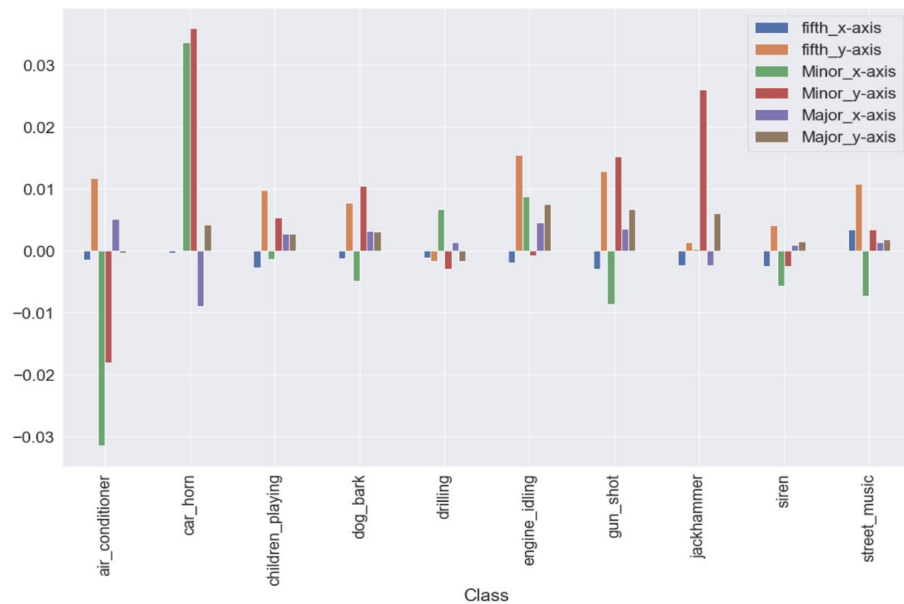- Does not requires data wrangling for further analysis

Class Distribution
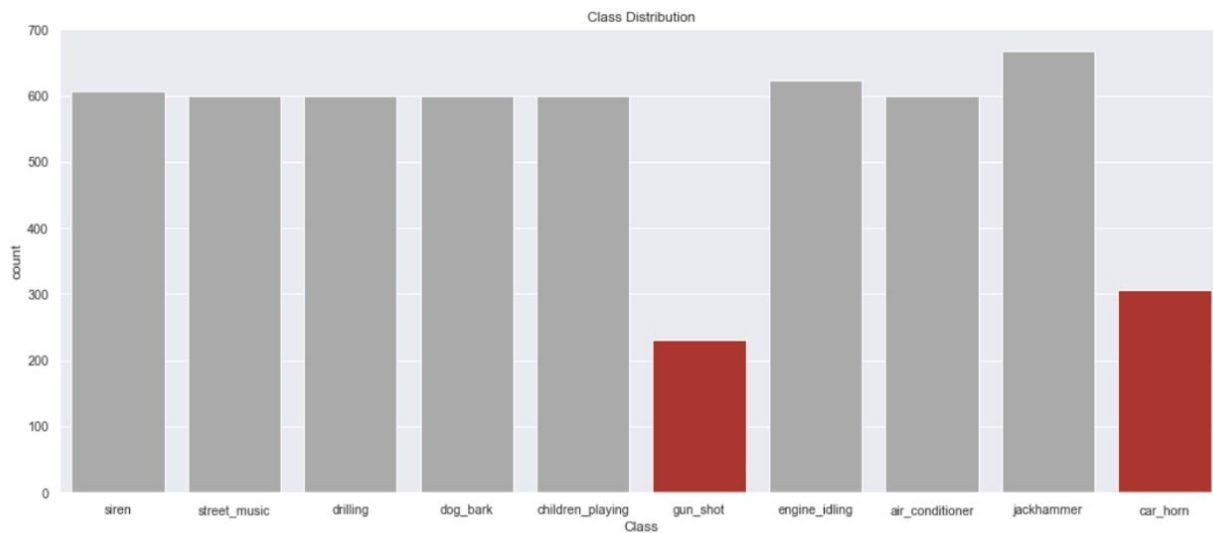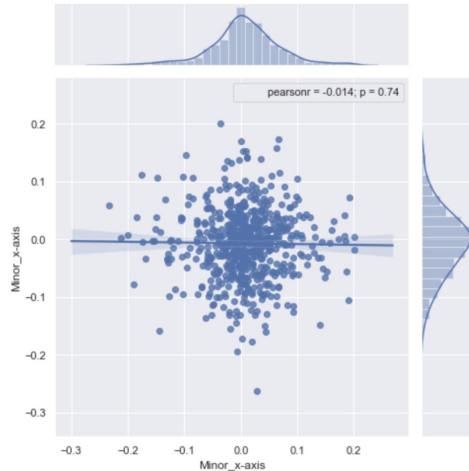
Data Visualization in 3D using Mfccs
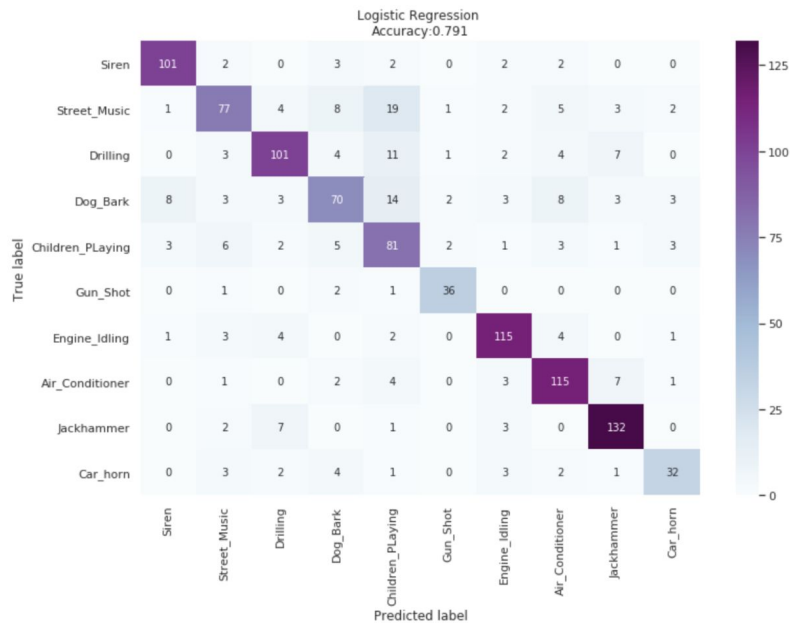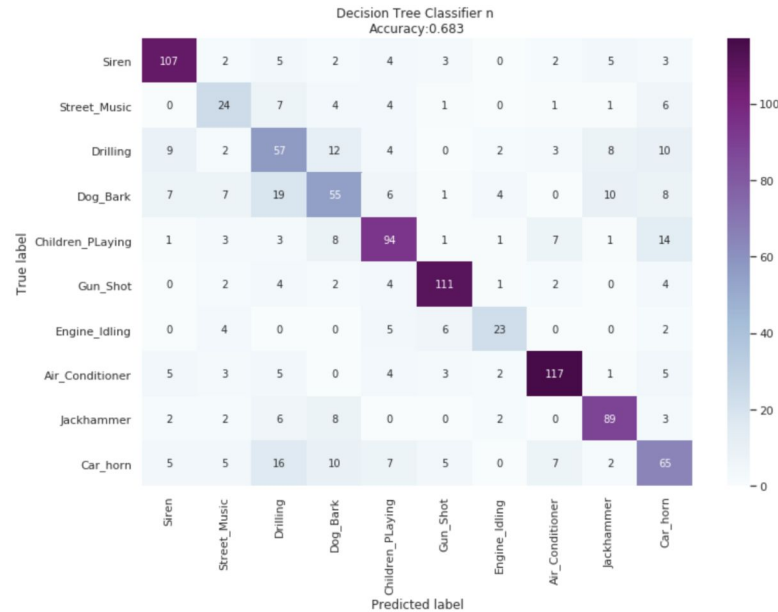
Data Visualization

Inferential Statistics

- **Pearson's** correlation coefficient test was conducted to measure the statistical relationship between **Minor_x-axis** of drilling and street music classes.
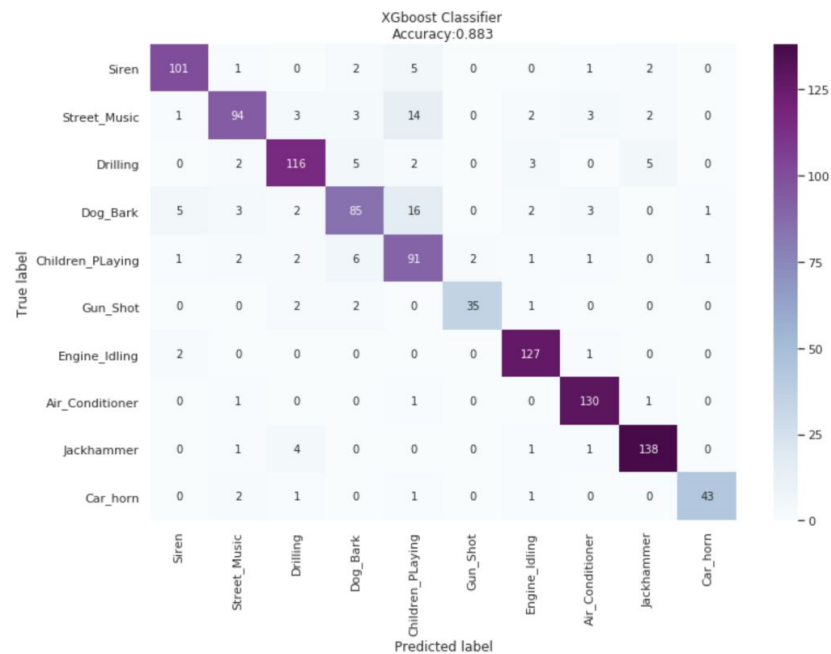
Baseline Modeling - Logistic Regression
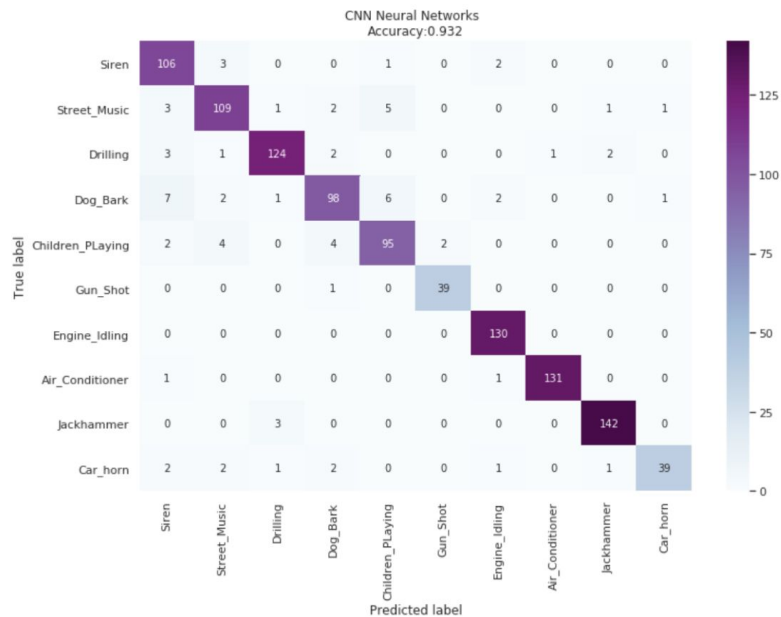

Logistic Regression
Accuracy:0.791

Extended Analysis - Decision Tree Classifier

Decision Tree Classifier n
Accuracy:0.683

XGBoost Classifier

XGboost Classifier
Accuracy:0.883

CNN Neural Network - Keras w/ Tensorflow

ML Models Evaluation

Model	Logistic Regression	Decision Tree Classifier	XGBoost Classifier	CNN Neural Networks
Accuracy	79%	68%	88%	93%
Weighted F1 avg	.79	.68	.88	.93

- **CNN Neural Networks out performed other models**
  - Accuracy = 93%
  - Weighted F1 Average = 93%

Recommendations

- The automatic classification of urban sounds is relevant in many areas and has a variety of applications including surveillance, highlight extraction, environmental monitoring, video summarization etc.
- It also has the potential of improving the quality of life of city dwellers by providing a data-driven understanding of urban sound and noise patterns.

Thank you!