



Music Genre Classification

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1 Introduction



“Which genre of music is this?”

Blues?
Classical?
Country?
Disco?
Hiphop?
Jazz?
Metal?
Pop?
Reggae?
Rock?

*Have you ever heard a song and had difficulty
categorizing it into a specific genre of music?*

If only you had a...

**Music
Genre
Classifier**





2 Dataset Overview

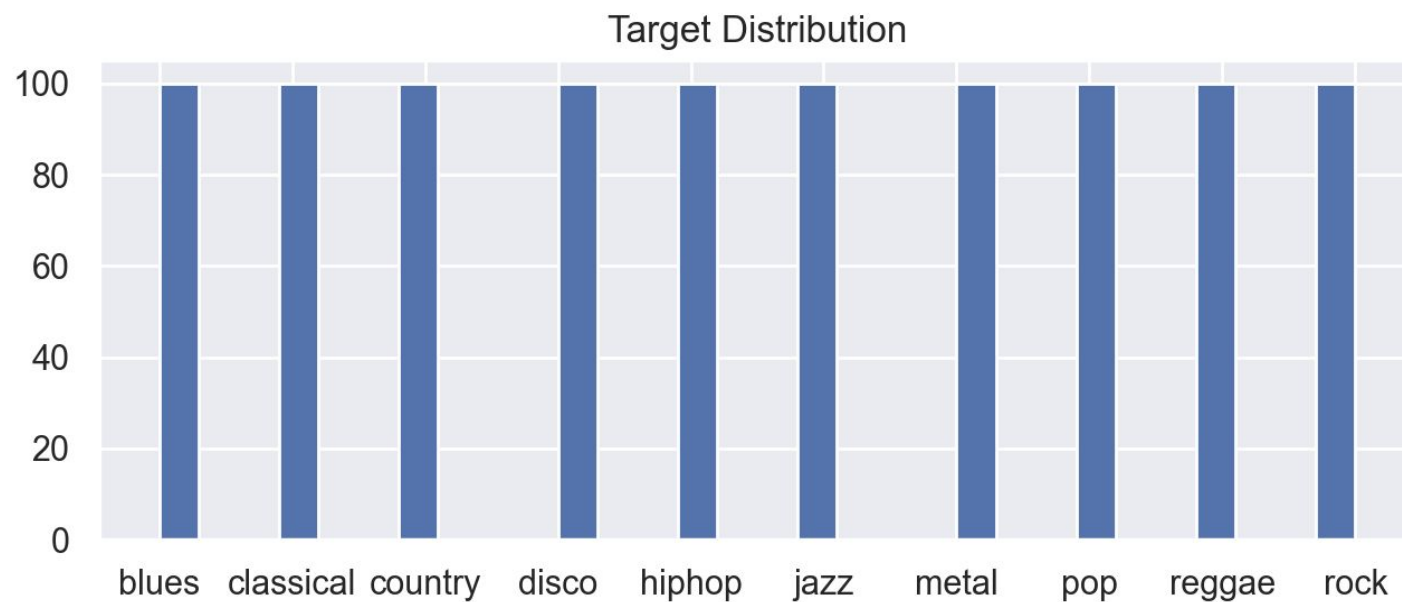




Dataset

- Dataset: music genre classification dataset found on Kaggle.
- This dataset contains 27 features (filename, rmse, chromasft, central_spectroid, central_bandwidth, rolloff, zero_cross, and 20 mfcc for the various frequencies within each .wav (Mel frequency, the way in which humans perceive sound))
- Label: 10 classes (blues, classical, country, disco, hiphop, jazz, metal, pop, reggae, rock)
- 1,000 rows, each row representing a single .wav file.

Target Balance

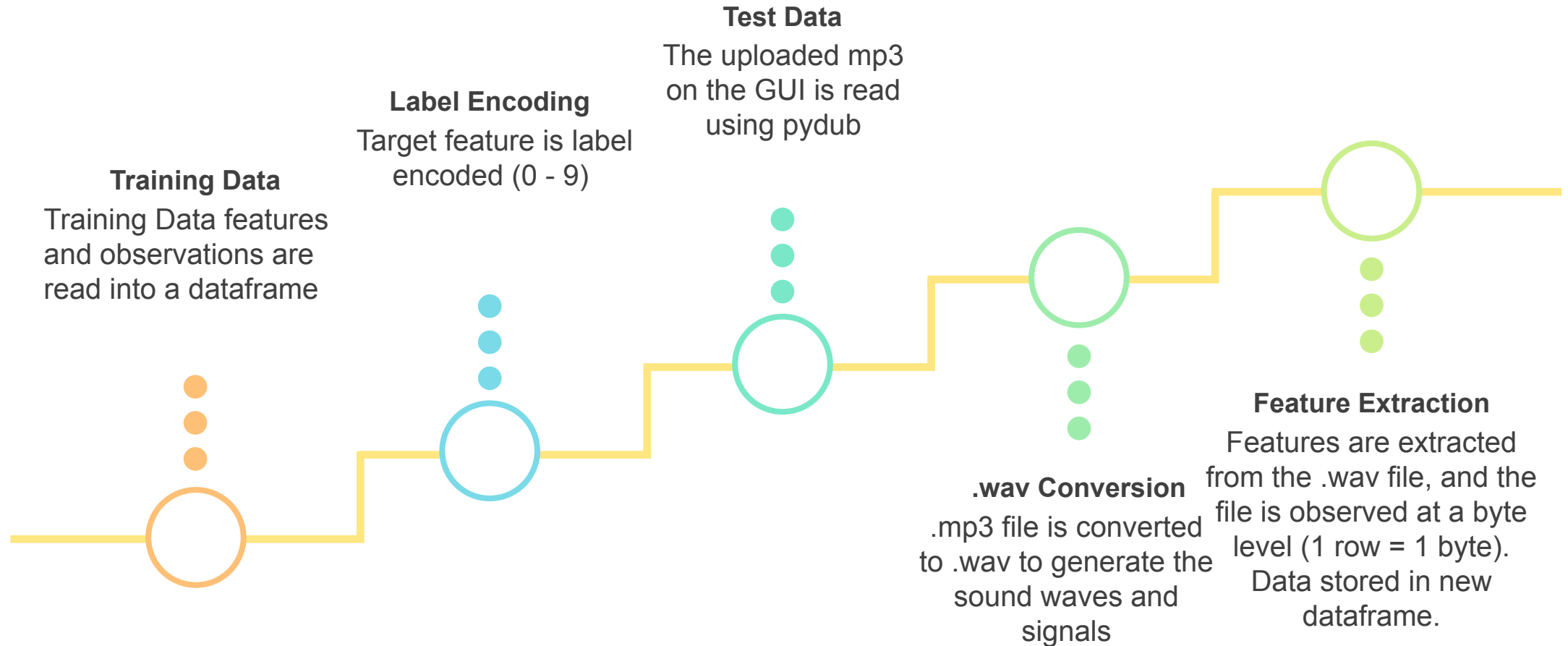




3 Experimental Setup



Data Preprocessing

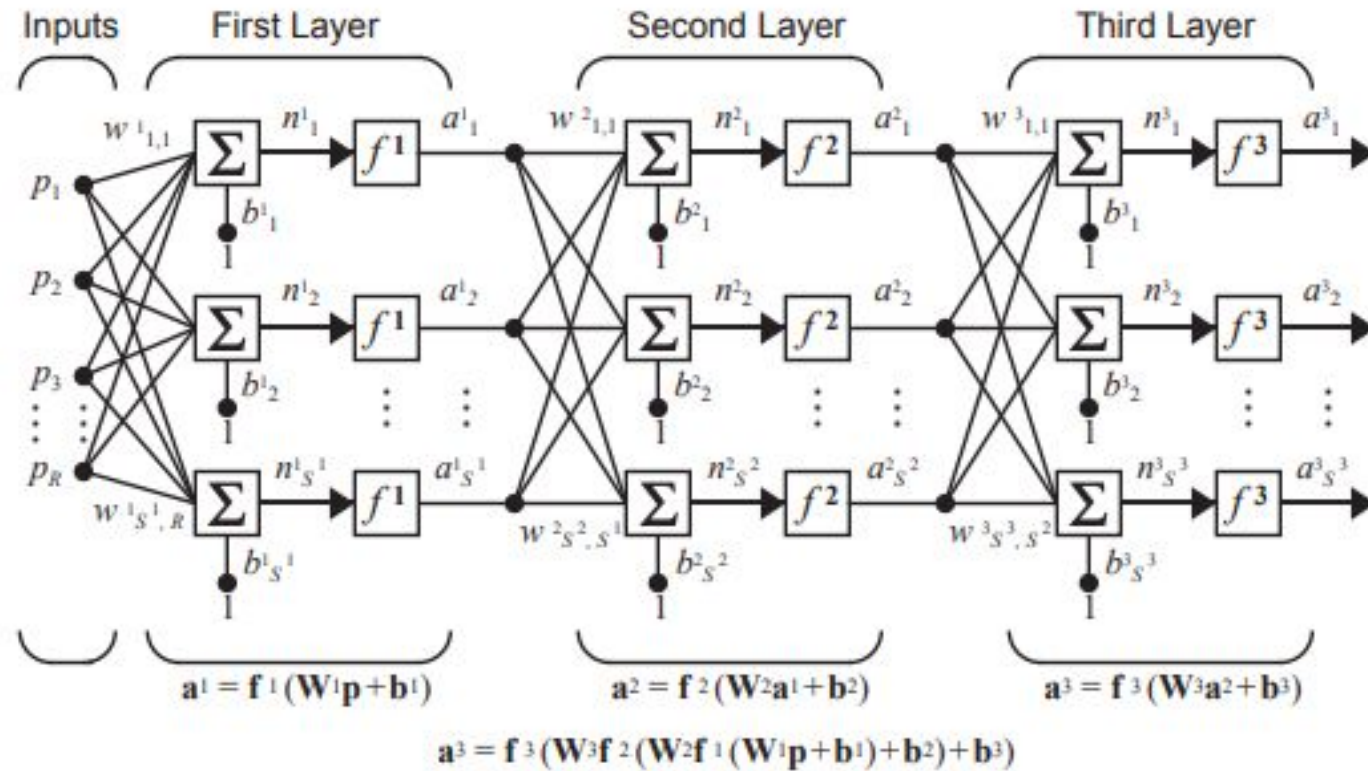




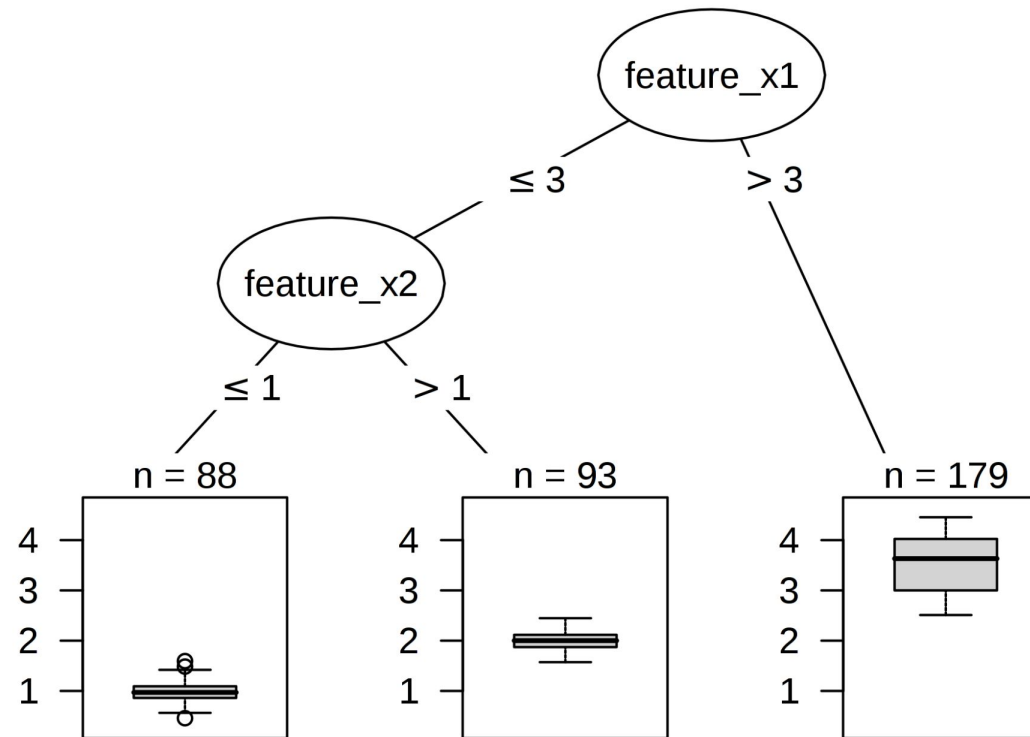
4 Modeling



Multilayer Perceptron



Decision Tree



Modeling



01

Create Network

Cross-Validation - GridSearchCV

```
MLPClassifier(  
    hidden_layer_sizes=(60,100,60),max_iter=10000,learning_rate='invscaling',solver="adam", activation='tanh', alpha=0.0001)
```

02

Fit Data

Using the NN classifier, train the model on data matrix (X) and target (y)

03

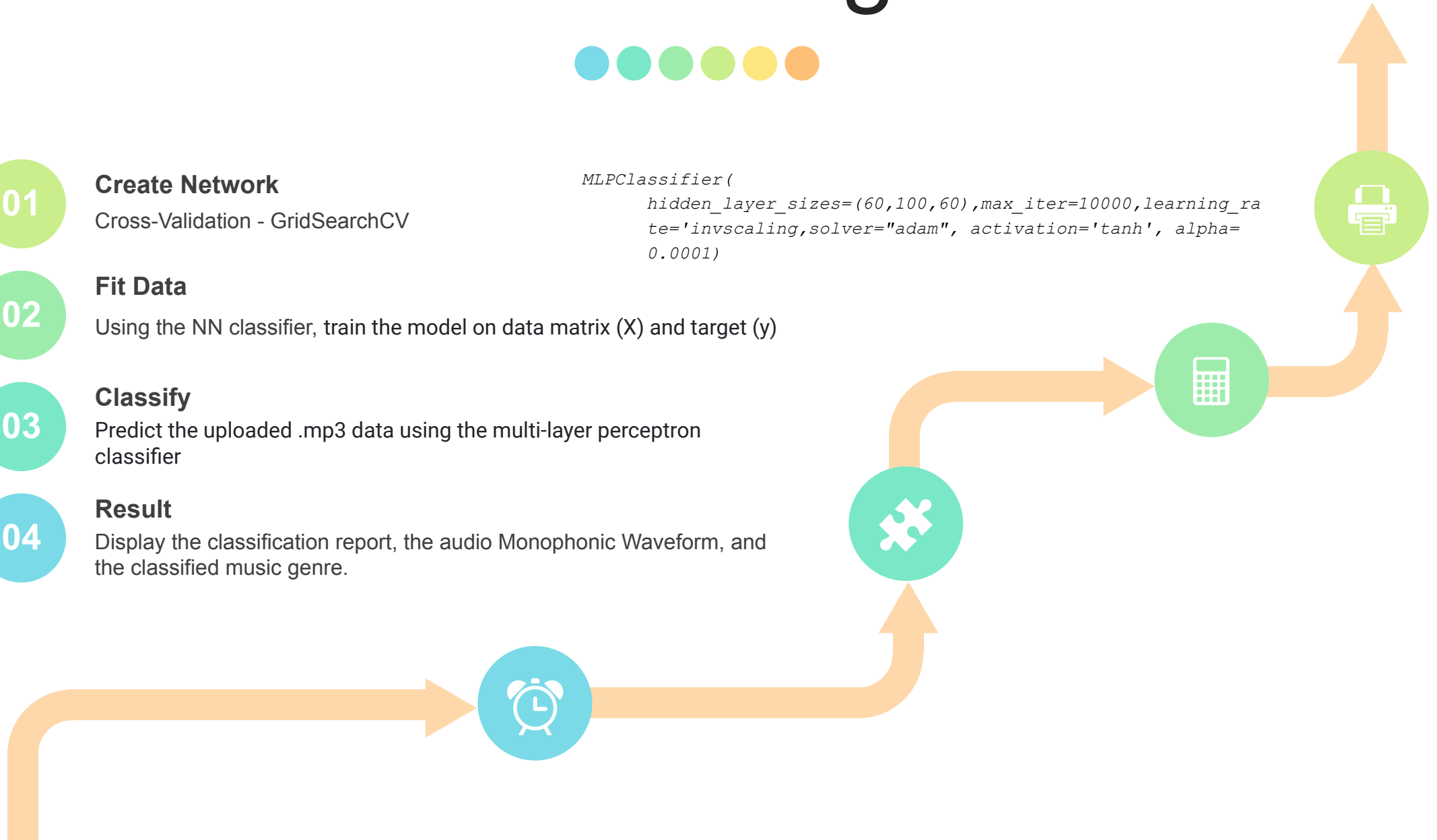
Classify

Predict the uploaded .mp3 data using the multi-layer perceptron classifier

04

Result

Display the classification report, the audio Monophonic Waveform, and the classified music genre.





5 Results

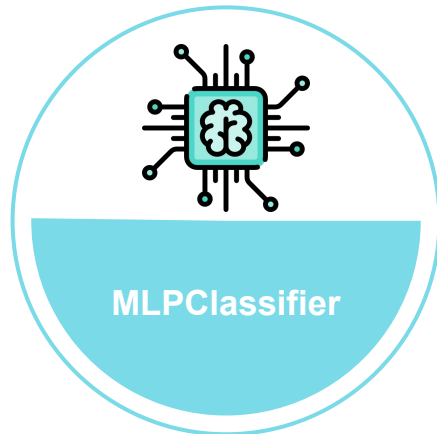


.mp3 file to .wav conversion



	± chroma_stft	± rmse	± spectral_centroid	± spectral_bandwidth	± rolloff	± zero_crossing_rate	± mcf1	± mcf2	± mcf3	± mcf4	± mcf5	± mcf6	± mcf7	± mcf8	± mcf9	± mcf10	±
...	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-529.10089	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
...	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-529.10089	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
...	0.93994	0.00000	5512.49994	3185.74988	9377.70996	0.00000	-529.10089	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
...	0.44115	0.00000	5678.89222	3056.50287	9313.11035	0.21777	-529.10089	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
...	0.70805	0.00000	5361.18569	3064.92454	9054.71191	0.38281	-529.10089	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
...	0.82350	0.00001	4802.39228	3216.80506	8796.31348	0.46826	-529.10089	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
...	0.60006	0.00002	4318.46333	3309.27007	8559.44824	0.48682	-529.10089	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
...	0.79990	0.00004	3483.50141	3408.31884	7988.81836	0.27490	-529.10089	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
...	0.62671	0.00007	2620.33720	3294.50589	7202.85645	0.11182	-528.79077	0.43820	0.43731	0.43582	0.43375	0.43108	0.42784	0.42401	0.41962	0.41464	0.00000
...	0.68632	0.00011	2008.32484	3077.75282	6244.62891	0.02734	-527.45721	2.31599	2.29047	2.24832	2.19012	2.11663	2.02886	1.92798	1.81534	1.69241	1.00000
...	0.54665	0.00015	1545.11068	2787.94296	4877.27051	0.01318	-525.89618	4.51953	4.48180	4.41934	4.33279	4.22302	4.09113	3.93844	3.76648	3.57695	3.00000
...	0.51823	0.00024	1318.34394	2639.79371	3919.04297	0.00879	-525.14532	5.58221	5.54691	5.48838	5.40702	5.30344	5.17839	5.03276	4.86762	4.68412	4.00000
...	0.64215	0.00031	994.34481	2334.38658	1421.19141	0.00879	-522.88074	8.76673	8.67737	8.52962	8.32521	8.06655	7.75666	7.39918	6.99823	6.55844	6.00000
...	0.45984	0.00038	884.45728	2215.99874	333.76465	0.00830	-522.16919	9.76613	9.65611	9.47423	9.22269	8.90455	8.52362	8.08448	7.59237	7.05309	6.00000
...	0.16414	0.00041	960.06231	2288.33100	904.39453	0.00781	-522.44226	9.37844	9.26424	9.07559	8.81493	8.48568	8.09210	7.63926	7.13295	6.57960	5.00000
...	0.41382	0.00043	850.20524	2146.75109	312.23145	0.00977	-521.38928	10.86087	10.72671	10.50516	10.19922	9.81307	9.35190	8.82193	8.23019	7.58455	6.00000
...	0.33165	0.00041	880.53545	2216.09804	312.23145	0.01172	-521.71289	10.40563	10.27851	10.06848	9.77830	9.41173	8.97354	8.46936	7.90566	7.28960	6.00000
...	0.62237	0.00049	799.93302	2112.65480	279.93164	0.01367	-520.50372	12.08891	11.88276	11.54484	11.08335	10.50940	9.83648	9.08005	8.25693	7.38471	6.00000
...	0.29923	0.00063	662.89770	1880.09483	258.39844	0.01318	-518.33258	15.12630	14.82193	14.32343	13.64364	12.79991	11.81345	10.70859	9.51196	8.25160	6.00000
...	0.34909	0.00077	498.01452	1595.95793	193.79883	0.01270	-516.67798	17.47368	17.19068	16.72543	16.08737	15.28937	14.34735	13.27989	12.10768	10.85308	9.00000
...	0.39692	0.00098	459.21371	1519.95102	183.03223	0.01074	-516.26294	18.05709	17.76353	17.28049	16.61716	15.78609	14.80286	13.68575	12.45525	11.13361	9.00000
...	0.45517	0.00130	404.79293	1407.08609	183.03223	0.01025	-513.96021	21.26886	20.84291	20.14599	19.19709	18.02179	16.65129	15.12132	13.47078	11.74042	9.00000
...	0.75818	0.00185	331.72571	1205.09499	183.03223	0.00928	-510.84933	25.59777	24.96401	23.93273	22.54013	20.83438	18.87336	16.72187	14.44866	12.12323	9.00000
...	0.58436	0.00213	260.29502	1018.40441	150.73242	0.00830	-508.03717	29.53022	28.76546	27.52433	25.85514	23.82194	21.50120	18.97785	16.34100	13.67950	11.00000
...	0.38707	0.00243	266.53030	1040.25391	172.26562	0.00928	-507.24017	30.62309	29.75799	28.35791	26.48297	24.21255	21.64082	18.87155	16.01244	13.16936	10.00000
...	0.57163	0.00269	247.28033	997.40442	150.73242	0.00781	-507.82108	29.83179	29.05579	27.79891	26.11364	24.06926	21.74797	19.24030	16.64017	14.03992	11.00000
...	0.47392	0.00255	261.83398	1022.88742	150.73242	0.00830	-507.40305	30.41983	29.63422	28.36056	26.65031	24.57143	22.20473	19.63938	16.96825	14.28298	11.00000
...	0.46362	0.00298	251.89269	983.44430	161.49902	0.00830	-506.61523	31.50892	30.64956	29.25799	27.39277	25.13107	22.56430	19.79288	16.92075	14.04975	11.00000
...	0.79689	0.00321	229.15735	901.05962	161.49902	0.00830	-504.93976	33.80588	32.73438	31.00665	28.70582	25.94064	22.83844	19.53712	16.17667	12.89084	9.00000
...	0.40423	0.00332	228.53342	861.34349	183.03223	0.00977	-502.18408	37.58883	36.18439	33.93279	30.96045	27.43041	23.52999	19.45685	15.40474	11.55024	8.00000
...	0.17391	0.00378	253.37690	915.81119	204.56543	0.01074	-501.38419	38.66582	37.10230	34.59746	31.29454	27.37835	23.06115	18.56686	14.11483	9.90472	6.00000
...	0.25591	0.00376	246.20275	882.60088	204.56543	0.01221	-501.22665	38.89997	37.36938	34.91563	31.67654	27.82972	23.57901	19.13922	14.72063	10.51473	6.00000
...	0.40655	0.00367	229.98729	818.37265	204.56543	0.01172	-500.52823	39.91838	38.47433	36.14706	33.05037	29.33307	25.16954	20.74882	16.26301	11.89609	7.00000
...	0.59033	0.00383	241.28080	839.99425	236.86523	0.01123	-498.94885	42.07455	40.40487	37.72287	34.17213	29.93906	25.23985	20.30571	15.36751	10.64125	6.00000
...	0.61516	0.00427	225.87106	813.26123	236.86523	0.01123	-497.34061	44.22132	42.18718	38.95680	34.75290	29.85538	24.57425	19.22089	14.08107	9.39268	5.00000
...	0.41121	0.00456	211.20642	725.51225	236.86523	0.01074	-495.76105	46.42645	44.30723	40.93861	36.54876	31.42536	25.88839	20.26115	14.84257	9.88414	5.00000

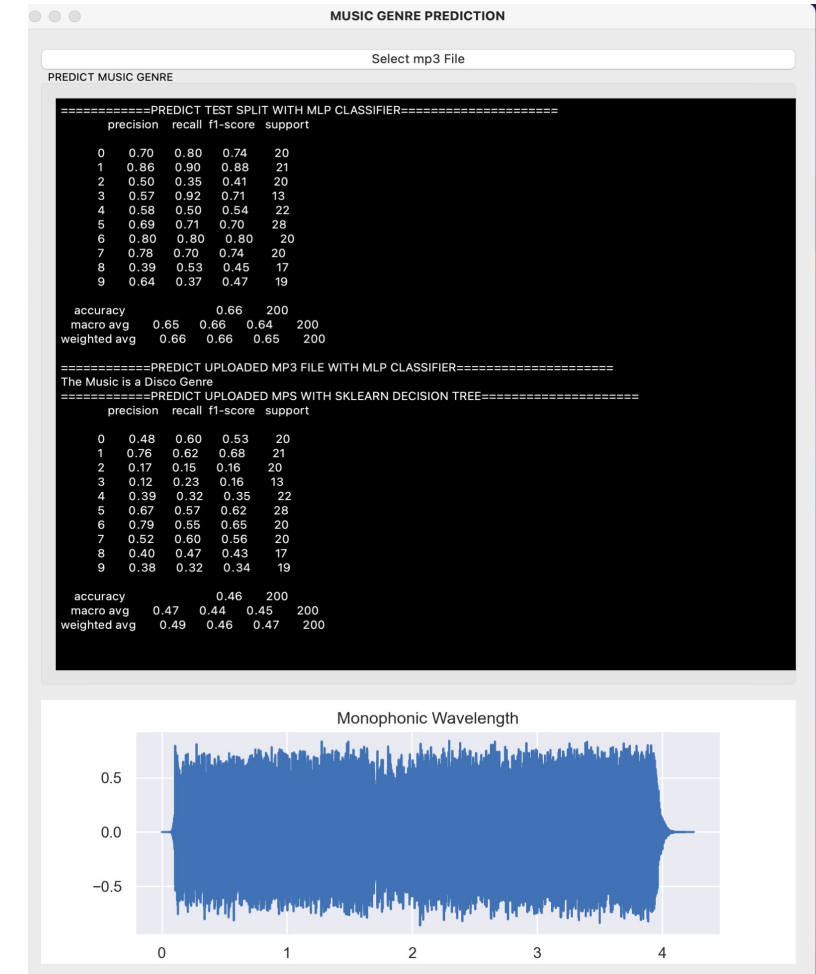
Outcome



- Accuracy Score: ~0.65
- Max F1-score variance: ~0.40
- Consistently outperformed decision tree model



- Accuracy Score: ~0.45
- Max F1-score variance: ~0.50





6 Conclusion



Conclusion



Overview

- Surprised the neural network outperformed a traditional model given the small dataset size
- MLPClassifier consistently outperformed the DecisionTreeClassifier



Difficulties

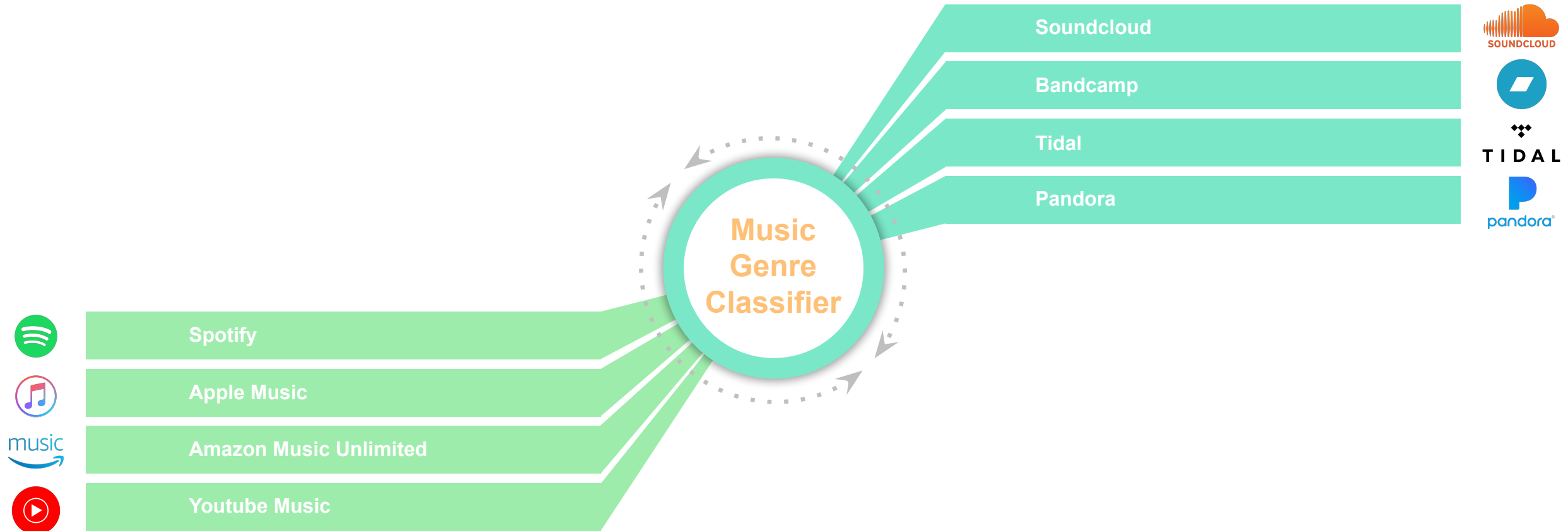
- Songs might not always fit into one genre
- High single-label precision is difficult to achieve



Caveats

- Training data limited to 10 core genres - ideal if training data consisted of larger array of genres
- Single-labeled target is difficult to work with - interested to see how well the models would perform on multi-labeled data

Potential Clients





Citations

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Thank You