# RESULTS

## Experiment 1 : TF-IDF on lyrics

(Train-Test split = 85%)

### Part 1 - All Genres

| **S.No** | **ML Model** | **Classes** | **Precision** | **Recall** | **F1-score** | **Avg. Accuracy** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | Logistic Regression (max\_iter = 1000) | Country | 0.53 | 0.26 | 0.35 | **0.6085** |
| Electronic | 0.33 | 0.01 | 0.03 |
| Folk | 0.50 | 0.01 | 0.01 |
| Hip-hop | 0.84 | 0.74 | 0.79 |
| Indie | 0.00 | 0.00 | 0.00 |
| Jazz | 0.50 | 0.18 | 0.27 |
| Metal | 0.74 | 0.54 | 0.63 |
| Other | 0.15 | 0.00 | 0.01 |
| Pop | 0.48 | 0.28 | 0.36 |
| R&B | 0.83 | 0.03 | 0.06 |
| Rock | 0.59 | 0.89 | 0.71 |
| 2 | Multinomial Naive Bayes | Country | 0.00 | 0.00 | 0.00 | 0.5365 |
| Electronic | 0.00 | 0.00 | 0.00 |
| Folk | 1.00 | 0.00 | 0.01 |
| Hip-hop | 0.87 | 0.57 | 0.69 |
| Indie | 0.00 | 0.00 | 0.00 |
| Jazz | 1.00 | 0.00 | 0.00 |
| Metal | 0.91 | 0.18 | 0.30 |
| Other | 0.00 | 0.00 | 0.00 |
| Pop | 0.60 | 0.01 | 0.02 |
| R&B | 0.00 | 0.00 | 0.00 |
| Rock | 0.50 | 0.99 | 0.67 |
| 3 | Decision Tree | Country | 0.26 | 0.24 | 0.25 | 0.4931 |
| Electronic | 0.20 | 0.18 | 0.19 |
| Folk | 0.12 | 0.08 | 0.10 |
| Hip-hop | 0.71 | 0.70 | 0.71 |
| Indie | 0.09 | 0.06 | 0.07 |
| Jazz | 0.26 | 0.27 | 0.27 |
| Metal | 0.44 | 0.41 | 0.43 |
| Other | 0.08 | 0.06 | 0.07 |
| Pop | 0.35 | 0.35 | 0.35 |
| R&B | 0.17 | 0.13 | 0.15 |
| Rock | 0.60 | 0.63 | 0.61 |
| 4 | SGD Classifier | Country | 0.48 | 0.07 | 0.12 | 0.5771 |
| Electronic | 0.18 | 0.00 | 0.01 |
| Folk | 0.25 | 0.01 | 0.01 |
| Hip-hop | 0.75 | 0.77 | 0.76 |
| Indie | 0.00 | 0.00 | 0.00 |
| Jazz | 0.27 | 0.07 | 0.11 |
| Metal | 0.71 | 0.46 | 0.56 |
| Other | 0.09 | 0.00 | 0.01 |
| Pop | 0.46 | 0.08 | 0.14 |
| R&B | 0.57 | 0.02 | 0.04 |
| Rock | 0.55 | 0.94 | 0.70 |

### Part 2 - Only 3 Genres (Country, Hip-hop, Metal)

| **S.No** | **ML Model** | **Classes** | **Precision** | **Recall** | **F1-score** | **Avg. Accuracy** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | Logistic Regression (max\_iter=500) | Country | 0.86 | 0.87 | 0.87 | **0.8990** |
| Hip-hop | 0.93 | 0.90 | 0.91 |
| Metal | 0.90 | 0.91 | 0.91 |
| 2 | Multinomial Naive Bayes | Country | 0.91 | 0.61 | 0.73 | 0.8350 |
| Hip-hop | 0.79 | 0.93 | 0.85 |
| Metal | 0.86 | 0.87 | 0.87 |
| 3 | Decision Tree | Country | 0.67 | 0.70 | 0.69 | 0.7903 |
| Hip-hop | 0.87 | 0.83 | 0.85 |
| Metal | 0.79 | 0.80 | 0.79 |
| 4 | SGD Classifier | Country | 0.84 | 0.87 | 0.86 | 0.8930 |
| Hip-hop | 0.93 | 0.89 | 0.91 |
| Metal | 0.89 | 0.91 | 0.90 |

## Experiment 2 : Extracted Statistical features from lyrics

(Train-Test split = 85%)

(Features used -'sentence\_count', 'char\_count', 'unique words', 'word\_count', 'unique word density', 'avg\_word\_length', 'expanded\_word\_count', 'contraction\_difference', 'contraction\_density')

### Part 1 - All Genres

| **S.No** | **ML Model** | **Classes** | **Precision** | **Recall** | **F1-score** | **Avg. Accuracy** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | Logistic Regression (max\_iter = 1000) | Country | 0.00 | 0.00 | 0.00 | 0.5348 |
| Electronic | 0.00 | 0.00 | 0.00 |
| Folk | 0.00 | 0.00 | 0.00 |
| Hip-hop | 0.77 | 0.65 | 0.70 |
| Indie | 0.00 | 0.00 | 0.00 |
| Jazz | 0.00 | 0.00 | 0.00 |
| Metal | 0.58 | 0.15 | 0.24 |
| Other | 0.00 | 0.00 | 0.00 |
| Pop | 0.46 | 0.06 | 0.11 |
| R&B | 0.00 | 0.00 | 0.00 |
| Rock | 0.51 | 0.96 | 0.67 |
| 2 | Multinomial Naive Bayes | Country | 0.00 | 0.00 | 0.00 | 0.4622 |
| Electronic | 0.00 | 0.00 | 0.00 |
| Folk | 0.00 | 0.00 | 0.00 |
| Hip-hop | 1.00 | 0.00 | 0.00 |
| Indie | 0.00 | 0.00 | 0.00 |
| Jazz | 0.00 | 0.00 | 0.00 |
| Metal | 0.00 | 0.00 | 0.00 |
| Other | 0.00 | 0.00 | 0.00 |
| Pop | 0.00 | 0.00 | 0.00 |
| R&B | 0.00 | 0.00 | 0.00 |
| Rock | 0.46 | 1.00 | 0.63 |
| 3 | Decision Tree (max\_depth=8) | Country | 0.00 | 0.00 | 0.00 | **0.5361** |
| Electronic | 0.29 | 0.01 | 0.01 |
| Folk | 0.00 | 0.00 | 0.00 |
| Hip-hop | 0.73 | 0.68 | 0.70 |
| Indie | 0.00 | 0.00 | 0.00 |
| Jazz | 0.17 | 0.00 | 0.00 |
| Metal | 0.50 | 0.24 | 0.32 |
| Other | 0.00 | 0.00 | 0.00 |
| Pop | 0.42 | 0.14 | 0.21 |
| R&B | 0.00 | 0.00 | 0.00 |
| Rock | 0.52 | 0.91 | 0.66 |
| 4 | SGD Classifier | Country | 0.00 | 0.00 | 0.00 | 0.5220 |
| Electronic | 0.00 | 0.00 | 0.00 |
| Folk | 0.00 | 0.00 | 0.00 |
| Hip-hop | 0.64 | 0.73 | 0.68 |
| Indie | 0.00 | 0.00 | 0.00 |
| Jazz | 0.00 | 0.00 | 0.00 |
| Metal | 0.24 | 0.00 | 0.00 |
| Other | 0.00 | 0.00 | 0.00 |
| Pop | 0.46 | 0.00 | 0.00 |
| R&B | 0.00 | 0.00 | 0.00 |
| Rock | 0.51 | 0.97 | 0.66 |

### Part 2 - Only 3 Genres (Country, Hip-hop, Metal)

| **S.No** | **ML Model** | **Classes** | **Precision** | **Recall** | **F1-score** | **Avg. Accuracy** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | Logistic Regression (max\_iter=500) | Country | 0.54 | 0.50 | 0.52 | 0.7197 |
| Hip-hop | 0.86 | 0.82 | 0.84 |
| Metal | 0.69 | 0.76 | 0.72 |
| 2 | Multinomial Naive Bayes | Country | 0.00 | 0.00 | 0.00 | 0.6288 |
| Hip-hop | 0.68 | 0.88 | 0.77 |
| Metal | 0.57 | 0.76 | 0.66 |
| 3 | Decision Tree | Country | 0.51 | 0.72 | 0.60 | **0.7252** |
| Hip-hop | 0.88 | 0.81 | 0.84 |
| Metal | 0.77 | 0.64 | 0.70 |
| 4 | SGD Classifier | Country | 0.55 | 0.21 | 0.30 | 0.6913 |
| Hip-hop | 0.83 | 0.83 | 0.83 |
| Metal | 0.61 | 0.85 | 0.71 |

**[NOTE : Jo Deep learning wala section hai in the paper, let it be as it is. I wasn’t able to find those collabs yet and it takes a lot of time to run those models.]**

## ~~Experiment 3 : Extracted Statistical features from lyrics + lyrics (tf-idf vectors)~~ [NOT POSSIBLE - KERNEL KEEPS DYING]

~~(Train-Test split = 85%)~~

~~(Features used -'sentence\_count', 'char\_count', 'unique words', 'word\_count', 'unique word density', 'avg\_word\_length', 'expanded\_word\_count', 'contraction\_difference', 'contraction\_density' + tf-idf vectors of lyrics)~~

### ~~Part 1 - All Genres~~

| **~~S.No~~** | **~~ML Model~~** | **~~Classes~~** | **~~Precision~~** | **~~Recall~~** | **~~F1-score~~** | **~~Avg. Accuracy~~** |
| --- | --- | --- | --- | --- | --- | --- |
| ~~1~~ | ~~Logistic Regression (max\_iter = 1000)~~ | ~~Country~~ |  |  |  |  |
| ~~Electronic~~ |  |  |  |
| ~~Folk~~ |  |  |  |
| ~~Hip-hop~~ |  |  |  |
| ~~Indie~~ |  |  |  |
| ~~Jazz~~ |  |  |  |
| ~~Metal~~ |  |  |  |
| ~~Other~~ |  |  |  |
| ~~Pop~~ |  |  |  |
| ~~R&B~~ |  |  |  |
| ~~Rock~~ |  |  |  |
| ~~2~~ | ~~Multinomial Naive Bayes~~ | ~~Country~~ |  |  |  |  |
| ~~Electronic~~ |  |  |  |
| ~~Folk~~ |  |  |  |
| ~~Hip-hop~~ |  |  |  |
| ~~Indie~~ |  |  |  |
| ~~Jazz~~ |  |  |  |
| ~~Metal~~ |  |  |  |
| ~~Other~~ |  |  |  |
| ~~Pop~~ |  |  |  |
| ~~R&B~~ |  |  |  |
| ~~Rock~~ |  |  |  |
| ~~3~~ | ~~Decision Tree~~ | ~~Country~~ |  |  |  |  |
| ~~Electronic~~ |  |  |  |
| ~~Folk~~ |  |  |  |
| ~~Hip-hop~~ |  |  |  |
| ~~Indie~~ |  |  |  |
| ~~Jazz~~ |  |  |  |
| ~~Metal~~ |  |  |  |
| ~~Other~~ |  |  |  |
| ~~Pop~~ |  |  |  |
| ~~R&B~~ |  |  |  |
| ~~Rock~~ |  |  |  |
| ~~4~~ | ~~SGD Classifier~~ | ~~Country~~ |  |  |  |  |
| ~~Electronic~~ |  |  |  |
| ~~Folk~~ |  |  |  |
| ~~Hip-hop~~ |  |  |  |
| ~~Indie~~ |  |  |  |
| ~~Jazz~~ |  |  |  |
| ~~Metal~~ |  |  |  |
| ~~Other~~ |  |  |  |
| ~~Pop~~ |  |  |  |
| ~~R&B~~ |  |  |  |
| ~~Rock~~ |  |  |  |

### ~~Part 2 - Only 3 Genres (Country, Hip-hop, Metal)~~

| **~~S.No~~** | **~~ML Model~~** | **~~Classes~~** | **~~Precision~~** | **~~Recall~~** | **~~F1-score~~** | **~~Avg. Accuracy~~** |
| --- | --- | --- | --- | --- | --- | --- |
| ~~1~~ | ~~Logistic Regression (max\_iter=500)~~ | ~~Country~~ |  |  |  |  |
| ~~Hip-hop~~ |  |  |  |
| ~~Metal~~ |  |  |  |
| ~~2~~ | ~~Multinomial Naive Bayes~~ | ~~Country~~ |  |  |  |  |
| ~~Hip-hop~~ |  |  |  |
| ~~Metal~~ |  |  |  |
| ~~3~~ | ~~Decision Tree~~ | ~~Country~~ |  |  |  |  |
| ~~Hip-hop~~ |  |  |  |
| ~~Metal~~ |  |  |  |
| ~~4~~ | ~~SGD Classifier~~ | ~~Country~~ |  |  |  |  |
| ~~Hip-hop~~ |  |  |  |
| ~~Metal~~ |  |  |  |

Paper link : <https://www.overleaf.com/6196157699hvkrknnrxqgq>