Polytechnic University of the Philippines – Sta. Mesa

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Second Semester

GROUP 1: YOMIFY

In Partial Fulfillment

Of the Academic Requirement in Integrative Programming

From Bachelor of Science in Information Technology 2 – 4

Under Professor Aleta C. Fabregas

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Introduction

In the digital age, music streaming platforms like Spotify have revolutionized how we consume music, offering vast libraries of songs at our fingertips. Among these, curated playlists have become particularly popular, often amassing millions of listens. One such playlist is "The Ultimate OPM," which has garnered significant attention on Spotify. Original Pilipino Music (OPM) is a significant cultural phenomenon in the Philippines, and understanding what makes certain OPM songs resonate more with audiences can provide valuable insights for musicians, composers, and producers.

This study aims to analyze the musical patterns and chord progressions that contribute to the popularity of songs in "The Ultimate OPM" playlist. By leveraging a dataset comprising these songs and their corresponding chords, we seek to uncover the underlying patterns that make these songs widely appealing. To achieve this, we employ the Apriori algorithm, a well-established method for mining frequent itemsets and discovering association rules in large datasets.

Problem Definition and Objectives

The goal of this study is to analyze the musical patterns and chord progressions that contribute to the popularity of songs in the "The Ultimate OPM" Spotify playlist. By leveraging a dataset comprising the songs and their corresponding chords, we aim to uncover the underlying patterns that make these songs resonate with a wide audience. This analysis will be conducted using the Apriori algorithm, a popular method for mining frequent itemsets and discovering association rules in large datasets. Our objectives, **Identify Frequent Chord Progressions**, Using the Apriori algorithm, the study aims to mine frequent chord progressions within the songs in the "The Ultimate OPM" playlist and **Discover Associations Between Chords**: The study seeks to uncover associations between different chords in the songs, which can help in understanding the common musical structures in popular OPM music.

Historical Data

The historical data was collected manually, focusing on the chord progressions from one of the most popular OPM playlists, "The Ultimate OPM," on Spotify. The dataset consists of the following columns: Composition, A, A#, Ab, B, Bb, C, C#, D, D#, Db, E, Eb, F, F#, G, G#, Gb, with a total of 18 columns.

Dataset collected by: BSIT 2-4, Group 1 from "The Ultimate OPM" playlist on Spotify. (https://drive.google.com/file/d/1BMCPl-QP1PSnnFeMnpINXgklzeBCA6hL/view?usp=drive_link)

The historical data focuses on identifying which chords are the most used in OPM compositions. A chord is a group of (typically three or more) notes sounded together, as a basis of harmony, but in this analysis, we focus only on the root note of a chord for the analysis.

Analysis

Computer Version, it includes the table format in text and the actual output in the program.

antecedents	consequents	antecedent support	consequent support	support	confidence	lift	conviction
A	B	0.8356	0.6301	0.5479	0.6557	1.0406	1.0744
B	A	0.6301	0.8356	0.5479	0.8696	1.0406	1.2603
C	A	0.5479	0.8356	0.4795	0.8750	1.0471	1.3151
A	C	0.8356	0.5479	0.4795	0.5738	1.0471	1.0606
A	D	0.8356	0.8219	0.7123	0.8525	1.0372	1.2070
D	A	0.8219	0.8356	0.7123	0.8667	1.0372	1.2329
E	A	0.7397	0.8356	0.6575	0.8889	1.0638	1.4795
A	E	0.8356	0.7397	0.6575	0.7869	1.0638	1.2213
G	A	0.7671	0.8356	0.6712	0.8750	1.0471	1.3151
A	G	0.8356	0.7671	0.6712	0.8033	1.0471	1.1838
B	D	0.6301	0.8219	0.5068	0.8043	0.9786	0.9102
D	B	0.8219	0.6301	0.5068	0.6167	0.9786	0.9649
E	B	0.7397	0.6301	0.5479	0.7407	1.1755	1.4266
B	E	0.6301	0.7397	0.5479	0.8696	1.1755	1.9954
C	D	0.5479	0.8219	0.5068	0.9250	1.1254	2.3744
D	C	0.8219	0.5479	0.5068	0.6167	1.1254	1.1793
G	C	0.7671	0.5479	0.5068	0.6607	1.2058	1.3324
C	G	0.5479	0.7671	0.5068	0.9250	1.2058	3.1050

E	D	0.7397	0.8219	0.6575	0.8889	1.0815	1.6027
D	E	0.8219	0.7397	0.6575	0.8000	1.0815	1.3014
F	D	0.5068	0.8219	0.4658	0.9189	1.1180	2.1963
D	F	0.8219	0.5068	0.4658	0.5667	1.1180	1.1380
G	D	0.7671	0.8219	0.6712	0.8750	1.0646	1.4247
D	G	0.8219	0.7671	0.6712	0.8167	1.0646	1.2702
G	E	0.7671	0.7397	0.5479	0.7143	0.9656	0.9110
E	G	0.7397	0.7671	0.5479	0.7407	0.9656	0.8982
G	F	0.7671	0.5068	0.4658	0.6071	1.1979	1.2553
F	G	0.5068	0.7671	0.4658	0.9189	1.1979	2.8721
A, B	D	0.5479	0.8219	0.4521	0.8250	1.0038	1.0176
A, D	B	0.7123	0.6301	0.4521	0.6346	1.0071	1.0123
B, D	A	0.5068	0.8356	0.4521	0.8919	1.0673	1.5205
A	B, D	0.8356	0.5068	0.4521	0.5410	1.0673	1.0744
B	A, D	0.6301	0.7123	0.4521	0.7174	1.0071	1.0179
D	A, B	0.8219	0.5479	0.4521	0.5500	1.0038	1.0046
E, A	B	0.6575	0.6301	0.4658	0.7083	1.1241	1.2681
E, B	A	0.5479	0.8356	0.4658	0.8500	1.0172	1.0959
A, B	E	0.5479	0.7397	0.4658	0.8500	1.1491	1.7352
E	A, B	0.7397	0.5479	0.4658	0.6296	1.1491	1.2205
A	E, B	0.8356	0.5479	0.4658	0.5574	1.0172	1.0213
B	E, A	0.6301	0.6575	0.4658	0.7391	1.1241	1.3128
E, A	D	0.6575	0.8219	0.6027	0.9167	1.1153	2.1370
E, D	A	0.6575	0.8356	0.6027	0.9167	1.0970	1.9726
A, D	E	0.7123	0.7397	0.6027	0.8462	1.1439	1.6918
E	A, D	0.7397	0.7123	0.6027	0.8148	1.1439	1.5534
A	E, D	0.8356	0.6575	0.6027	0.7213	1.0970	1.2288
D	E, A	0.8219	0.6575	0.6027	0.7333	1.1153	1.2842
G, A	D	0.6712	0.8219	0.6027	0.8980	1.0925	1.7452
G, D	A	0.6712	0.8356	0.6027	0.8980	1.0746	1.6110
A, D	G	0.7123	0.7671	0.6027	0.8462	1.1030	1.5137
G	A, D	0.7671	0.7123	0.6027	0.7857	1.1030	1.3425
A	G, D	0.8356	0.6712	0.6027	0.7213	1.0746	1.1797
D	G, A	0.8219	0.6712	0.6027	0.7333	1.0925	1.2329
G, E	A	0.5479	0.8356	0.5342	0.9750	1.1668	6.5753
G, A	E	0.6712	0.7397	0.5342	0.7959	1.0760	1.2753
E, A	G	0.6575	0.7671	0.5342	0.8125	1.0592	1.2420
G	E, A	0.7671	0.6575	0.5342	0.6964	1.0592	1.1281
E	G, A	0.7397	0.6712	0.5342	0.7222	1.0760	1.1836
A	G, E	0.8356	0.5479	0.5342	0.6393	1.1668	1.2534
E, B	D	0.5479	0.8219	0.4795	0.8750	1.0646	1.4247
E, D	B	0.6575	0.6301	0.4795	0.7292	1.1572	1.3656
B, D	E	0.5068	0.7397	0.4795	0.9459	1.2788	4.8151
E	B, D	0.7397	0.5068	0.4795	0.6481	1.2788	1.4016
B	E, D	0.6301	0.6575	0.4795	0.7609	1.1572	1.4321
D	E, B	0.8219	0.5479	0.4795	0.5833	1.0646	1.0849

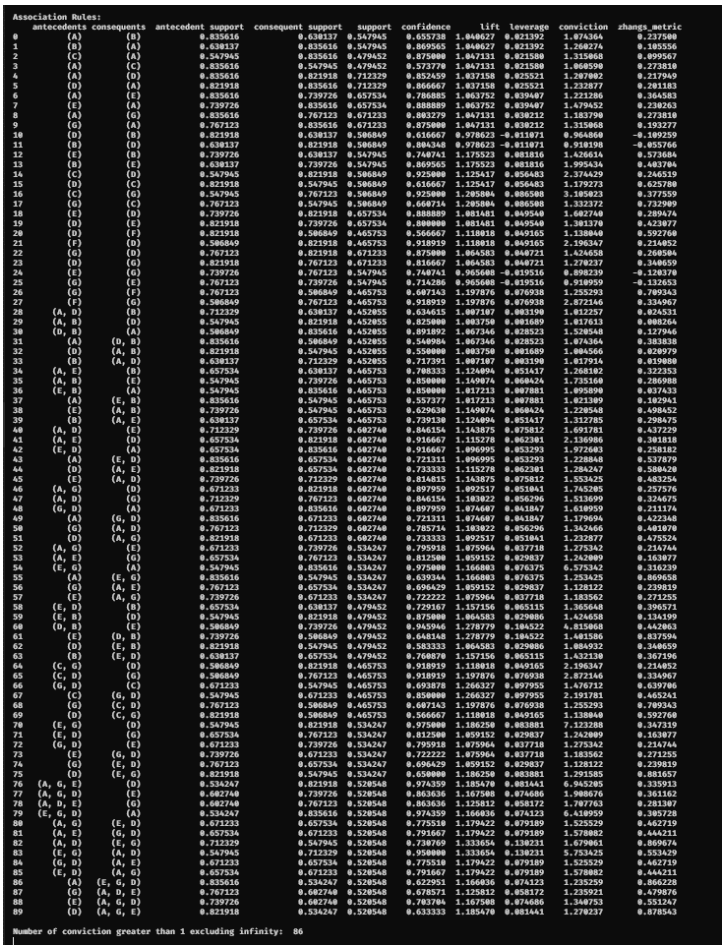
G, C	D	0.5068	0.8219	0.4658	0.9189	1.1180	2.1963
G, D	C	0.6712	0.5479	0.4658	0.6939	1.2663	1.4767
C, D	G	0.5068	0.7671	0.4658	0.9189	1.1979	2.8721
G	C, D	0.7671	0.5068	0.4658	0.6071	1.1979	1.2553
C	G, D	0.5479	0.6712	0.4658	0.8500	1.2663	2.1918
D	G, C	0.8219	0.5068	0.4658	0.5667	1.1180	1.1380
G, E	D	0.5479	0.8219	0.5342	0.9750	1.1863	7.1233
G, D	E	0.6712	0.7397	0.5342	0.7959	1.0760	1.2753
E, D	G	0.6575	0.7671	0.5342	0.8125	1.0592	1.2420
G	E, D	0.7671	0.6575	0.5342	0.6964	1.0592	1.1281
E	G, D	0.7397	0.6712	0.5342	0.7222	1.0760	1.1836
D	G, E	0.8219	0.5479	0.5342	0.6500	1.1863	1.2916
G, E, A	D	0.5342	0.8219	0.5205	0.9744	1.1855	6.9452
G, E, D	A	0.5342	0.8356	0.5205	0.9744	1.1660	6.4110
G, A, D	E	0.6027	0.7397	0.5205	0.8636	1.1675	1.9087
E, A, D	G	0.6027	0.7671	0.5205	0.8636	1.1258	1.7078
G, E	A, D	0.5479	0.7123	0.5205	0.9500	1.3337	5.7534
G, A	E, D	0.6712	0.6575	0.5205	0.7755	1.1794	1.5255
G, D	E, A	0.6712	0.6575	0.5205	0.7755	1.1794	1.5255
E, A	G, D	0.6575	0.6712	0.5205	0.7917	1.1794	1.5781
E, D	G, A	0.6575	0.6712	0.5205	0.7917	1.1794	1.5781
A, D	G, E	0.7123	0.5479	0.5205	0.7308	1.3337	1.6791
G	E, A, D	0.7671	0.6027	0.5205	0.6786	1.1258	1.2359
E	G, A, D	0.7397	0.6027	0.5205	0.7037	1.1675	1.3408
A	G, E, D	0.8356	0.5342	0.5205	0.6230	1.1660	1.2353
D	G, E, A	0.8219	0.5342	0.5205	0.6333	1.1855	1.2702

Screenshot of the actual output of the code.

```
Frequent Itemsets:
      support      itemsets
0   0.835616           (A)
1   0.630137           (B)
2   0.547945           (C)
3   0.821918           (D)
4   0.739726           (E)
5   0.506849           (F)
6   0.520548          (F♯)
7   0.767123           (G)
8   0.547945        (B, A)
9   0.479452        (A, C)
10  0.712329        (D, A)
11  0.657534        (A, E)
12  0.671233        (A, G)
13  0.506849        (B, D)
14  0.547945        (B, E)
15  0.506849        (D, C)
16  0.506849        (G, C)
17  0.657534        (D, E)
18  0.465753        (D, F)
19  0.671233        (D, G)
20  0.547945        (G, E)
21  0.465753        (G, F)
22  0.452055     (B, A, D)
23  0.465753     (B, A, E)
24  0.602740     (D, A, E)
25  0.602740     (D, A, G)
26  0.534247     (A, G, E)
27  0.479452     (B, E, D)
28  0.465753     (D, G, C)
29  0.534247     (D, G, E)
30  0.520548  (D, A, G, E)

 Total Number of Frequent Itemsets: 31
```

Figure 1: Frequent Itemsets



```
Association Rules:
   antecedents consequents  antecedent support  consequent support   support  confidence      lift  leverage  conviction  zhangs_metric
0          (A)         (B)             0.835616            0.630137  0.547945    0.655738  1.040627  0.021392    1.074364       0.237500
1          (B)         (A)             0.630137            0.835616  0.547945    0.869565  1.040627  0.021392    1.260274       0.189556
2          (C)         (A)             0.547945            0.835616  0.479452    0.875000  1.047131  0.021580    1.315068       0.099567
3          (A)         (C)             0.835616            0.547945  0.479452    0.573770  1.047131  0.021580    1.060590       0.273810
4          (A)         (D)             0.835616            0.821918  0.712329    0.852459  1.037158  0.025521    1.207002       0.217949
5          (D)         (A)             0.821918            0.835616  0.712329    0.866667  1.037158  0.025521    1.232877       0.201183
6          (A)         (E)             0.835616            0.739726  0.657534    0.786885  1.063752  0.039407    1.221286       0.364583
7          (E)         (A)             0.739726            0.835616  0.657534    0.888889  1.063752  0.039407    1.479452       0.230263
8          (A)         (G)             0.835616            0.767123  0.671233    0.803279  1.047131  0.030212    1.183790       0.273810
9          (G)         (A)             0.767123            0.835616  0.671233    0.875000  1.047131  0.030212    1.315068       0.193277
10         (D)         (B)             0.821918            0.630137  0.506849    0.616667  0.978623 -0.011071    0.964860      -0.109259
11         (B)         (D)             0.630137            0.821918  0.506849    0.804348  0.978623 -0.011071    0.910198      -0.055766
12         (E)         (B)             0.739726            0.630137  0.547945    0.740741  1.175523  0.081816    1.426614       0.573684
13         (B)         (E)             0.630137            0.739726  0.547945    0.869565  1.175523  0.081816    1.995434       0.403704
14         (C)         (D)             0.547945            0.821918  0.506849    0.925000  1.125417  0.056483    2.374429       0.246519
15         (D)         (C)             0.821918            0.547945  0.506849    0.616667  1.125417  0.056483    1.179273       0.625780
16         (C)         (G)             0.547945            0.767123  0.506849    0.925000  1.205804  0.086508    3.105823       0.377559
17         (G)         (C)             0.767123            0.547945  0.506849    0.660714  1.205804  0.086508    1.332372       0.732909
18         (E)         (D)             0.739726            0.821918  0.657534    0.888889  1.081481  0.049540    1.602740       0.289474
19         (D)         (E)             0.821918            0.739726  0.657534    0.800000  1.081481  0.049540    1.303170       0.423077
20         (D)         (F)             0.821918            0.506849  0.465753    0.566667  1.118018  0.049165    1.138040       0.592760
21         (F)         (D)             0.506849            0.821918  0.465753    0.918919  1.118018  0.049165    2.196347       0.214052
22         (G)         (D)             0.767123            0.821918  0.671233    0.875000  1.064583  0.040721    1.424658       0.260504
23         (D)         (G)             0.821918            0.767123  0.671233    0.816667  1.064583  0.040721    1.270237       0.340659
24         (C)         (G)             0.739726            0.767123  0.547945    0.740741  0.965608 -0.019516    0.898239      -0.128378
25         (G)         (E)             0.767123            0.739726  0.547945    0.714286  0.965608 -0.019516    0.910959      -0.132653
26         (G)         (F)             0.767123            0.506849  0.465753    0.607143  1.197876  0.076938    1.255293       0.709343
27         (F)         (G)             0.506849            0.767123  0.465753    0.918919  1.197876  0.076938    2.872146       0.334967
28      (A, B)         (D)             0.712329            0.630137  0.452055    0.634615  1.007107  0.003190    1.012257       0.024531
29      (A, B)         (D)             0.547945            0.821918  0.452055    0.825000  1.003750  0.001689    1.017613       0.008264
30      (D, B)         (A)             0.506849            0.835616  0.452055    0.891892  1.067346  0.028523    1.520548       0.127946
31         (A)      (D, B)             0.835616            0.506849  0.452055    0.540984  1.067346  0.028523    1.074364       0.383838
32         (D)      (A, B)             0.821918            0.547945  0.452055    0.550000  1.003750  0.001689    1.004566       0.020979
33         (B)      (A, D)             0.630137            0.712329  0.452055    0.717391  1.007107  0.003190    1.017914       0.019080
34      (A, D)         (B)             0.657534            0.630137  0.465753    0.708333  1.124094  0.051417    1.260102       0.322353
35      (A, B)         (E)             0.547945            0.739726  0.465753    0.850000  1.149074  0.060424    1.735160       0.286988
36      (E, B)         (A)             0.547945            0.835616  0.465753    0.850000  1.017213  0.007881    1.095890       0.037433
37         (A)      (E, B)             0.835616            0.547945  0.465753    0.557377  1.017213  0.007881    1.021309       0.102941
38         (E)      (A, B)             0.739726            0.547945  0.465753    0.629630  1.149074  0.060424    1.220548       0.498452
39         (B)      (A, E)             0.630137            0.657534  0.465753    0.739130  1.124094  0.051417    1.312785       0.298475
40      (A, D)         (E)             0.712329            0.739726  0.602740    0.846154  1.143875  0.075812    1.691781       0.437229
41      (A, E)         (D)             0.657534            0.821918  0.602740    0.916667  1.115278  0.062301    2.136986       0.303818
42      (E, D)         (A)             0.657534            0.835616  0.602740    0.916667  1.096995  0.053293    1.972603       0.258182
43         (A)      (E, D)             0.835616            0.657534  0.602740    0.721311  1.096995  0.053293    1.228848       0.537879
44         (D)      (A, E)             0.821918            0.657534  0.602740    0.733333  1.115278  0.062301    1.284247       0.580420
45         (E)      (A, D)             0.739726            0.712329  0.602740    0.814815  1.143875  0.075812    1.553425       0.483254
46      (A, G)         (D)             0.671233            0.821918  0.602740    0.897959  1.092517  0.051041    1.745205       0.257576
47      (A, D)         (G)             0.712329            0.767123  0.602740    0.846154  1.103022  0.056296    1.513699       0.324675
48      (G, D)         (A)             0.671233            0.835616  0.602740    0.897959  1.074607  0.041847    1.618959       0.211174
49         (A)      (G, D)             0.835616            0.671233  0.602740    0.721311  1.074607  0.041847    1.179694       0.422348
50         (G)      (A, D)             0.767123            0.712329  0.602740    0.785714  1.103022  0.056296    1.342466       0.401070
51         (D)      (A, G)             0.821918            0.671233  0.602740    0.733333  1.092517  0.051041    1.232877       0.475524
52      (A, G)         (E)             0.671233            0.739726  0.534247    0.795918  1.075964  0.037718    1.275342       0.214744
53      (A, E)         (G)             0.657534            0.767123  0.534247    0.812500  1.059152  0.029837    1.242009       0.163077
54      (E, G)         (A)             0.547945            0.835616  0.534247    0.975000  1.166803  0.076375    6.575342       0.316239
55         (A)      (E, G)             0.835616            0.547945  0.534247    0.639344  1.166803  0.076375    1.253425       0.869658
56         (G)      (A, E)             0.767123            0.657534  0.534247    0.696429  1.059152  0.029837    1.128122       0.239819
57         (E)      (A, G)             0.739726            0.671233  0.534247    0.722222  1.075964  0.037718    1.183562       0.271255
58      (E, D)         (B)             0.657534            0.630137  0.479452    0.729167  1.157156  0.065115    1.365648       0.396573
59      (E, B)         (D)             0.547945            0.821918  0.479452    0.875000  1.064583  0.029086    1.424658       0.134199
60      (D, B)         (E)             0.506849            0.739726  0.479452    0.945946  1.278779  0.104522    4.815068       0.442063
61         (E)      (D, B)             0.739726            0.506849  0.479452    0.648148  1.278779  0.104522    1.401586       0.837594
62         (D)      (E, B)             0.821918            0.547945  0.479452    0.583333  1.064583  0.029086    1.084932       0.340659
63         (B)      (E, D)             0.630137            0.657534  0.479452    0.760870  1.157156  0.065115    1.432130       0.367196
64      (C, G)         (D)             0.506849            0.821918  0.465753    0.918919  1.118018  0.049165    2.196347       0.214052
65      (C, D)         (G)             0.506849            0.767123  0.465753    0.918919  1.197876  0.076938    2.872146       0.334967
66      (G, D)         (C)             0.671233            0.547945  0.465753    0.693878  1.266327  0.097955    1.476712       0.639706
67         (C)      (G, D)             0.547945            0.671233  0.465753    0.850000  1.266327  0.097955    2.191781       0.465241
68         (G)      (C, D)             0.767123            0.506849  0.465753    0.607143  1.197876  0.076938    1.255293       0.709343
69         (D)      (C, G)             0.821918            0.506849  0.465753    0.566667  1.118018  0.049165    1.138040       0.592760
70      (E, G)         (D)             0.547945            0.821918  0.534247    0.975000  1.186250  0.083881    7.123288       0.347319
71      (E, D)         (G)             0.657534            0.767123  0.534247    0.812500  1.059152  0.029837    1.242009       0.163077
72      (G, D)         (E)             0.671233            0.739726  0.534247    0.795918  1.075964  0.037718    1.275342       0.214744
73         (E)      (G, D)             0.739726            0.671233  0.534247    0.722222  1.075964  0.037718    1.183562       0.271255
74         (G)      (E, D)             0.767123            0.657534  0.534247    0.696429  1.059152  0.029837    1.128122       0.239819
75         (D)      (E, G)             0.821918            0.547945  0.534247    0.650000  1.186250  0.083881    1.291585       0.881657
76      (A, G, E)         (D)             0.534247            0.821918  0.520548    0.974359  1.185470  0.081441    6.945205       0.335913
77      (A, G, D)         (E)             0.602740            0.739726  0.520548    0.863636  1.167508  0.074686    1.908676       0.361162
78      (A, D, E)         (G)             0.602740            0.767123  0.520548    0.863636  1.125812  0.058172    1.787763       0.281307
79      (E, G, D)         (A)             0.534247            0.835616  0.520548    0.974359  1.166036  0.074123    6.410959       0.305728
80         (A, G)      (E, D)             0.671233            0.657534  0.520548    0.775510  1.179422  0.079189    1.525529       0.462719
81         (A, E)      (G, D)             0.657534            0.671233  0.520548    0.791667  1.179422  0.079189    1.578082       0.444211
82         (A, D)      (E, G)             0.712329            0.547945  0.520548    0.730769  1.333654  0.130231    1.679061       0.869674
83         (E, G)      (A, D)             0.547945            0.712329  0.520548    0.950000  1.333654  0.130231    5.753425       0.553429
84         (G, D)      (A, E)             0.671233            0.657534  0.520548    0.775510  1.179422  0.079189    1.525529       0.462719
85         (E, D)      (A, G)             0.657534            0.671233  0.520548    0.791667  1.179422  0.079189    1.578082       0.444211
86            (A)   (E, G, D)             0.835616            0.534247  0.520548    0.622951  1.166036  0.074123    1.235259       0.866228
87            (G)   (A, D, E)             0.767123            0.602740  0.520548    0.678571  1.125812  0.058172    1.235921       0.479876
88            (E)   (A, G, D)             0.739726            0.602740  0.520548    0.703704  1.167508  0.074686    1.340753       0.551247
89            (D)   (A, G, E)             0.821918            0.534247  0.520548    0.633333  1.185470  0.081441    1.270237       0.878543

Number of conviction greater than 1 excluding infinity:  86
```

Figure 2: Actual output of the generate associated rule

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from mlxtend.frequent_patterns import apriori, association_rules
from mlxtend.preprocessing import TransactionEncoder
data_sets = pd.read_csv("output_root_notes.csv",header=None, dtype=str)
custom_transactions = data_sets.apply(lambda x: x.dropna().tolist(), axis=1).tolist()
te = TransactionEncoder()
te_ary = te.fit(custom_transactions).transform(custom_transactions)
df = pd.DataFrame(te_ary, columns=te.columns_)
# Apply the apriori algorithm to find frequent itemsets with a minimum support of 60%
frequent_itemsets = apriori(df, min_support=0.44, use_colnames=True)
print("\nFrequent Itemsets: \n", frequent_itemsets)
print("\n Total Number of Frequent Itemsets:" , len(frequent_itemsets))
# Generate association rules with a minimum confidence of 50%
rules = association_rules(frequent_itemsets, metric="confidence", min_threshold=0.5)
# Sort the rules based on the conviction in ascending order
# rules_sorted_by_conviction = rules.sort_values(by='conviction', ascending=True)
print("\nAssociation Rules:\n", rules.to_string())
```

The Program used to generate the association rule.

Manual Version *(Apriori Algorithm). Sorted in Ascending according to Support.*

LHS	RHS	support	confidence	lift	conviction
A, B	D	0.4521	0.8250	1.0038	1.0176
A, D	B	0.4521	0.6346	1.0071	1.0123
B, D	A	0.4521	0.8919	1.0673	1.5205
A	B, D	0.4521	0.5410	1.0673	1.0744
B	A, D	0.4521	0.7174	1.0071	1.0179
D	A, B	0.4521	0.5500	1.0038	1.0046
F	D	0.4658	0.9189	1.1180	2.1963
D	F	0.4658	0.5667	1.1180	1.1380
G	F	0.4658	0.6071	1.1979	1.2553
F	G	0.4658	0.9189	1.1979	2.8721
E, A	B	0.4658	0.7083	1.1241	1.2681
E, B	A	0.4658	0.8500	1.0172	1.0959
A, B	E	0.4658	0.8500	1.1491	1.7352
E	A, B	0.4658	0.6296	1.1491	1.2205
A	E, B	0.4658	0.5574	1.0172	1.0213
B	E, A	0.4658	0.7391	1.1241	1.3128
G, C	D	0.4658	0.9189	1.1180	2.1963
G, D	C	0.4658	0.6939	1.2663	1.4767
C, D	G	0.4658	0.9189	1.1979	2.8721
G	C, D	0.4658	0.6071	1.1979	1.2553
C	G, D	0.4658	0.8500	1.2663	2.1918
D	G, C	0.4658	0.5667	1.1180	1.1380
C	A	0.4795	0.8750	1.0471	1.3151
A	C	0.4795	0.5738	1.0471	1.0606
E, B	D	0.4795	0.8750	1.0646	1.4247
E, D	B	0.4795	0.7292	1.1572	1.3656
B, D	E	0.4795	0.9459	1.2788	4.8151
E	B, D	0.4795	0.6481	1.2788	1.4016
B	E, D	0.4795	0.7609	1.1572	1.4321
D	E, B	0.4795	0.5833	1.0646	1.0849
B	D	0.5068	0.8043	0.9786	0.9102
D	B	0.5068	0.6167	0.9786	0.9649
C	D	0.5068	0.9250	1.1254	2.3744
D	C	0.5068	0.6167	1.1254	1.1793
G	C	0.5068	0.6607	1.2058	1.3324
C	G	0.5068	0.9250	1.2058	3.1050
G, E, A	D	0.5205	0.9744	1.1855	6.9452
G, E, D	A	0.5205	0.9744	1.1660	6.4110
G, A, D	E	0.5205	0.8636	1.1675	1.9087
E, A, D	G	0.5205	0.8636	1.1258	1.7078
G, E	A, D	0.5205	0.9500	1.3337	5.7534
G, A	E, D	0.5205	0.7755	1.1794	1.5255
G, D	E, A	0.5205	0.7755	1.1794	1.5255
E, A	G, D	0.5205	0.7917	1.1794	1.5781

E, D	G, A	0.5205	0.7917	1.1794	1.5781
A, D	G, E	0.5205	0.7308	1.3337	1.6791
G	E, A, D	0.5205	0.6786	1.1258	1.2359
E	G, A, D	0.5205	0.7037	1.1675	1.3408
A	G, E, D	0.5205	0.6230	1.1660	1.2353
D	G, E, A	0.5205	0.6333	1.1855	1.2702
G, E	A	0.5342	0.9750	1.1668	6.5753
G, A	E	0.5342	0.7959	1.0760	1.2753
E, A	G	0.5342	0.8125	1.0592	1.2420
G	E, A	0.5342	0.6964	1.0592	1.1281
E	G, A	0.5342	0.7222	1.0760	1.1836
A	G, E	0.5342	0.6393	1.1668	1.2534
G, E	D	0.5342	0.9750	1.1863	7.1233
G, D	E	0.5342	0.7959	1.0760	1.2753
E, D	G	0.5342	0.8125	1.0592	1.2420
G	E, D	0.5342	0.6964	1.0592	1.1281
E	G, D	0.5342	0.7222	1.0760	1.1836
D	G, E	0.5342	0.6500	1.1863	1.2916
A	B	0.5479	0.6557	1.0406	1.0744
B	A	0.5479	0.8696	1.0406	1.2603
E	B	0.5479	0.7407	1.1755	1.4266
B	E	0.5479	0.8696	1.1755	1.9954
G	E	0.5479	0.7143	0.9656	0.9110
E	G	0.5479	0.7407	0.9656	0.8982
E, A	D	0.6027	0.9167	1.1153	2.1370
E, D	A	0.6027	0.9167	1.0970	1.9726
A, D	E	0.6027	0.8462	1.1439	1.6918
E	A, D	0.6027	0.8148	1.1439	1.5534
A	E, D	0.6027	0.7213	1.0970	1.2288
D	E, A	0.6027	0.7333	1.1153	1.2842
G, A	D	0.6027	0.8980	1.0925	1.7452
G, D	A	0.6027	0.8980	1.0746	1.6110
A, D	G	0.6027	0.8462	1.1030	1.5137
G	A, D	0.6027	0.7857	1.1030	1.3425
A	G, D	0.6027	0.7213	1.0746	1.1797
D	G, A	0.6027	0.7333	1.0925	1.2329
E	A	0.6575	0.8889	1.0638	1.4795
A	E	0.6575	0.7869	1.0638	1.2213
E	D	0.6575	0.8889	1.0815	1.6027
D	E	0.6575	0.8000	1.0815	1.3014
G	A	0.6712	0.8750	1.0471	1.3151
A	G	0.6712	0.8033	1.0471	1.1838
G	D	0.6712	0.8750	1.0646	1.4247
D	G	0.6712	0.8167	1.0646	1.2702
A	D	0.7123	0.8525	1.0372	1.2070
D	A	0.7123	0.8667	1.0372	1.2329

Visualization

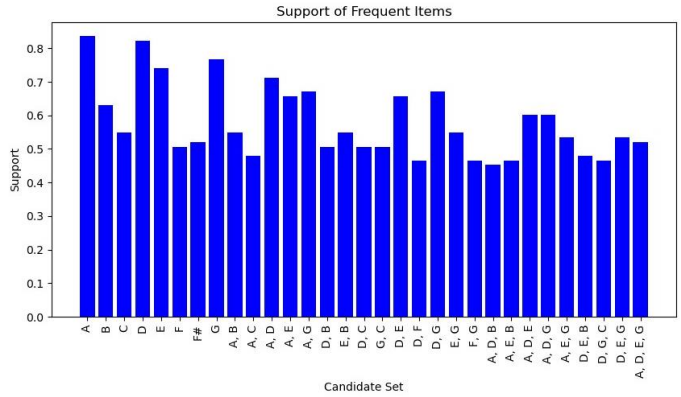


Figure 1: Support of Frequent Items

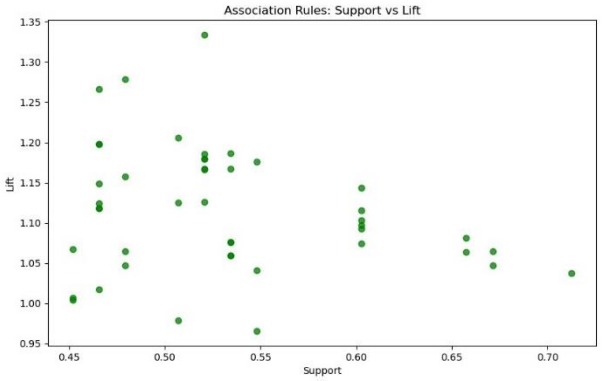


Figure 2: Support vs Lift

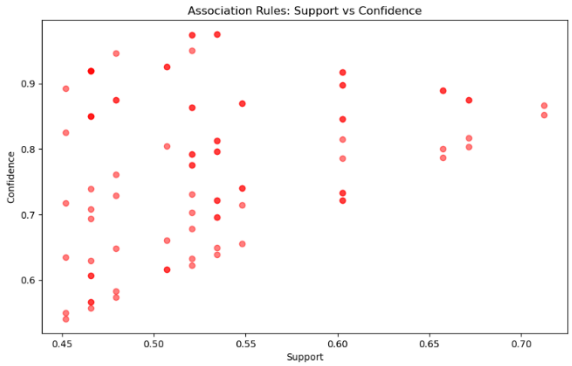


Figure 3: Support vs Confidence

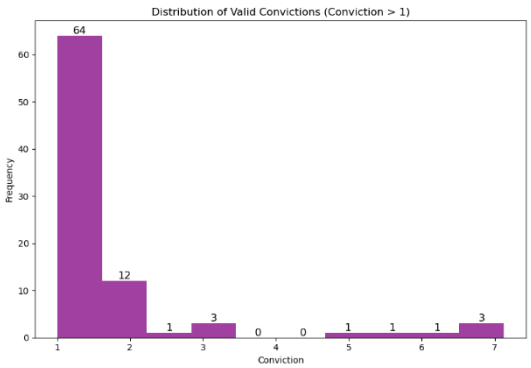


Figure 4: Distribution of Valid Convictions

Market Basket Analysis Result Interpretation

Compositions	A	B	C	D	E	F	F#	G
1	1	1	0	1	1	0	1	0
2	0	1	0	1	1	0	1	0
3	1	1	1	1	1	1	1	1
4	1	0	0	1	1	1	0	1
5	1	0	0	1	0	1	0	1

...

69	1	1	1	1	1	1	1	1
70	1	0	1	1	0	1	0	1
71	1	1	0	1	0	0	1	0
72	1	0	0	1	1	1	1	1
73	1	1	0	1	1	1	1	1

LHS	RHS	FREQUENCY	SUPPORT	CONFIDENCE	LIFT
G, C	D	34	0.4658	0.9189	1.1180

Regel

LHS → RHS
G,C → D

Confidence

fre(LHS, RHS) / frq(LHS)
frq(G,C, D) / frq (G,C)
34/37 = 0.9189

Frequency

frq(LHS, RHS)
frq(G,C → D) = 34

Lift

Confidence(LHS, RHS) / Support(RHS)
0.9189 / 0.8219 = 1.1180

Support

Frq(LHS, RHS) / N
34/73 = 0.4658