MUSIC ISP 2020

Report Analysis using Data

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**Introduction:** Data analysts/scientists are jobs that have become more relevant throughout time. The occupation has been rapidly increasing in job openings. With society evolving each day, it is only a matter of when everything will be recorded online. If everything transfers digitally (ex. Effect from COVID-19), it means lots of data will be stored in databases. Data analysts are trained to study and make predictions using the data already given. The more data, the more accurate predictions can be. This is a very useful job since every industry and company needs to have an analyst. For example, most businesses use data analysts to predict which investments and/or companies are worth buying, by using historical information about the company and its industry. Analysts are also found in finance, gastronomy, and environmental sciences. It can even be important in life sciences and hospitals since data can be used to help research new cures and medication. The possibilities are endless. To summarize, every industry can include analysts because all industries use data.

By using databases and query languages, we are able to link and find connections in the data, and answer questions that can aid in analytical statements.

Here are 10 questions that are solved by using EXCEL and SQL server related to music.

**Purpose:** To display the connection between music and data, and being able to link information and make connections. In order to get to the analytical spectrum, a database must be formed using categories such as finding a composer's milestone, nationality, musical era, pieces, and popularity.

**Materials:**

-Microsoft EXCEL (view file in folder)

- 10 composers
- Date of birth and death
- Nationality
- First, last, most popular pieces and its movements (with duration in seconds and minutes)
- Popularity of each movement under Spotify, iTunes, and YouTube

-Microsoft SQL Server

-Microsoft Power BI

**Question 1: Display first and last piece for each composer.**

Here is the query in SQL to solve:

```sql
select a.name, b1.piece_name as first_piece, b1.date_released, b2.piece_name as last_piece,
b2.date_released
from artist a, piece b1, piece b2
where a.artist_code = b1.artist_code
and a.artist_code = b2.artist_code
and b1.piece_code like ('%-FP')
and b2.piece_code like ('%-LP')
```

Here is the outcome:

| name | first_piece | date_released | last_piece | date_released |
|---|---|---|---|---|
| Dmitri Shostakovich | Scherzo in F-Sharp Minor | 1919 | Sonata for Viola and Piano | 1975 |
| Gustav Holst | Three Folk Tunes | 1903 | Scherzo | 1934 |
| Percy Grainger | La Scandinavie | 1903 | Harvest Hymn | 1940 |
| Julius Fucik | Entrance of the Gladiators | 1897 | Zvuky fanfar | 1914 |
| Vincent Persichetti | Serenade No. 1 | 1929 | Harpsichord Sonata No. 9 | 1987 |
| Gabriel Faure | Le Papillon et la fleur | 1868 | String Quartet in E minor | 1923 |
| John Mackey | Redline Tango | 2004 | Antique Violences : Concerto for Trumpet | 2017 |
| Pyotr Ilyich Tchaikovsky | Scherzo a la russe | 1867 | Symphony No. 6 in B minor | 1893 |
| Johann Strauss II | Erster Gedanke (First Thought) | 1831 | Klange aus der Raimundzeit (Echoes from the days of Raimund) | 1898 |
| Camille Saint Saens | Le Soir | 1841 | Vieilles chansons | 1921 |

Relevance: By using SQL, it is faster to find each composer's first and last piece, while also viewing the year it has been released.


**Question 2: Find the composers who wrote music during the Romantic Era.**

Query used in SQL:

```sql
select 'ROMANTIC ERA' as ERA, *
from artist
where first_piece_released >= 1820
or last_piece_released <= 1900
```

Outcome using query:

| ERA | artist_code | name | nationality | born | rip | first_piece_released | last_piece_released |
|---|---|---|---|---|---|---|---|
| ROMANTIC ERA | DS | Dmitri Shostakovich | Russian | 1906-09-25 | 1975-08-09 | 1919 | 1975 |
| ROMANTIC ERA | GH | Gustav Holst | British | 1874-09-21 | 1934-05-25 | 1903 | 1934 |
| ROMANTIC ERA | PG | Percy Grainger | Australian | 1882-07-08 | 1961-02-20 | 1903 | 1940 |
| ROMANTIC ERA | JF | Julius Fucik | Czech | 1872-07-18 | 1916-09-25 | 1897 | 1914 |
| ROMANTIC ERA | VP | Vincent Persichetti | American | 1915-06-06 | 1987-08-14 | 1929 | 1987 |
| ROMANTIC ERA | GF | Gabriel Faure | French | 1845-05-12 | 1924-11-04 | 1868 | 1923 |
| ROMANTIC ERA | JM | John Mackey | American | 1973-10-01 | NULL | 2004 | NULL |
| ROMANTIC ERA | PT | Pyotr Ilyich Tchaikovsky | Russian | 1840-05-07 | 1893-11-06 | 1867 | 1893 |
| ROMANTIC ERA | JS | Johann Strauss II | Austrian | 1825-10-25 | 1899-06-03 | 1831 | 1898 |
| ROMANTIC ERA | CS | Camille Saint Saens | French | 1835-10-09 | 1921-12-16 | 1841 | 1921 |

Relevance: This table displays all the composers (out of the ten used) who began to release their works during the Romantic Era. Knowing this information helps analysts see if the era impacted the composer's compositions in any way.

**Question 3: Find the composers who wrote music during the 20th and 21th Century Era.**

Query used in SQL:

```sql
select '20TH CENTURY AND 21ST CENTURY' as ERA, *
from artist
where first_piece_released >= 1900
```

Outcome:

| ERA | artist_code | name | nationality | born | rip | first_piece_released | last_piece_released |
|---|---|---|---|---|---|---|---|
| 20TH CENTURY AND 21ST CENTURY | DS | Dmitri Shostakovich | Russian | 1906-09-25 | 1975-08-09 | 1919 | 1975 |
| 20TH CENTURY AND 21ST CENTURY | GH | Gustav Holst | British | 1874-09-21 | 1934-05-25 | 1903 | 1934 |
| 20TH CENTURY AND 21ST CENTURY | PG | Percy Grainger | Australian | 1882-07-08 | 1961-02-20 | 1903 | 1940 |
| 20TH CENTURY AND 21ST CENTURY | VP | Vincent Persichetti | American | 1915-06-06 | 1987-08-14 | 1929 | 1987 |
| 20TH CENTURY AND 21ST CENTURY | JM | John Mackey | American | 1973-10-01 | NULL | 2004 | NULL |

Relevance: This query displays a table with all the artists in the list that are from the 20th and 21th Century Era. This shows how artists might be influenced by the era's trend and type of music being created/performed. For example, concert band pieces were not as popular in the Romantic Era versus the 20th and 21th Century Era. By knowing this, analysts can infer that some composers in this era might solely write concert band pieces, which is understandable because of the era it is produced in.

**Question 4: Identify composers who lived in both the Romantic Era and 20th /21th Century Era.**

The SQL Query:

```sql
select * from artist
where first_piece_released >= 1820
and first_piece_released <1900
and last_piece_released >=1900
```

The Outcome:

| artist_code | name | nationality | born | rip | first_piece_released | last_piece_released |
|---|---|---|---|---|---|---|
| JF | Julius Fucik | Czech | 1872-07-18 | 1916-09-25 | 1897 | 1914 |
| GF | Gabriel Faure | French | 1845-05-12 | 1924-11-04 | 1868 | 1923 |
| CS | Camille Saint Saens | French | 1835-10-09 | 1921-12-16 | 1841 | 1921 |

Relevance: By using this table, we now know that out of the ten, Julius Fucik, Gabriel Faure, and Camille Saint Saens had to transition from the Romantic Era, to the 20th /21th Century Era. This can be important to know because this could show how the composer's had to change their style of music composition, in order to fit in with the era.

**Question 5: Display the "Top 20" movements based on popularity in Spotify.**

The Query:

```
select top 20 p.movement_title, p.spotify
from popularity p
order by p.spotify desc
```

The Table Outcome:

| movement_title | spotify |
|---|---|
| XIII. Le Cygne | 44,909,391 |
| No. 10 Scene (Moderato) | 38,935,007 |
| VI. Waltz 2 | 19,058,542 |
| The Blue Danube | 16,232,360 |
| IV. Jupiter, the Bringer of Jollity | 4,254,899 |
| No. 2 Waltz (Tempo Di Valse) | 3,050,796 |
| I. Mars, the Bringer of War | 2,124,349 |
| No. 9 Finale (Andante) | 2,066,034 |
| VII. Aquarium | 2,037,140 |
| No. 29 Final Scene | 1,601,460 |
| No. 14 Scene (Moderato) | 1,574,791 |
| No. 1 Introduction | 1,523,463 |
| No. 3 Scene (Allegro Moderato) | 1,340,686 |
| No. 6 Pas d'action | 1,008,623 |
| No. 8 Goblet Dance | 1,002,223 |
| No. 21 Spanish Dance | 934,746 |
| No. 11 Scene (Allegro Moderato - Allegro Vivo) | 899,468 |
| No. 12 Scene (Allegro) | 871,820 |
| No. 7 Subject | 864,744 |
| No. 15 Scene (Allegro Giusto) | 699,100 |

Relevance: By using the table, it is easily shown that on Spotify, the movement "Le Cygne" by Camille Saint Saens is the most played movement on Spotify (out of the ten composers). By showing the "Top 20", you can notice how many of the movements listed near the top can be relevant in pop culture. For example, "Waltz 2" by Dmitri Shostakovich is a well known movement from "Jazz Suite No.2". By analyzing this point, we can do more research to find out as to why it is so popular, which in this case, could be because of the well known movie, "Eyes Wide Shut" directed by Stanley Kubrick, and the song being used in one of the scenes of the movie. Knowing this, one assumption we can make is that this song has gained popularity due to the movie, letting it have more exposure.

**Question 6: Display the "Top 10" movements based on popularity in YouTube.**

Query Programmed:

```
select top 10 p.movement_title, p.youtube
from popularity p
order by p.youtube desc
```

Outcome:

| movement_title | youtube |
|---|---|
| The Blue Danube | 30,843,535 |
| Entrance of the Gladiators | 10,021,446 |
| Entrance of the Gladiators | 10,021,446 |
| IV. Jupiter, the Bringer of Jollity | 6,927,445 |
| I. Mars, the Bringer of War | 6,471,924 |
| VI. Waltz 2 | 5,104,607 |
| XIII. Le Cygne | 4,566,142 |
| VII. Aquarium | 3,162,768 |
| VII. In Paradisum | 1,784,409 |
| I. Introduction et marche royale du lion | 1,444,822 |

Relevance: By showing the popularity on YouTube instead of Spotify, it gives a different perspective to what the most view movement is. Using this table, we can see that "The Blue Danube" by Johann Strauss Jr is the most viewed movement (using the information given by the ten composers). We can link this information and explain why this is the most popular movement. Knowing more background knowledge on the song, this piece is well known and is recognized as one of the most popular waltz pieces in history. It is a tune that people know immediately and is popular in society, explaining the amount of views it has received on YouTube.

**Question 7: Display the popularity count for each composer's first piece.**

Query for Question:

```
Select a.name, p.piece_name,sum (pop.itunes+pop.spotify+pop.youtube) as popularity_count
from artist a, piece p, movements m, popularity pop
where a.artist_code = p.artist_code
and p.piece_code = m.piece_code
and m.movement_code = pop.movement_code
and p.piece_code like ('%-FP')
group by a.name, p.piece_name
order by popularity_count desc
```

Outcome for Question 7:

| name | piece_name | popularity_count |
|---|---|---|
| Julius Fucik | Entrance of the Gladiators | 10,062,525 |
| Percy Grainger | La Scandinavie | 348,273 |
| John Mackey | Redline Tango | 289,870 |
| Gabriel Faure | Le Papillon et la fleur | 137,812 |
| Pyotr Ilyich Tchaikovsky | Scherzo a la russe | 46,635 |
| Dmitri Shostakovich | Scherzo in F-Sharp Minor | 7,290 |
| Vincent Persichetti | Serenade No. 1 | 6,792 |
| Camille Saint Saens | Le Soir | 2,992 |
| Johann Strauss II | Erster Gedanke (First Thought) | 2,643 |
| Gustav Holst | Three Folk Tunes | 2,159 |

Relevance: By knowing the popularity count for each composer's first piece, we can find out who had the biggest debut when entering the music industry. With the information on this table, we can see that "Entrance of the Gladiators" by Julius Fucik seems to have the highest number on popularity count, meaning that his first song was already a hit and well known in the world's culture. This piece is often known as the very iconic circus music that is often heard in the media, yet not many people know the original title of the song and continue to refer it to as "clown music".

**Question 8: From each composer's most popular piece, show the longest movement, with its time.**

Query:

```
select p.piece_code, max(durations_in_sec) as longest_duration_in_MP into tmp_table
from piece p, movements m
where p.piece_code = m.piece_code
and p.piece_code like ('%-MP')
group by p.piece_code


select a.name, m.movement_title, t.longest_duration_in_MP
from artist a, piece p, movements m, tmp_table t
where a.artist_code = p.artist_code
and p.piece_code = m.piece_code
and p.piece_code = t.piece_code
and m.durations_in_sec = t.longest_duration_in_MP
order by p.piece_code
```

Outcome:

| name | movement_title | longest_duration_in_MP (seconds) |
|---|---|---|
| Camille Saint Saens | XIII. Le Cygne | 184 |
| Dmitri Shostakovich | VI. Waltz 2 | 193 |
| Gabriel Faure | II. Offertoire | 497 |
| Gustav Holst | V. Saturn, the Bringer of Old Age | 543 |
| Julius Fucik | Entrance of the Gladiators | 158 |
| John Mackey | Aurora Awakes | 690 |
| Johann Strauss II | The Blue Danube | 707 |
| Percy Grainger | Country Gardens | 124 |
| Pyotr Ilyich Tchaikovsky | No. 13 Dance of the Swans | 1070 |
| Vincent Persichetti | Pageant | 450 |

Relevance: In this table, not only do we see what movement is the longest in the most popular piece, but we also the duration of the movement. This tells us that even though the movement can be lengthy, people seem to still enjoy the piece and listen to it often, showing an example of the quality of their music with numbers.

**Question 9: Using each composer's first piece, find the shortest movement and display the length.**

The Query:

```
select p.piece_code, min(durations_in_sec) as shortest_duration_in_FP into tmp_table
from piece p, movements m
where p.piece_code = m.piece_code
and p.piece_code like ('%-FP')
group by p.piece_code

select a.name, m.movement_title, t.shortest_duration_in_FP
from artist a, piece p, movements m, tmp_table t
where a.artist_code = p.artist_code
and p.piece_code = m.piece_code
and p.piece_code = t.piece_code
and m.durations_in_sec = t.shortest_duration_in_FP
order by p.piece_code
```

Outcome:

| name | movement_title | shortest_duration_in_FP (seconds) |
|---|---|---|
| Camille Saint Saens | Le Soir | 74 |
| Dmitri Shostakovich | Scherzo in F-Sharp Minor | 193 |
| Gabriel Faure | Le Papillon et la fleur, Op. 1 | 138 |
| Gustav Holst | Three Folk Tunes | 173 |
| Julius Fucik | Entrance of the Gladiators | 158 |
| John Mackey | Redline Tango | 567 |
| Johann Strauss II | Erster Gedanke (First Thought) | 47 |
| Percy Grainger | II. Vermelandsvisa | 132 |
| Pyotr Ilyich Tchaikovsky | Scherzo a la russe | 345 |
| Vincent Persichetti | IV. Interlude | 70 |

Relevance: This displays the shortest movement in the composer's first piece. Since most of these are not multiple movements, we can assume that their first pieces are much shorter than their most popular or last, showing the development of their compositions and their growth as artists. It must be noted though that duration is only one attribute to take account for when figuring out development.

**Question 10: Show the most popular movement from every composer's most popular piece.**

Query:

```
select m.piece_code,m.movement_code, pop.spotify+pop.itunes+pop.youtube as popularity_counter
--into tmp_table10
from movements m , popularity pop
where piece_code in
        (select piece_code from piece
        where piece_code like ('%-MP%'))
and m.movement_code = pop.movement_code
```

```
select piece_code, max(popularity_counter) as counter_of_most_popular_movement into
tmp_table11
from tmp_table10
group by piece_code


select a.name, p.piece_name ,m.movement_title, tmp11.counter_of_most_popular_movement
from tmp_table11 tmp11, tmp_table10 tmp10, movements m, piece p, artist a
where tmp11.counter_of_most_popular_movement = tmp10.popularity_counter
and tmp10.movement_code = m.movement_code
and m.piece_code = p.piece_code
and p.artist_code = a.artist_code
```

Final Outcome on SQL:

| name | piece_name | movement_title | counter_of_most_popular_movement |
|---|---|---|---|
| Dmitri Shostakovich | Jazz Suite No.2 | VI. Waltz 2 | 24163175 |
| Gustav Holst | The Planets | IV. Jupiter, the Bringer of Jollity | 11182370 |
| Percy Grainger | Country Gardens | Country Gardens | 390975 |
| Julius Fucik | Entrance of the Gladiators | Entrance of the Gladiators | 10062525 |
| Vincent Persichetti | Pageant | Pageant | 243115 |
| Gabriel Faure | Requiem | VII. In Paradisum | 1853159 |
| John Mackey | Aurora Awakes | Aurora Awakes | 1369393 |
| Pyotr Ilyich Tchaikovsky | Swan Lake | No. 10 Scene (Moderato) | 39206351 |
| Johann Strauss II | An der schonen blauen Donau (The Blue Danube) | The Blue Danube | 47075921 |
| Camille Saint Saens | The Carnival of the Animals | XIII. Le Cygne | 49475559 |

Relevance: By displaying the most popular movement from the most popular piece, we can truly see which specific movement is the most popular out of all the movements from the 10 composer's information. With this data, we can see that after combining all the popularity counts from Spotify, iTunes, and YouTube together, "Le Cygne" is the most popular movement . For more background on "Le Cygne", it was composed by Camille Saint Saens and was choreographed by Mikhail Fokine, to be a solo ballet dance, after hearing the song and a poem by Tennyson. This may be one of the factors as to why this is the most popular movement. More specifically to Asia, this song was played in a Taiwanese movie called "Secret", directed by Jay Chou, and is very popular in Taiwan and Asia in general.


**Visual Presentation Examples**

Analysts often create visual representations of their charts so that viewers can understand the information better. Unfortunately, very limited visuals are available to be created due to having to purchase the full version of Power BI. Instead, the samples below are made using the free BETA sample available (I apologize). Having the BETA version also means creators are unable to share their work, so screenshots are used to display how the interactions can function.


**Example 1: Map and Location of Composer's Birth Country**

(This map shows the country each composer is from and when the mouse hovers over the coloured circles, it tells which composer is from that country)
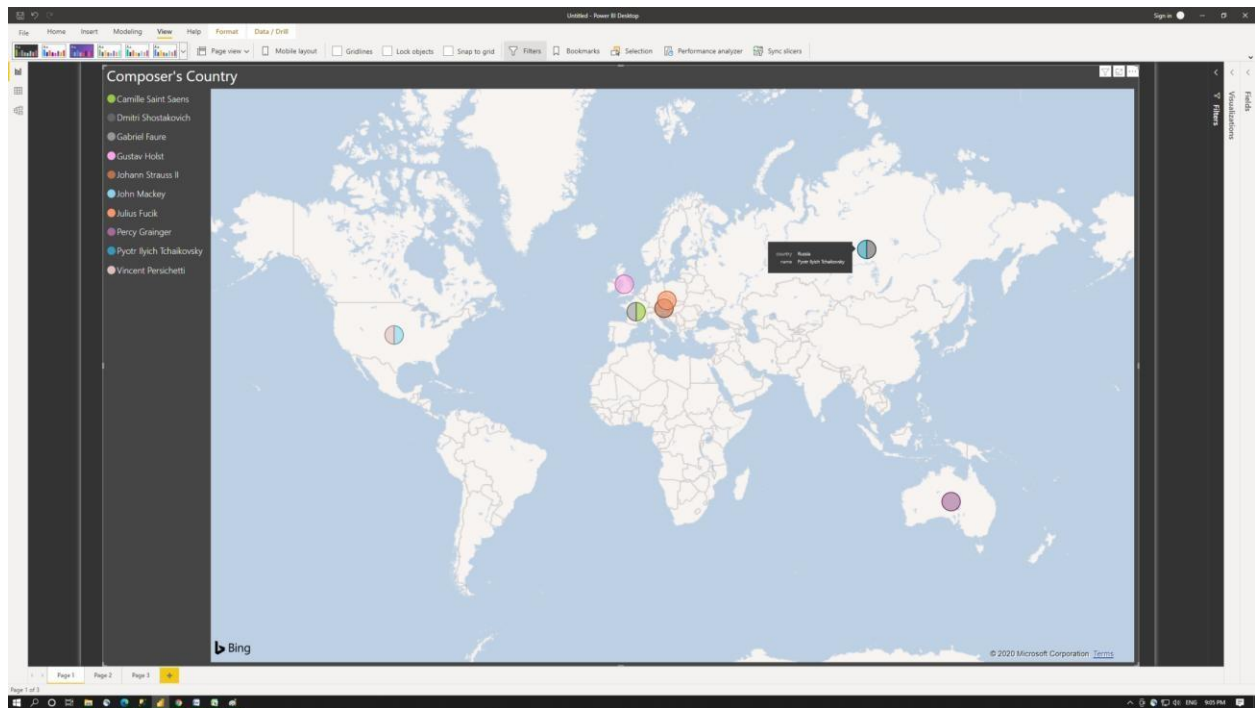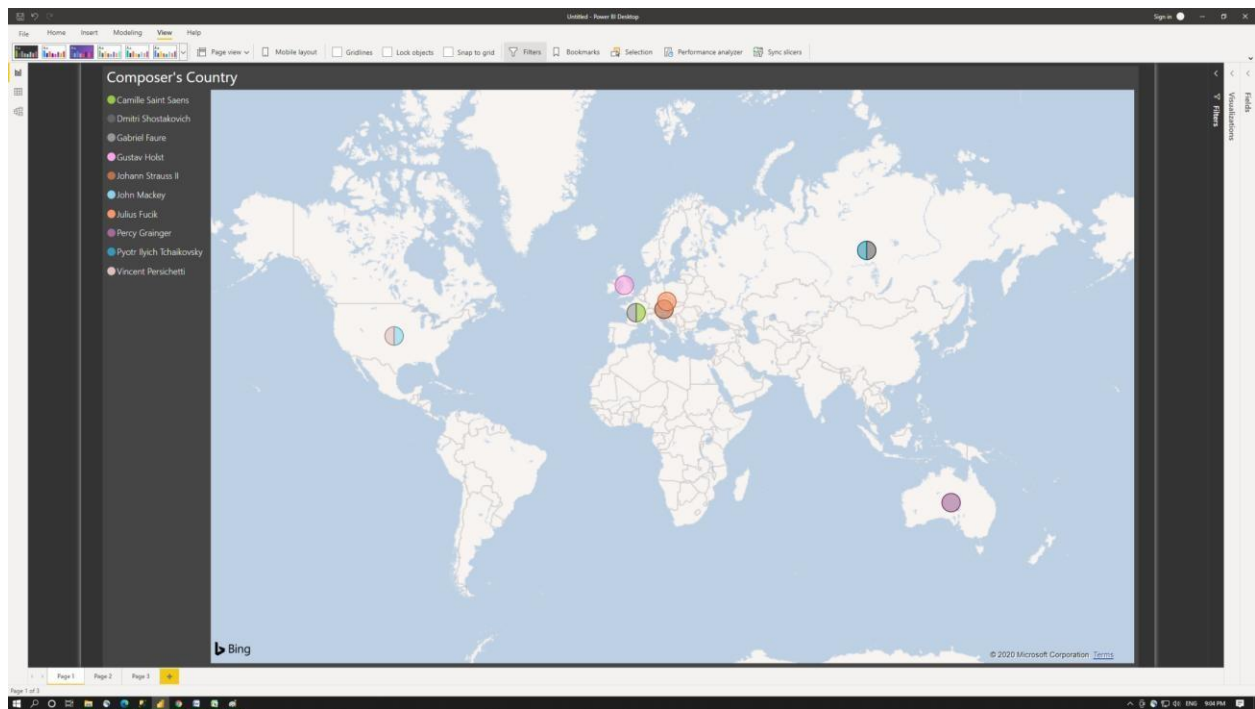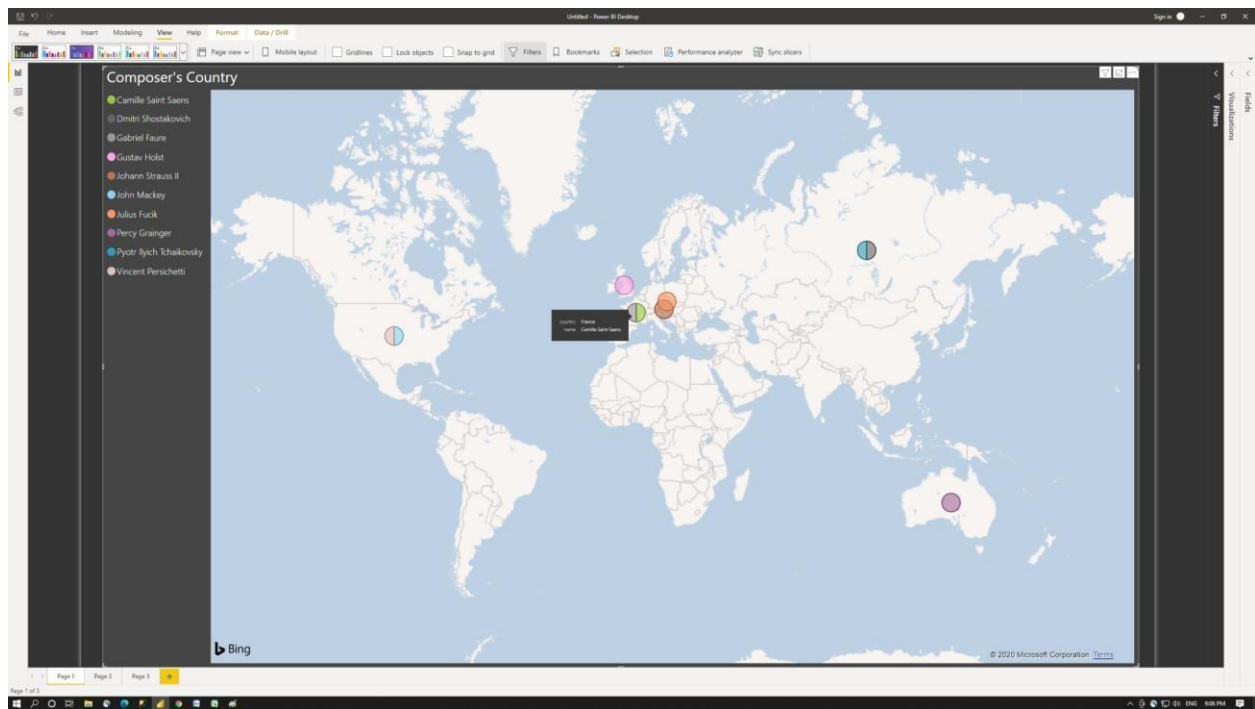
**Example 2: Accordion Style Displaying the Composer's Piece Information**

(In this example, I showed how the info gets more specific for Camille Saint Saens when clicking, but it works for every composer and their pieces as well)

1)

| name | durations_in_sec |
|---|---|
| Camille Saint Saens | 1689 |
| Dmitri Shostakovich | 3388 |
| Gabriel Faure | 2108 |
| Gustav Holst | 3441 |
| Johann Strauss II | 1181 |
| John Mackey | 6081 |
| Julius Fucik | 526 |
| Percy Grainger | 1340 |
| Pyotr Ilyich Tchaikovsky | 11585 |
| Vincent Persichetti | 1797 |
| **Total** | **33136** |

2)

| name | durations_in_sec |
|---|---|
| **Camille Saint Saens** | 1689 |
| Le Soir | 74 |
| The Carnival of the Animals | 1244 |
| Vieilles chansons | 371 |
| **Dmitri Shostakovich** | 3388 |
| **Gabriel Faure** | 2108 |
| **Gustav Holst** | 3441 |
| **Johann Strauss II** | 1181 |
| **John Mackey** | 6081 |
| **Julius Fucik** | 526 |
| **Percy Grainger** | 1340 |
| **Pyotr Ilyich Tchaikovsky** | 11585 |
| **Vincent Persichetti** | 1797 |
| **Total** | **33136** |

3)

| name | durations_in_sec |
|---|---|
| **Camille Saint Saens** | 1689 |
| **Le Soir** | 74 |
| **The Carnival of the Animals** | 1244 |
| I. Introduction et marche royale du lion | 118 |
| II. Poules et coqs | 53 |
| III. Hemiones | 39 |
| IV. Tortues | 113 |
| IX. Le coucou au fond des bois | 137 |
| V. L'elephant | 82 |
| VI. Kangourous | 0 |
| VII. Aquarium | 121 |
| VIII. Personnages a longues oreilles | 43 |
| X. Voliere | 70 |
| XI. Pianistes | 82 |
| XII. Fossiles | 86 |
| XIII. Le Cygne | 184 |
| XIV. Final | 116 |
| **Vieilles chansons** | 371 |
| **Dmitri Shostakovich** | 3388 |
| **Gabriel Faure** | 2108 |
| **Gustav Holst** | 3441 |
| **Johann Strauss II** | 1181 |
| **John Mackey** | 6081 |
| **Julius Fucik** | 526 |
| **Percy Grainger** | 1340 |
| **Pyotr Ilyich Tchaikovsky** | 11585 |
| **Vincent Persichetti** | 1797 |
| **Total** | **33136** |

**Conclusion:** To conclude, there are endless possibilities when it comes to dealing with data, and it is able to connect with the music world, to understand information at a deeper level, as well as become more passionate and educated on the music itself.