Grand Challenges Project 1 Final Report

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1 Introduction and Motivation

Through undertaking this project, the aim is to determine the changes in the music industry as a whole and what factors have changed in previous decades. Songs that have topped the charts in previous decades have varied greatly, and through this analysis it will be aimed to determine what attributes have changes, and also what societal and technological changes have caused this shift in popular music. From this data, estimations of how music may change in the future can be made, and this can allow new artists to take advantage of current industry trends.

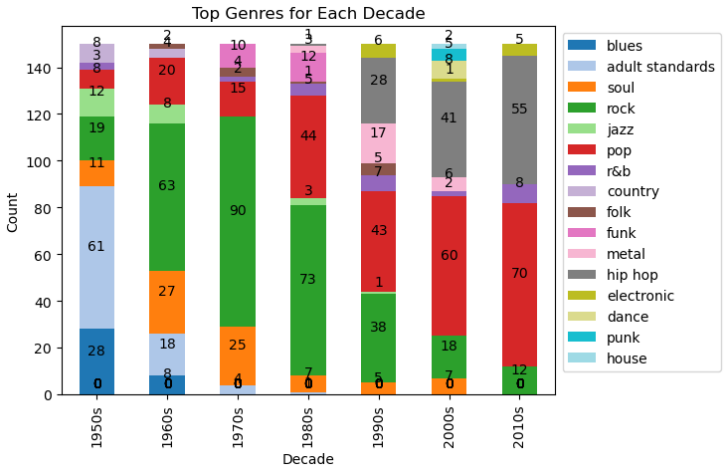
2 Methods and Dataset

Firstly, the dataset for this analysis was obtained from *Organise Your Music* (Organise Your Music 2016), which is a website which utilises the Spotify API in order to get a list of 12 attributes for each song within a playlist. The playlists which were used for this data were Spotify's "All out decades" playlists, ranging from the 1950s to 2010s, as they each contain 150 of the most popular and iconic songs of their respective decades.

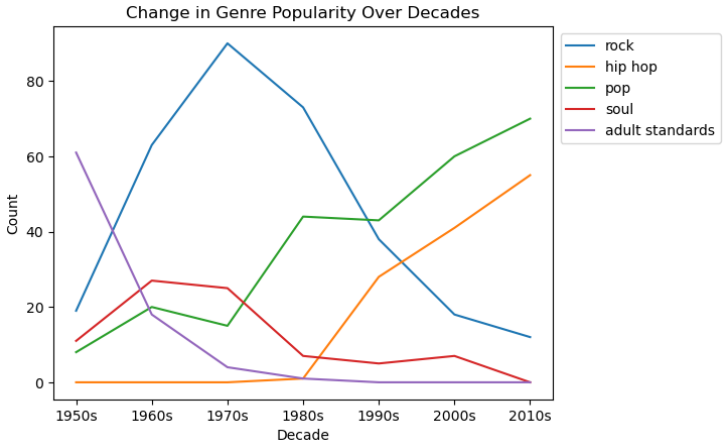
The methods used in analysing this data were through the use of Python in Jupyter Notebook *(Jupyter 2023)*. Additonally, the Pandas library was used to read and manipulate the data from the csv files, and Matplotlib was used to create the graphs and visuals.

3 Experimental Setup and Results

In order to find results, a number of graphs were created in order to answer the questions. These can be seen below.
These first graphs aim to answer the question of what were the popularity of different genres in each decade.



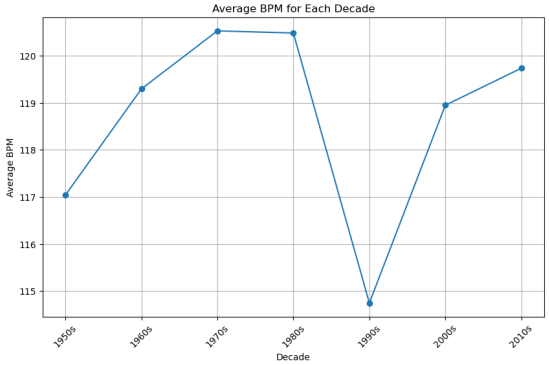
This first graph is a stacked bar chart, which shows the top genres for each decade through their size of the each colour in the bar. Some trends are visible from this graph, such as the rise and fall of rock over the decades which can be seen in green. Additionally, the emergence of pop and hip hop is visible in the later decades, and this can be seen in the graph in red and grey respectively.



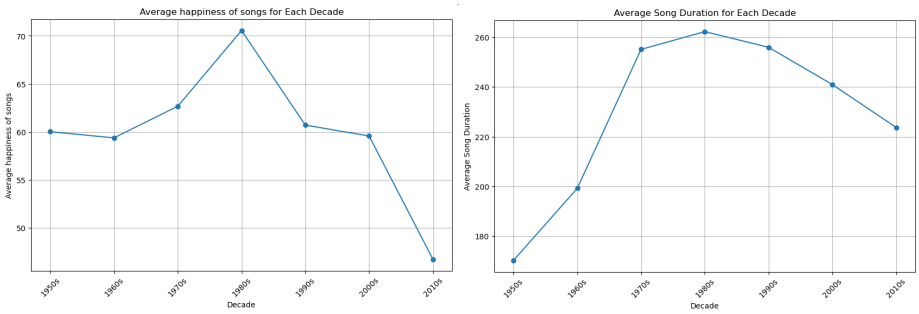
This next graph also shows the popularity of genres in each decade, however this includes just the top 5 genres. This allows the popularity of each genres to be seen compared to the others over time. As seen in this graph, rock was the most popular genre by far in the 1970s, whereas now in the 2010s both pop and hip hop are the two biggest genres by far.

From the results in these first two graphs, it can be seen that rock once was the most popular genres by far, whereas in the 2010s, rock has greatly declined, and pop and hip hop are now dominating the top songs.

These next graphs each show different elements of songs over the decades, and how they have changed. These graphs aim to answer the question of what elements make up a popular song.

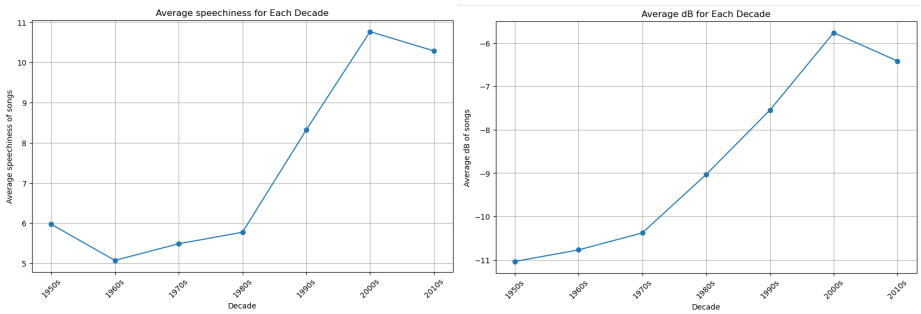


The above graph shows average BPM of songs in each decade. As seen in the graph, the average BPM each decade varies very little. This could indicate that songs with 115-120 BPM could be the most enjoyable for the listener, and this is why many popular songs, regardless of decade, are within this range.



The graph above on the left shows the average happiness of songs each decade. As can be seen in the graph, happiness of music peaked in the 1980s, whereas in the 2010s happiness of music is at an all time low. This may be due to external political and economic factors which are spoken on in music having a more negative sentiment at this time.

The graph on the right above shows the average song duration for each decade. As can be seen, the length of songs steadily increased up until the 80s, where it then began to decrease. The initial increase could be due to evolving music technology and release formats, which allowed for longer songs.



The graph on the left shows the average speechiness each decade, which is an indication of how much of a song is spoken words compared to instrumental. The graph on the right shows the average decibels each decade, which is an indication of how loud a song is. Interestingly, they both appear to follow a similar trend and increasing throughout the decades, which indicates somehow these two factors could be correlated.

4 Conclusions and Discussion

In Conclusion, the above results show that throughout the decades, some elements of music have varied drastically, such as the top genres, which are almost unrecognisable from 50 years ago. However, other factors such as BPM appear to remain very similar, indicating that this is an important factor when creating a song.

Other factors such as song duration and happiness appear to be on a downwards trend, so this indicates for a song to become popular in the modern day, shorter and sadder songs have an advantage.

Additionally, many of these changes appear to be influenced by changes in the ways music was produced, as in the 1990s almost all variables appear to have changed in one way or another. This is likely due to the fact that around this time digital music production was beginning to become much more popular than in previous decades thanks to new technology. This may be the case for future decades too, as AI technology may also impact the way music is made, but this cannot be determined for sure.

5 References

Jupyter 2023, *Jupyter Notebook*, Jupyter.org, viewed 18 August 2023, <https://jupyter.org/>.

Organise Your Music 2016, *Organize Your Music*, Playlistmachinery.com, viewed 18 August 2023, <http://organizeyourmusic.playlistmachinery.com/index.html>.

6 Appendix

Feedback was sorted into four categories: Analysis, Dataset, Visuals, and Miscellaneous.

Analysis Feedback
Firstly, three people mentioned that it might be a good idea to look into the effects of social media and Tiktok trends in order to see factors which may have influenced a songs popularity.
While this could be a good focus of another study, I chose not to focus on it as I was analysing music across 7 decades, and social media only really applies to the 2010s, which is one out of seven decades, meaning that this information isnt that useful.

Three people mentioned the correlation between technology and the attributes of music. I chose to include this in my analysis, as my data did have evidence to back this up, due to the drastic changes in technology and music in the 80s and 90s.

Two people mentioned that connections between trends and world events and seasonal changes could be interesting. This was briefly addressed in my presentation, as the correlation between music getting sadder, and a worsening political and economic state in the world could be present.

One person also mentioned how the reason for changes in music is quite subjective. I chose to address this in my project as this is true, however trends can still be seen as possible changes, because some correlation is still visible.

Dataset Feedback
Four people mentioned that the dataset is missing certain data values. This was true at the time of my initial proposal, however I chose to address this feedback by manually filling in all the blank data values through a simple google search of the songs data.

Two people mentioned that I could include data from other streaming platforms. I chose not to address this, as while I would have loved to do this, unfortunately other music platforms do not have the same amount of data and level of API access to do this. However, with Spotify being the biggest platform, the data from Spotify is likely to be indicative of the entire music scene.

One person mentioned that more music may be released in some decades. This is true, however not really relevant, as the same sample size of top songs was used for each decade, giving accurate information despite any differences.

One person mentioned see if new genres have appeared over time. I addressed this feedback, as exactly this happened with hip hop in the 1990s, a new genre

which became exceedingly popular out of nowhere.

One person mentioned to consider different factors such as instrument type and emotion. I addressed this feedback as I created a graph of the happiness of songs over different decades. Unfortunately, instrument type is hard to track, as this would have to be recorded manually for each song, and many songs contain a large number of instruments so this would be very difficult.

Visuals Feedback
Three people mentioned that the visuals could do with some improvement as they were initially very cluttered. This was true, so I addressed this feedback by combining subgenres such as "Alternative rock" and "Album rock" simply into one genre called "Rock". By doing this the graph was simplified signifcantly and became much easier to read.

Miscellaneous Feedback
One person mentioned that do the top songs correlate with overall music trends. As this is hard to fully know the answer to, I chose not to address it. However the top 150 songs should be indicative of a wide range of popular songs within a decade, so with a sample this size I believe the trends should correlate.

One person mentioned what quantifies a songs popularity. I chose not to address this, as a songs popularity is quantified simply by how many times it has been listened to. Yes for older decades when streaming services were not a thing this may be slightly inaccurate, but most data suggests that the top streamed songs from each decade is very similar to what was the most popular at the given time.

One person mentioned does this have any application. I chose to address this, as this data can be very useful for any aspiring musicians wishing to make a hit song, as many hits have similar attributes.