# Exploring the Relationship Between Music Listening Habits and Weather Conditions

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### Motivation

I listen to music every day, and depending on how I'm feeling or the situation, I frequently find that my listening preferences change. Curiosity to find out if outside influences, like the weather, affect my taste in music drove this experiment. I wanted to look for any trends or connections by examining my Spotify listening history and contrasting it with meteorological data. I was also able to hone my data analysis abilities and learn more about my own behavioural patterns thanks to this initiative.

### Data Source

SpotifyData: My Spotify listening history was exported using Spotify's data download feature. The dataset includes timestamps, track details, artist names, listening duration, and skip status for the last three months.

Weather Data: Weather data for Sabanci University was obtained from Meteostat, an open-source weather data API. The dataset includes daily metrics such as precipitation (prcp), average temperature (tavg), and other environmental variables.

### Data Analysis

**Techniques Used**

1. **Data Preprocessing**:
   * Converted timestamps into dates and aggregated the listening duration to a daily level.
   * Assigned genres to the top 50 artists I listened to, based on their predominant music styles.
   * Addressed missing values in the weather data using linear interpolation to ensure a consistent dataset.
2. **Data Visualization**:
   * Used line plots, bar charts, and scatter plots to visualize daily trends in music listening and weather conditions.
   * Plotted the most listened genre and its relation to weather metrics like precipitation.
3. **Correlation Analysis**:
   * Computed correlation coefficients to measure the strength of the relationship between listening duration, skipped songs, and weather variables.

**Stages of Analysis**

1. **Exploratory Data Analysis (EDA)**: Visualized trends and distributions in the data to identify potential patterns.
2. **Merging Datasets**: Combined Spotify and weather datasets based on the date to analyze relationships between music listening habits and weather conditions.
3. **Statistical Analysis**: Evaluated correlations to test the hypothesis that weather influences music preferences.

### Findings

**Through the analysis, I discovered the following:**

* **Listening Duration and Precipitation**: There was no significant correlation between daily precipitation levels and my total listening hours.
* **Genre Preferences and Weather**: My preferred genres (e.g., Hip-Hop, Indie, and Instrumental) did not show a meaningful relationship with precipitation or temperature.
* **Skipped Songs and Temperature**: Similarly, the number of skipped songs did not vary significantly with temperature changes.
* **Key Insights About Myself**:

1. My listening habits are largely independent of weather conditions.
2. Genres like Hip-Hop, Indie, and Instrumental consistently dominate my playlist, regardless of external factors.

### Limitations and Future Work

**Limitations**

1. **Manual Genre Assignment**: Genres were assigned manually to the top 50 artists, which might introduce bias.
2. **Limited Timeframe**: The analysis was restricted to three months of data, which might not capture seasonal or long-term trends.
3. **Data Gaps**: Missing weather data points were filled using linear interpolation, which may not accurately reflect real-world conditions.

**Future Work**

1. **Expanding the Dataset**: Including a larger timeframe and additional locations to explore broader trends.
2. **Additional Contextual Data**: Incorporating mood or activity logs to better understand the factors influencing my listening habits.
3. **Machine Learning**: Using advanced algorithms to uncover hidden patterns or relationships in the data.
4. **Real-Time Analysis**: Building a system to track and analyze listening behavior alongside weather data in real-time.

### Conclusion

The idea that the weather could affect how I listen to music was investigated in this study. However, the analysis did not find any significant correlation between my listening duration, genre choices, or skipped songs and weather metrics (such as temperature and precipitation). Although the hypothesis was not confirmed, this study improved my abilities in data processing and visualization and gave me insightful knowledge about my musical preferences.  
  
Additionally, this initiative opens the door for more thorough investigations by highlighting the possibilities for future research into the interaction between human behavior and outside influences.  
  
We appreciate you reading!