Music Recommendation System - Literature Review

The internet has become a vast source of multimedia entertainment, offering a variety of options like videos, books, and music. However, users often struggle to discover new music and artists due to the overwhelming amount of content available. They are forced to do direct searches, even when they don't have a specific song or artist in mind. Therefore, there is a need to find a better way of discovering new music that involves understanding the user's preferences better.

The first step in data collection involves User Modelling [1], which includes stable properties such as age, gender, location, interests, lifestyle, and personality, as well as fluid components like mood, attitude, and opinions. The second step is Item Profiling [1][4], which consists of three categories: Editorial metadata (such as cover name, composer, title, genre), Acoustic metadata (obtained by analyzing the audio signal, such as beat, tempo, pitch, instrument, mood), and Cultural metadata (obtained from mining social networks like Facebook, Youtube, Twitter, which provide valuable human knowledge like comments, music reviews, tags, and friendship networks [2]).

Two popular analysis algorithms have been found to perform well: Collaborative Filtering (CF) and Content-Based Model (CBM) [3]. In CBM, the system recommends items that are similar to the ones the user has enjoyed in the past. It does this by learning the commonalities among the songs that the user has rated highly, such as specific artists, genres, and subject matter. In CF, the system recommends items that people with similar tastes and preferences have enjoyed in the past. It does this by first finding similar users, and then recommending items that those similar users have rated highly. Combining CBM and CF in a hybrid approach is suggested to maximize the benefits of both methods and enhance overall performance.

In order to measure similarities between objects, one possible method is to represent them as vectors (embeddings) and calculate the distance between them. The vectors' dimensions correspond to the features (defined by User Modelling and Item Profilling) [5]. Renshaw’s patent [4] also uses vectors to generate playlists based on seed songs. While Chang delves deeper into the CF and CBM, and uses Cosine distance to determine the similarity between two vectors; Renshaw defines a new Clustering algorithm for music similarity vectors, and intruduces some well known metrics: Manhattan, Euclidian, Chebychev or Mahalanobis distance. All of which are suitable for distance measurements.

To conclude the review, we have gained a better understanding of the problem areas related to recommendation systems. The methods we have discovered will be useful in planning and designing our own system.

References:

[1] A Survey of Music Recommendation Systems and Future Perspectives
Song, Yading, Simon Dixon, and Marcus Pearce. "A survey of music recommendation systems and future perspectives." *9th international symposium on computer music modeling and retrieval*. Vol. 4. 2012.

[2] Music recommendation by unified hypergraph: combining social media information and music content
Bu, Jiajun, et al. "Music recommendation by unified hypergraph: combining social media information and music content." *Proceedings of the 18th ACM international conference on Multimedia*. 2010.

[3] Towards the Next Generation of Recommender Systems: A Survey of the State-of-the-Art and Possible Extensions
Adomavicius, Gediminas, and Alexander Tuzhilin. "Toward the next generation of recommender systems: A survey of the state-of-the-art and possible extensions." *IEEE transactions on knowledge and data engineering* 17.6 (2015): 734-749.

[4] Client-Based Generation Of Music Playlists via Clustering Of Music Similarity Vectors
Renshaw, Erin, and John Platt. "Client-based generation of music playlists via clustering of music similarity vectors." *U.S. Patent No. 7,571,183*. 4 Aug. 2009.

[5] Data-Driven Music Exploration: Building a Spotify Song Recommender
Chang. "Data-Driven Music Exploration: Building a Spotify Song Recommender". *Medium Website*. 2023.