

Music Recommendation



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Introduction

Typical Filter Types in Recommendation

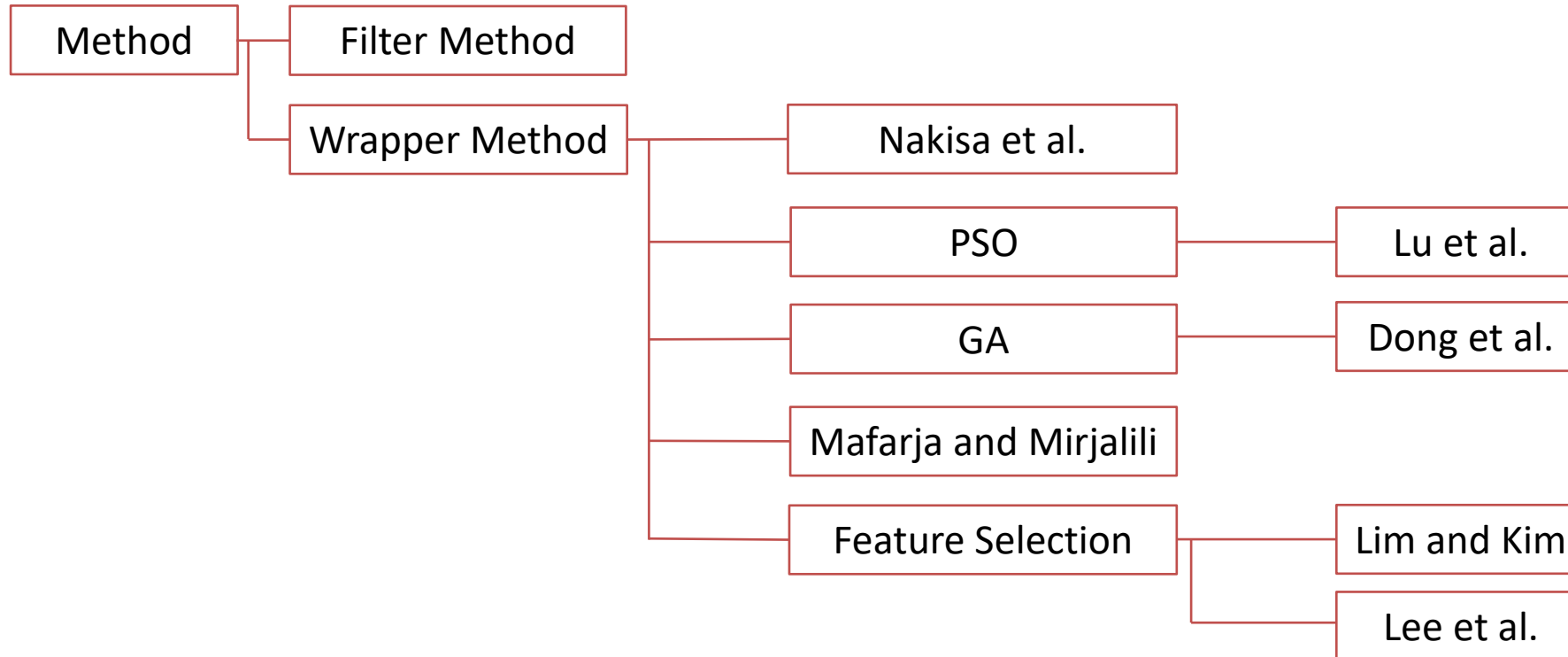
● Journal

- Current challenges and visions in music recommender systems research
- Music Recommendation Using Content and Context Information Mining
- On Effective Location-Aware Music Recommendation
- Global and country-specific mainstreamness measures: Definitions, analysis, and usage for improving personalized music recommendation systems
- Sound and Music Recommendation with Knowledge Graphs
- **Background music recommendation based on latent factors and moods**
- **Tag-aware dynamic music recommendation**
- **Use of Deep Learning in Modern Recommendation System: A Summary of Recent Works**
- **Moodplay: Interactive music recommendation based on Artists' mood similarity**
- **Efficient music recommender system using context graph and particle swarm**

● Conference

- Deep content-based music recommendation
- Music recommendation by unified hypergraph: combining social media information and music content
- Music Recommendation from Song Sets
- Context-aware mobile music recommendation for daily activities
- A music recommendation system based on music data grouping and user interests
- Exploiting Music Play Sequence for Music Recommendation
- A Music Recommendation System Based on Acoustic Features and User Personalities
- Improving Music Recommendation Using Distributed Representation
- Music recommendation via heterogeneous information graph embedding
- Leveraging multi-dimensional user models for personalized next-track music recommendation
- Explicit Modelling of the Implicit Short Term User Preferences for Music Recommendation
- New Paths in Music Recommender Systems Research
- Using offline metrics and user behavior analysis to combine multiple systems for music recommendation
- User Perception of Next-Track Music Recommendations
- A Survey of Music Recommendation Systems and Future Perspectives
- **Music personalized recommendation system based on hybrid filtration**
- **Music recommendation model by analysis of listener's musical preference factor of K-pop**
- **Latent Feature Combination for Multi-Context Music Recommendation**
- **Mood-aware music recommendation via adaptive song embedding**
- **Social Influence-Based Similarity Measures for User-User Collaborative Filtering Applied to Music Recommendation**

Taxonomy



Journal

- **Current challenges and visions in music recommender systems research**

- **Name of the Journal : International Journal of Multimedia Information Retrieval**
- **Number of Quotations : 125**
- ***Web of Science* Core Collection : Science Citation Index Expanded (SCIE)**
- **Impact Factor : 3.429**
- **Date of Publication : April 2018**

- **Main Idea**

- MRS research is still facing substantial challenges. In particular when it comes to build, incorporate, and evaluate recommendation strategies that integrate information beyond simple user–item interactions or content-based descriptors, but dig deep into the very essence of listener needs, preferences, and intentions, MRS research becomes a big endeavor and related publications quite sparse. Researchers first identify and shed light on what we believe are the most pressing challenges MRS research is facing, from both academic and industry perspectives. They review the state of the art toward solving these challenges and discuss its limitations. Second, they detail possible future directions and visions they contemplate for the further evolution of the field. The article should therefore serve two purposes: giving the interested reader an overview of current challenges in MRS research and providing guidance for young researchers by identifying interesting, yet under-researched, directions in the field.

- **Future Improvement**

- While personality characteristics of humans are a predictable and stable measure that shapes human behaviors, emotions are short-term affective responses to a particular stimulus. Both have been shown to influence music tastes and user requirements for MRS.
- Most of the existing music recommender systems make recommendations solely based on a set of user-specific and item-specific signals. However, in real-world scenarios, many other signals are available. These additional signals (e.g., location, time of the day, activity, weather, mood, day of the week) can be further used to improve the recommendation performance.

Journal

- **Music Recommendation Using Content and Context Information Mining**

- **Name of the Journal : IEEE Intelligent Systems**
- **Number of Quotations : 203**
- ***Web of Science* Core Collection : Science Citation Index Expanded (SCIE)**
- **Impact Factor : 3.210**
- **Date of Publication : 18 March 2010**

- **Main Idea**

- The Ubiquitous Music Recommender (uMender) tackles the music recommendation problem by mining musical content and context information. For musical content, researchers propose a two-stage clustering approach that identifies each music item's perceptual patterns, which consist of acoustical and temporal features hidden in music. Considering such patterns, a user's listening interest in music items can be captured more precisely. For context information, they have designed a novel solution for capturing a user's preferences under various context conditions. Instead of computing the correlation coefficients of user ratings, as in traditional methods, we group users under similar context conditions to find implicit, more applicable perceptual patterns. Through integrated mining of both context information and musical content, uMender provides appropriate, ubiquitous music recommendations. On the basis of the CF principle, uMender groups users with similar contexts, implying similar interests in music. Then, uMender identifies relevant music items that match both the user's listening interests and the current context.

- **Future Improvement**

- They will investigate more dimensions of contextual information to improve the recommender's quality.
- They hope to adopt perceptual patterns to enhance content-based retrieval.
- They intend to apply the integrated mining of context information and multimedia content to other multimedia applications.

Journal

- **On Effective Location-Aware Music Recommendation**

- **Name of the Journal : ACM Transactions on Information Systems**
- **Number of Quotations : 94**
- ***Web of Science* Core Collection : Science Citation Index Expanded (SCIE)**
- **Impact Factor : 2.889**
- **Date of Publication : April 2016**

- **Main Idea**

- Researchers present a novel venue-aware music recommender system called VenueMusic to effectively identify suitable songs for various types of popular venues in our daily lives. Toward this goal, a Location-aware Topic Model (LTM) is proposed to (i) mine the common features of songs that are suitable for a venue type in a latent semantic space and (ii) represent songs and venue types in the shared latent space, in which songs and venue types can be directly matched. It is worth mentioning that to discover meaningful latent topics with the LTM, a Music Concept Sequence Generation (MCSG) scheme is designed to extract effective semantic representations for songs. The comparisons with state-of-the-art music recommender systems demonstrate the superior performance of VenueMusic system on recommendation accuracy by associating venue and music contents using a latent semantic space. This work is a pioneering study on the development of a venue-aware music recommender system. The results show the importance of considering the influence of venue types in the development of context-aware music recommender systems.

- **Future Improvement**

- They plan to evaluate the system using larger and more complex datasets. It will be interesting to integrate broader venue types into the system and take other kinds of personal context information like age or gender into consideration.
- Another novel research direction is to extend the current system to other kinds of media data (e.g., video and text) and support different music search-related applications (e.g., ranking/reranking and personalization).

Journal

- **Global and country-specific mainstreamness measures: Definitions, analysis, and usage for improving personalized music recommendation systems**
 - **Name of the Journal : Plos one**
 - **Number of Quotations : 11**
 - **Web of Science Core Collection : Science Citation Index Expanded (SCIE)**
 - **Impact Factor : 2.740**
 - **Date of Publication : June 7, 2019**
- **Main Idea**
 - First, assuming that there is a difference between the global music mainstream and a country-specific one, they define the measures at two levels: relating a listener's music preferences to the global music preferences of all users, or to music preferences of the user's country. Second, they perform in-depth quantitative and qualitative studies of music mainstream in that they analyze differences between countries in terms of their level of mainstreamness analyzing these with a mixed-methods approach, and investigate differences between countries in terms of listening preferences related to popular music artists. Third, they demonstrate the applicability of their study results to improve music recommendation systems. To this end, they conduct rating prediction experiments using the proposed 6 mainstreamness measures: defined by a distribution-based or rank-based approach, defined on a global level or on a country level, and for artist play counts or artist listener counts.
- **Future Improvement**
 - The target user's mainstreamness levels have to be computed and, considering the other users' mainstreamness levels, the target user has to be assigned to the corresponding user set for each of the mainstreamness approaches.
 - The recommendation approach that perform best for the mainstreamness measure - user set pair has to be identified and applied. Taking an even more fine-tuned approach, depending on a user's country and the corresponding country profile, the corresponding most appropriate measure and/or algorithm may be adopted for the recommendation task.
 - Future work should expand the perspective on cultural aspects.

Journal

- **Sound and Music Recommendation with Knowledge Graphs**

- **Name of the Journal : ACM Transactions on Intelligent Systems and Technology**
- **Number of Quotations : 82**
- ***Web of Science* Core Collection : Science Citation Index Expanded (SCIE)**
- **Impact Factor : 2.672**
- **Date of Publication : October 2016**

- **Main Idea**

- Researchers describe how to create and exploit a knowledge graph to supply a hybrid recommendation engine with information that builds on top of a collections of documents describing musical and sound items. Tags and textual descriptions are exploited to extract and link entities to external graphs such as WordNet and DBpedia, which are in turn used to semantically enrich the initial data. Two explicit graph feature mappings are formulated to obtain meaningful item feature representations able to catch the knowledge embedded in the graph. Those content features are further combined with additional collaborative information deriving from implicit user feedback. An extensive evaluation on historical data is performed over two different datasets: a dataset of sounds composed of tags, textual descriptions, and user's download information gathered from Freesound.org and a dataset of songs that mixes song textual descriptions with tags and user's listening habits extracted from Songfacts.com and Last.fm, respectively.

- **Future Improvement**

- Without considering the collaborative information, the accuracy drops significantly. In addition, when considering only collaborative features accuracy performances are comparable with respect to hybrid feature combination variants. Finally, they see that the semantic expansion of tags and terms do not improve consistently accuracy with respect to the usage of pure keywords and tags combined with collaborative information
- When using only keyword or tag-based representations, the system is able to retrieve only those few items with an exact keyword/tag match with those liked by the user. Thus, the system is unable to widely explore the item space to find those items which are semantically related to the ones liked by the user.

Journal (Added)

- **Background music recommendation based on latent factors and moods**
 - Name of the Journal : Knowledge-Based Systems
 - Number of Quotations : 10
 - *Web of Science* Core Collection : Science Citation Index Expanded (SCIE)
 - Impact Factor : 5.921
 - Date of Publication : November 2018
- **Main Idea**
 - Many mobile devices are equipped with video shooting function, and users tend to use these mobile devices to produce user generated content (UGC), and share with friends or the public owing to the popularity of social media. To make the video to be attractive, embedding appropriate background music into the video is a popular way to enrich user experience, but it is a time-consuming and labor-intensive task to find music that fits the video. This work proposes to use latent factors to recommend a list of music songs for a given video, in which the recommendation is based on the proposed score function, which involves the weighted average of the latent factors for the video and music. Moreover, we use pairwise ranking to design the objective function, and use stochastic gradient descent to optimize the proposed objective function. In the experiments, we specify two hypotheses and design several experiments to assess the performance and the effectiveness of the proposed algorithm from different aspects, including accuracy, quantitative research, and qualitative research. The experimental results indicate that the proposed model is promising in accuracy and quantitative research. Furthermore, this work provides detailed analysis to investigate the fitness of the background music that recommended by the system through interviewing the subjects.
- **Keywords**
 - Background music recommendation system, Moods, Latent

Journal (Added)

- **Tag-aware dynamic music recommendation**

- Name of the Journal : **Expert Systems with Applications**
- Number of Quotations : 19
- *Web of Science* Core Collection : Science Citation Index Expanded (SCIE)
- Impact Factor : 5.452
- Date of Publication : September 2018

- **Main Idea**

- We present a tag-aware dynamic music recommendation framework that achieves personalized and accurate music recommendations to users. The proposed framework leverages the available semantic labels (in terms of tags) of music tracks to complement a highly sparse user-item interaction matrix, which effectively addresses the data sparsity issue faced by most music recommendation systems. Music tracks are more accurately represented by aggregating the latent factors derived from both the tag space and the user interaction information. The proposed framework further employs a Gaussian state-space model to capture the evolving nature of users' preferences over time, which helps achieve time-sensitive recommendation of music. A variational approximation is developed to achieve fast inference and learning of model parameters. Experiments conducted using actual music data and comparison with state-of-the art competitive recommendation algorithms help demonstrate the effectiveness of the proposed framework.

- **Keywords**

- Music recommendation, Matrix factorization, Temporal dynamics, Tag aware

Journal (Added)

- **Use of Deep Learning in Modern Recommendation System: A Summary of Recent Works**

- Name of the Journal : International Journal of Computer Applications
- Number of Quotations : 39
- *Web of Science* Core Collection : Science Citation Index Expanded (SCIE)
- Impact Factor : 3.976
- Date of Publication : December 2017

- **Main Idea**

- With the exponential increase in the amount of digital information over the internet, online shops, online music, video and image libraries, search engines and recommendation system have become the most convenient ways to find relevant information within a short time. In the recent times, deep learning's advances have gained significant attention in the field of speech recognition, image processing and natural language processing. Meanwhile, several recent studies have shown the utility of deep learning in the area of recommendation systems and information retrieval as well. In this short review, we cover the recent advances made in the field of recommendation using various variants of deep learning technology. We organize the review in three parts: Collaborative system, Content based system and Hybrid system. The review also discusses the contribution of deep learning integrated recommendation systems into several application domains. The review concludes by discussion of the impact of deep learning in recommendation system in various domain and whether deep learning has shown any significant improvement over the conventional systems for recommendation. Finally, we also provide future directions of research which are possible based on the current state of use of deep learning in recommendation systems.

- **Future Improvement**

- Deep Learning, Recommender system, Literature review, Machine Learning, Collaborative filtering, Hybrid system

Journal (Added)

- **Moodplay: Interactive music recommendation based on Artists' mood similarity**

- Name of the Journal : International Journal of Human-Computer Studies
- Number of Quotations : 34
- *Web of Science* Core Collection : Science Citation Index Expanded (SCIE)
- Impact Factor : 3.163
- Date of Publication : January 2019

- **Main Idea**

- A large amount of research in recommender systems focuses on algorithmic accuracy and optimization of ranking metrics. However, recent work has unveiled the importance of other aspects of the recommendation process, including explanation, transparency, control and user experience in general. Building on these aspects, this paper introduces MoodPlay, an interactive music-artists recommender system which integrates content and mood-based filtering in a novel interface. We show how MoodPlay allows the user to explore a music collection by musical mood dimensions, building upon GEMS, a music-specific model of affect, rather than the traditional Circumplex model. We describe system architecture, algorithms, interface and interactions followed by use-case and offline evaluations of the system, providing evidence of the benefits of our model based on similarities between the typical moods found in an artist's music, for contextual music recommendation. Finally, we present results of a user study (N=279) in which four versions of the interface are evaluated with varying degrees of visualization and interaction. Results show that our proposed visualization of items and mood information improves user acceptance and understanding of both the underlying data and the recommendations. Furthermore, our analysis reveals the role of mood in music recommendation, considering both artists' mood and users' self-reported mood in the user study. Our results and discussion highlight the impact of visual and interactive features in music recommendation, as well as associated human-cognitive limitations. This research also aims to inform the design of future interactive recommendation systems.

- **Keywords**

- Recommender Systems, Music Recommendation, Mood Context, Context-aware Recommendation, Affective Computing, Recommendation Interface

Journal (Added)

- **Efficient music recommender system using context graph and particle swarm**

- Name of the Journal : Multimedia Tools and Applications
- Number of Quotations : 37
- *Web of Science* Core Collection : Science Citation Index Expanded (SCIE)
- Impact Factor : 2.313
- Date of Publication : February 2017

- **Main Idea**

- Music recommender systems is an important field of research because of easy availability and use of online music. The most existing models only focus on explicit data like ratings and other user-item dimensions. A challenging problem in music recommendation is to model a variety of contextual information, such as feedback, time and location. In this article, we proposed a competent hybrid music recommender system (HMRS), which works on context and collaborative approaches. The timestamp is extracted from users listening log to construct a decision context behavior that extracted various temporal features like a week, sessions(as morning, evening or night). We used depth first-search (DFS) algorithm which traverses the whole graph through the paths in different contexts. Bellman-Ford algorithm provides ranked list of recommended items with multi-layer context graph. We enhanced the process using particle swarm optimization (PSO) which produced highly optimized results. The dataset is used from Last.fm which contains 19,150,868 music listening logs of 992 users (till May, 4th 2009). We extract the properties of music from user's listening history and evaluate the efficient system to recommend music based on user's contextual preferences. Our system noticeably delivers the best recommendations regarding recall results when compared to existing methods.

- **Keywords**

- Recommender system, Collaborative filtering, Hybrid, Particle swarm optimization, Music

Conference

- **Deep content-based music recommendation**

- **Name of the Conference(Abbrev.) : Advanced in Neural Information Processing Systems 26 (NIPS)**
- **Rank(Source) of the Conference : A(ERA)**
- **Number of Quotations : 997**
- **Date of Publication : NIPS 2013**
- **Conference Year : 1987 -**

- **Main Idea**

- Researchers propose to use a latent factor model for recommendation, and predict the latent factors from music audio when they cannot be obtained from usage data. They compare a traditional approach using a bag-of-words representation of the audio signals with deep convolutional neural networks, and evaluate the predictions quantitatively and qualitatively on the Million Song Dataset. They show that using predicted latent factors produces sensible recommendations, despite the fact that there is a large semantic gap between the characteristics of a song that affect user preference and the corresponding audio signal. They also show that recent advances in deep learning translate very well to the music recommendation setting, with deep convolutional neural networks significantly outperforming the traditional approach.

- **Future Improvement**

- Even though a lot of characteristics of songs that affect user preference cannot be predicted from audio signals, the resulting recommendations seem to be sensible. They can conclude that predicting latent factors from music audio is a viable method for recommending new and unpopular music.
- They suspect that using a ranking loss approach may suffer from the problem(i.e. popular songs will have an unfair advantage).

Conference

- **Music recommendation by unified hypergraph: combining social media information and music content**
 - **Name of the Conference(Abbrev.)** : Proceedings of the 18th ACM Multimedia Conference on Multimedia (Multimedia)
 - **Rank(Source) of the Conference** : A1(Qualis)
 - **Number of Quotations** : 666
 - **Date of Publication** : MM 2010
 - **Conference Year** : 1993 -
- **Main Idea**
 - Researchers propose a novel music recommendation algorithm by using both multiple kinds of social media information and music acoustic-based content. Instead of graph, they use hypergraph to model the various objects and relations, and consider music recommendation as a ranking problem on this hypergraph. While an edge of an ordinary graph connects only two objects, a hyper edge represents a set of objects. In this way, hypergraph can be naturally used to model high order relations.
- **Future Improvement**
 - MRH can also be used for recommender systems in other kinds of social media communities, such as movies and pictures. In this work, they treat all types of social relations equally. However, in practical applications, different types of relations may have different importance.
 - Their approach is not limited to music track recommendation. They can exploit it in different applications, such as friend recommendation and personalized tag recommendation.

Conference

- **Music Recommendation from Song Sets**

- **Name of the Conference(Abbrev.) : International Conference on Music Information (ISMIR)**
- **Rank(Source) of the Conference : A1(Qualis)**
- **Number of Quotations : 166**
- **Date of Publication : ISMIR 2004**
- **Conference Year : 2000 -**

- **Main Idea**

- Researchers motivate the problem of music recommendation based solely on acoustics from groups of related songs or 'song sets'. They propose four solutions which can be used with any acoustic-based similarity measure. They first builds a model for each song set and recommends new songs according to their distance from this model. The next three approaches recommend songs according to the average, median and minimum distance to songs in the song set.

- **Future Improvement**

- Future work will focus on the use of other acoustic distance measures, particularly those incorporating rhythmic information, and learning which sounds in the song set perceptually distinguish it from the rest of audio space.
- They will also consider recommending groups of songs. As described, they hope to conduct this research on a larger, more varied collection of song sets with greater feedback from users.

Conference

- **Context-aware mobile music recommendation for daily activities**

- **Name of the Conference(Abbrev.) : Proceedings of the 20th ACM International Conference on Multimedia (Multimedia)**
- **Rank(Source) of the Conference : A1(Qualis)**
- **Number of Quotations : 216**
- **Date of Publication : MM 2012**
- **Conference Year : 1993 –**

- **Main Idea**

- Given the popularity of mobile music devices with rich sensing and wireless communication capabilities, researchers present in this paper a novel approach to employ contextual information collected with mobile devices for satisfying users' short-term music playing needs. They present a probabilistic model to integrate contextual information with music content analysis to offer music recommendation for daily activities, and they present a prototype implementation of the model. Finally, they present evaluation results demonstrating good accuracy and usability of the model and prototype.

- **Future Improvement**

- They are currently improving the user experience of the system.
- They also are exploring the integration of context awareness with collaborative filtering to provide even more accurate recommendations.
- They should consider not only activities, but also other features(e.g., weathers or locations).

Conference

- **A music recommendation system based on music data grouping and user interests**

- **Name of the Conference(Abbrev.) : Proceedings of the 10th ACM International Conference on Information and Knowledge Management (CIKM)**
- **Rank(Source) of the Conference : A(ERA)**
- **Number of Quotations : 212**
- **Date of Publication : CIKM 2001**
- **Conference Year : 1992 -**

- **Main Idea**

- In this paper, researchers design the Music Recommendation System (MRS) to provide a personalized service of music recommendation. The music objects of MIDI format are first analyzed. For each polyphonic music object, the representative track is first determined, and then six features are extracted from this track. According to the features, the music objects are properly grouped. For users, the access histories are analyzed to derive user interests. The content-based, collaborative and statistics-based recommendation methods are proposed, which are based on the favorite degrees of the users to the music groups. A series of experiments are carried out to show that our approach is feasible. When a new music object is inserted in the database of the MRS, it goes through two function blocks, i.e., track selector and feature extractor. According to the extracted features, the incoming music object is properly assigned to certain music group by the classifier function block.

- **Future Improvement**

- They will research into the summarization of music objects.
- Other features and recommendation methods will be also investigated.

Conference

- **Exploiting Music Play Sequence for Music Recommendation**

- **Name of the Conference(Abbrev.)** : International Joint Conference on Artificial Intelligence (IJCAI)
- **Rank(Source) of the Conference** : A(ERA), A1(Qualis)
- **Number of Quotations** : 47
- **Date of Publication** : IJCAI 2017
- **Conference Year** : 1969 –

- **Main Idea**

- To explore the effects of music play sequence on developing effective personalized music recommender systems, researchers propose to use word embedding techniques in music play sequences to estimate the similarity between songs. The learned similarity is then embedded into matrix factorization to boost the latent feature learning and discovery. Furthermore, the proposed method only considers the k-nearest songs (e.g. k= 5) in the learning process and thus avoids the increase of time complexity. Experimental results on two public datasets demonstrate that our methods could significantly improve the performance on both rating prediction and top-n recommendation tasks.

- **Future Improvement**

- More number of latent factors leads to better representation capability and more accurate prediction. Thus, with the increasing of the number of factors in matrix factorization, the performance of all the methods is improved. In the meantime, it also increases the time complexity and the risk of overfitting.

Conference

- **A Music Recommendation System Based on Acoustic Features and User Personalities**

- **Name of the Conference(Abbrev.) : Pacific-Asia Conference on Knowledge Discovery (PAKDD)**
- **Rank(Source) of the Conference : A(ERA)**
- **Number of Quotations : 14**
- **Date of Publication : PAKDD 2016**
- **Conference Year : 1997 –**

- **Main Idea**

- In this study, researchers proposed a hybrid approach to provide personalized music recommendations. This is achieved by extracting audio features of songs and integrating these features and user personalities for context-aware recommendation using the state-of-the-art support vector machines (SVM). The system is based on SVM model, which is faster than traditional recommendation algorithms and can solve matrix sparse and cold start problems. By using the audio features and user personalities information, this model can take content and context information, rather than only user ratings, into consideration.

- **Future Improvement**

- Future research would collect more data to test whether the model still performs well with large data sets to overcome the disadvantage of using limited scale of datasets.
- Additional context features such as time and location will also be conserved to improve the model.

Conference

- **Improving Music Recommendation Using Distributed Representation**

- **Name of the Conference(Abbrev.) : Companion: Proceedings of the 25th International Conference Companion on World Wide Web (WWW)**
- **Rank(Source) of the Conference : A(ERA), A1(Qualis)**
- **Number of Quotations : 12**
- **Date of Publication : WWW 2016**
- **Conference Year : 1994 -**

- **Main Idea**

- In this paper, a music recommendation approach based on distributed representation is presented. The proposed approach firstly learns the distributed representations of music pieces and acquires users' preferences from listening records. Then, it recommends appropriate music pieces whose distributed representations are in accordance with target users' preferences. Experiments on a real world dataset demonstrate that the proposed approach outperforms the state-of-the-art methods.

- **Future Improvement**

- Researchers plan to combine the distributed representation with more advanced recommendation techniques, to further improve the performance.
- They will try to evaluate their approach by online experiments.

Conference

- **Music recommendation via heterogeneous information graph embedding**

- **Name of the Conference(Abbrev.)** : IEEE International Joint Conference on Neural Networks (IJCNN)
- **Rank(Source) of the Conference** : A(ERA), A2(Qualis)
- **Number of Quotations** : 10
- **Date of Publication** : IJCNN 2017
- **Conference Year** : 1990 -

- **Main Idea**

- Researchers study the problem of personalized music recommendation that takes different kinds of auxiliary information into consideration. To achieve this goal, a Heterogeneous Information Graph (HIG) is first constructed to encode different kinds of heterogeneous information, including the interactions between users and music pieces, music playing sequences, and the metadata of music pieces. Based on HIG, a Heterogeneous Information Graph Embedding method (HIGE) is proposed to learn the latent low-dimensional representations of music pieces. Then, they further develop a context-aware music recommendation method. Extensive experiments have been conducted on real-world datasets to compare the proposed method with other state-of-the-art recommendation methods. The results demonstrate that the proposed method significantly outperforms those baselines, especially on sparse datasets.

- **Future Improvement**

- Researchers plan to adopt advanced recommending techniques, such as deep learning, to further improve the performance. In addition, they will explore if users' satisfaction can be increased by online experiments.

Conference

- **Leveraging multi-dimensional user models for personalized next-track music recommendation**
 - **Name of the Conference(Abbrev.)** : Proceedings of the Symposium on Applied Computing (SAC)
 - **Rank(Source) of the Conference** : B(ERA), A1(Qualis)
 - **Number of Quotations** : 25
 - **Date of Publication** : SAC 2017
 - **Conference Year** : 1986 –
- **Main Idea**
 - Existing approaches to this "next-track music recommendation" problem often focus solely on the user's recent listening behavior or current situational context and do not consider long-term preferences. In this work, researchers explore the value of including different types of information that reflect long-term preferences into the playlist generation process. Although empirical evaluations show that the most recently played tracks should generally govern the next-track selection process, considering long-term preferences can help to improve the quality of the playlists in different dimensions.
- **Future Improvement**
 - Conducting user studies to evaluate our approaches with respect to the perceived quality of the next-track recommendations and general user satisfaction is part of our ongoing work.

Conference

- **Explicit Modelling of the Implicit Short Term User Preferences for Music Recommendation**

- **Name of the Conference(Abbrev.)** : European Conference on Information Retrieval (ECIR)
- **Rank(Source) of the Conference** : B(ERA), A2(Qualis)
- **Number of Quotations** : 7
- **Date of Publication** : ECIR 2018
- **Conference Year** : 1979 –

- **Main Idea**

- Researchers try to explicitly model the short term preferences of the user with the help of Last.fm tags of the songs the user has listened to. With a session defined as a period of activity surrounded by periods of inactivity, they introduce the concept of a subsession, which is that part of the session wherein the preference of the user does not change much. They assume the user preference might change within a session and a session might have multiple subsessions. They use their modelling of the user preferences to generate recommendations for the next song the user might listen to.

- **Future Improvement**

- Recommending a set of possible next songs based on the current subsession modelled by the Last.fm tags of the songs user has listened to might ignore other important features like time of the day, location, etc.

Conference

- **New Paths in Music Recommender Systems Research**

- **Name of the Conference(Abbrev.)** : Proceedings of 11th ACM Conference on Recommender Systems (RecSys)
- **Rank(Source) of the Conference** : B(ERA), B1(Qualis)
- **Number of Quotations** : 26
- **Date of Publication** : Rec 2017
- **Conference Year** : 2007 -

- **Main Idea**

- It is increasingly more common for a music listener to simply access music than to purchase and own it in a personal collection. In this scenario, recommendation calls no longer for a one-shot recommendation for the purpose of a track or album purchase, but for a recommendation of a listening experience, comprising a very wide range of challenges, such as sequential recommendation, or conversational and contextual recommendations. Recommendation technologies now impact all actors in the rich and complex music industry ecosystem (listeners, labels, music makers and producers, concert halls, advertisers, etc.). To highlight these developments, researchers focus on three use cases: automatic playlist generation, context aware music recommendation, and recommendation in the creative process of music making.

- **Future Improvement**

- Beside a rich variety of other use cases, such as user-centric MRS (e.g., emotion- and personality-aware), recommending fans to artists, artists to labels, concert venues to performers, or tracks to listener groups, researchers reflect on social implications of music recommendation growth, such as filter bubble, ethics, and influence on popular culture, and on the challenges ahead from both academic and industry perspectives.

Conference

- Using offline metrics and user behavior analysis to combine multiple systems for music

recommendation

- Name of the Conference(Abbrev.) : Conference on Recommender Systems (RecSys)
- Rank(Source) of the Conference : B(ERA), B1(Qualis)
- Number of Quotations : 5
- Date of Publication : RecSys 2018
- Conference Year : 2007 –

- Main Idea

- Researchers focus on music recommendation and propose a new way to improve recommendations, with respect to a desired metric of choice, by combining multiple systems for each user individually based on their expected performance. Essentially, their approach consists in predicting an expected error that each system will produce for each user based on their previous activity. To this end, they propose to train regression models for different metrics predicting the performance of each system based on a number of features characterizing previous user behavior in the system. They then use different fusion strategies to combine recommendations generated by each system. Following this approach one can optimize the final hybrid system with respect to the desired metric of choice. As a proof of concept, they conduct experiments combining two recommendation systems, a Matrix Factorization model and a popularity-based recommender. They use the data provided by Melon, a Korean music streaming service, to train and evaluate the performance of the systems.

- Future Improvement

- For the future work researchers propose to study alternative ranking fusion or score-fusion methods.
- It is also challenging to estimate the importance of individual user behavior features and compare global features and session features for predicting system performance as well as consider other user behavior features and demographic features.
- Another research possibility is to evaluate robustness of regression models and study the effect of the size of listening behavior data on the quality of predictions.

Conference

- **User Perception of Next-Track Music Recommendations**

- **Name of the Conference(Abbrev.)** : Proceedings of the 25th Conference on User Modeling Adaption and Personalization (UMAP)
- **Rank(Source) of the Conference** : B1(Qualis)
- **Number of Quotations** : 27
- **Date of Publication** : UMAP 2017
- **Conference Year** : 1993 –

- **Main Idea**

- Researchers aim to check the external validity of insights that are obtained through such offline experiments on historical datasets. Our results indicate that manually created playlists can in fact represent a reasonable gold standard, an insight for which no evidence existed in the literature before. Furthermore, their work was able to confirm that considering playlist homogeneity aspects does not only lead to performance improvements in offline experiments – as indicated by past research – but also to a better quality perception by users. However, the observations also revealed that user studies of this type can be easily distorted by item familiarity biases, because the participants tend to evaluate continuation alternatives better when they know the track or the artist.

- **Future Improvement**

- In the music domain, the participants have to invest a considerable amount of time as they are required to listen to a number of tracks during the experiment. In their setup, they therefore limited the number of tracks in the given playlist to four and only provided 30-second previews of the tracks.
- All of the tracks in the experiment were not longer than usual pop songs and each track exhibited limited within-track variation of the tempo or harmonics.
- They limited the number of playlists in the experiment to five in order to end up with a sufficient number of participants per playlist.

Conference

- **A Survey of Music Recommendation Systems and Future Perspectives**

- **Name of the Conference(Abbrev.) : International Symposium on Computer Music Modeling and Retrieval (CMMR)**
- **Rank(Source) of the Conference : B5(Qualis)**
- **Number of Quotations : 172**
- **Date of Publication : CMMR 2012**
- **Conference Year : 2003 –**

- **Main Idea**

- This paper surveys a general framework and state-of-art approaches in recommending music. Due to the relatively poor experience in finding songs in long tail and the powerful emotional meanings in music, two user-centric approaches: context-based model and emotion-based model, have been paid increasing attention. In this paper, three key components in music recommender - user modelling, item profiling, and match algorithms are discussed. Six recommendation models and four potential issues towards user experience, are explained

- **Future Improvement**

- As the users aggregate in the recommender systems, it needs to be able to adapt to new data such as user listening histories and listening behavior to further personalized their music taste.
- Most of the recommender systems are not flexible, because the playlist is ordered by the similarity distance between seed songs. Though the most similar songs are given in order, the theme and mood can be dramatically changed in between. Rather than randomly shuffling, human skipping behavior can be considered for dynamic playlist generation.
- The future research direction will be mainly focused on user centric music recommender systems. A survey among athletes showed practitioners in sport and exercise environments tend to select music in a rather arbitrary manner without full consideration of its motivational characteristics. Therefore, future music recommender should be able to lead the users reasonably choose music.

Conference (Added)

- **Music personalized recommendation system based on hybrid filtration**

- Name of the Conference(Abbrev.) : 2019 International Conference on Intelligent Transportation, Big Data & Smart City (ICITBS)
- Rank(Source) of the Conference : B1(Qualis)
- Number of Quotations : 6
- Date of Publication : ICITBS 2019
- Conference Year : 2015 –
- Conference on Intelligent Transportation

- **Main Idea**

- Duet to the diversity and fuzziness of music itself and the accuracy of music melody, the recommendation algorithm with highest accuracy can not match users' test completely. For such problem, this article proposes a hybrid recommendation algorithm based on collaborative filtering algorithm and music genes, and design a personalized music recommendation system. The system first computes recommendation results according to the collaborative filtering algorithm, and discover the potential interests of the user. Then each music is weighted by preference on the genes of collected music. After weight selection the music which has prior preference is taken as recommendation results. Finally two recommendation results are performed weighted combination and filtering to make recommendation. The experimental data indicate the improved scheme can increase the accuracy of recommendation and meet users' demand from different levels.

- **Keywords**

- Collaborative filtering, music gene, personalized recommendation, hybrid filtering

Conference (Added)

- **Music recommendation model by analysis of listener's musical preference factor of K-pop**

- Name of the Conference(Abbrev.) : Proceedings of the 2018 International Conference on Information Science and System (ICISS)
- Rank(Source) of the Conference : B(Era), B3(Qualis)
- Number of Quotations : 5
- Date of Publication : ICISS 2018
- Conference Year : 2018 –

- **Main Idea**

- Recently, the popularity of Korean pop music (or K-pop) has been increasing, due to technological developments in digital devices. According to the IFPI, 59% of Koreans regularly listen to music on their smartphones and other related devices. Thus, the present study proposes a music recommendation model that predicts listeners' music preferences and recommends customized music lists. For this purpose, two pilot tests (with one participant in each test) were conducted and linear regression analysis was performed by using the Tensorflow application. The first test determined the participant's song preferences, based on a sample of 200 K-pop songs, while the second test added a neutral response option when considering a sample of 200 additional Kpop songs. The results indicate that the prediction accuracy of the participant's song preferences in the first test was 71.5%. However, after adding the neutral response option in the second pilot test, the prediction accuracy increased to 84.0%. This model can be used to predict the music preferences of listeners on a wider scale.

- **Keywords**

- K-pop, Korean pop music, Digital music, Music recommendation system, Content based recommendation system, Music preference factor

Conference (Added)

- **Latent Feature Combination for Multi-Context Music Recommendation**

- **Name of the Conference(Abbrev.) : International Workshop on Content-Based Multimedia Indexing (CBMI)**
- **Rank(Source) of the Conference : B3(Qualis)**
- **Number of Quotations : 4**
- **Date of Publication : CBMI 2018**
- **Conference Year : 2003 –**

- **Main Idea**

- In recent years, music aficionados have increasingly been consuming music via public music streaming platforms. Due to the size of the collections provided, music recommender systems have become a vital component as these aim to provide recommendations that match the user's current context as, throughout the day, users listen to music in numerous different contexts and situations. In this paper, we propose a multi-context aware track recommender system that jointly exploits information about the current situation and musical preferences of users. To jointly model users by their situational and musical preferences, we cluster users based on their situational features and similarly, cluster music tracks based on their content features. Our experiments show that by relying on Factorization Machines for the computation of recommendations, the proposed approach allows to successfully leverage interaction effects between listening histories, situational and track content information, substantially outperforming a set of baseline recommenders.

- **Keywords**

- Music Recommender Systems, Context-aware Recommender Systems

Conference (Added)

- **Mood-aware music recommendation via adaptive song embedding**

- Name of the Conference(Abbrev.) : 2018 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM)
- Rank(Source) of the Conference : B4(Qualis)
- Number of Quotations : 4
- Date of Publication : ASONAM 2018
- Conference Year : 2011 –

- **Main Idea**

- In this paper, we propose an autonomous and adaptive recommendation system that relies on the user's mood and implicit feedback to recommend songs without any prior knowledge about the user preferences. Our method builds autonomously a latent factor model from the available online data of many users (generic song map per mood) based on the associations extracted between user, song, user mood and song emotion. It uses a combination of the Reinforcement Learning (RL) framework and Page-Hinkley (PH) test to personalize the general song map for each mood according to user implicit reward. We conduct a series of tests using LiveJournal two-million (LJ2M) dataset to show the effect of mood in music recommendation and how the proposed solution can improve the performance of music recommendation over time compared to other conventional solutions in terms of hit rate and FI score.

- **Keywords**

- Mood, Recommender systems, Feature extraction

Conference (Added)

- **Social Influence-Based Similarity Measures for User-User Collaborative Filtering Applied to Music**

Recommendation

- **Name of the Conference(Abbrev.) : International Conference on Distributed Computing and Artificial Intelligence (DCAI)**
- **Rank(Source) of the Conference : B4(Qualis)**
- **Number of Quotations : 3**
- **Date of Publication : DCAI 2018**
- **Conference Year : 2004 –**

- **Main Idea**

- Social characteristics present in current music streaming services allow to use methods for endowing these systems with more reliable recommendation functionalities. There are many proposals in the literature that take advantage of that information and use it in the context of recommender systems. However, in the specific application domain of music the studies are much more limited, and the methods developed for other domains cannot be often applied since they require social interaction data that are not available in the streaming systems. In this paper, we present a method to determine social influence of users uniquely from friendship relations. The degree of influence obtained is used to define new similarity metrics for collaborative filtering (CF) where more weight is given to more influential users.

- **Keywords**

- Music recommender systems, Social influence, Trust, Collaborative filtering, Streaming services

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