International Conference on Innovative Computing and Communication (ICICC-2020) An Automatic Approach to Music Recommendations Based on Individual Personality Traits

Article · April 2021

CITATIONS
0

READS
35

4 authors, including:

Payal Gulati
YMCA University of Science and Technology
18 PUBLICATIONS **109** CITATIONS
SEE PROFILE

Rosy Madaan
GD Goenka University Gurgaon
13 PUBLICATIONS **46** CITATIONS
SEE PROFILE

Surbhi Bhatia
King Faisal University
63 PUBLICATIONS **378** CITATIONS
SEE PROFILE

An Automatic Approach to Music Recommendations Based on Individual Personality Traits

Sonali Gupta[a], Payal Gulati[a], Rosy Madaan[b], Surbhi Bhatia[c]

[a]*Department of Computer Engineering, J C Bose UST,YMCA, Faridabad, India*
[b]*FET, MRIRS, Faridabad, India*
[c]*Information System Department, King Faisal University, Saudi Arabia*

Abstract:

Music is an important means of leisure and entertainment of human beings. Music helps in refreshing mood and regaining energy during the busy lifestyle of an individual. It has been observed that a person prefers to listen to music as per his temperament and personality. Thus Personality influences the behavior, interests and tastes of an individual. It plays an important role in determining the preferences of a human being as user's tastes and music needs are highly dependent on a multitude of features that he/she possess. Therefore in this work an automatic music recommender system that automatically predicts the personality of an individual and depicts the music based on individual's personality has been proposed.

1. Introduction

With the advent of Web 2.0, large amount of music related content is available to a huge population around the world. It has been observed that a person is always keen to listen music as per his/her own temperament. Thus, in this work, musical needs of a person have been identified based on the analysis of the user's personality by harnessing information such as demographics, linguistic features used in communication carried out on different social media platform.

Now-a-days, everyone prefer to use social networking sites like Facebook, Instagram, Twitter and messaging apps like Whatsapp, SnapChat for purposes like communication and connections. Moreover the user can also login to different leading business and learning applications using these social network accounts. They spend hours browsing webpages on these platforms, meanwhile expressing feelings and sentiments in the form of social media posts, comments or blogs about topics of their interests. Personality traits of an individual can be extracted based on their social network accounts.

Personality typically includes the set of features possessed by a person that are responsible for uniquely influencing his/her cognitive behaviour. individual. The Big Five bipolar personality traits namely Extraversion, Agreeableness, Conscien-tiousness, Openness-to-experience, and Neuroticism are used to characterise a person [6][7][8].

Recent research suggests that a person's psychology can be predicted from his Social Media profile, messages , blogs, pictures etc. For instance, an individual who possess travelling as his hobby is likely to love adventure, open to new challenges, is likely to love seeing new places, enjoy meeting new people, experiencing new foods etc. Similarly, a person who is an artist is likely not afraid of what others think, love reaching their goals, to see the world differently, come up with original ideas, to be gregarious or reticent.

The proposed approach employs different features based on linguistics, profile and Application attributes of a social media user to recognize personality based on the Big Five personality traits. The proposed work correlates these features and the Big Five personality traits. Based on the identified personality traits and the user preferences, valid music recommendations are given to the user.

People with similar personality features are more likely to have similar interests and preferences. Thus, the proposed framework also focuses on generating evidences for similar personality with the help of different functional modules.

The paper is structures as follows: Section 2 provides the related works in the area; Section 3 presents the framework for proposed system Section 4 presents the proposed personality based recommender system and section 5 concludes the paper with the possible directions for future.

2. Related Work

Over the past two decades, various researchers have shown that personality of an individual can best be revealed by Big Five personality traits i.e. neuroticism, agreeableness, openness, conscientiousness, and extroversion[1]. Initially, The Big Five personality traits was developed by Ernest Tupes and Raymond Christal [6] J.M. Digman [7] and further refined by Lewis Goldberg [8] .

The Big Five traits are characterized by the following:

• Openness to Experience: curious, intelligent, imaginative. High scorers tend to be artistic and sophisticated in taste and appreciate diverse views, ideas, and experiences.

• Conscientiousness: responsible, organized, persevering. Conscientious individuals are extremely reliable and tend to be high achievers, hard workers, and planners.

• Extroversion: outgoing, amicable, assertive. Friendly and energetic, extroverts draw inspiration from social situations.

• Agreeableness: cooperative, helpful, nurturing. People who score high in agreeableness are peace-keepers who are generally optimistic and trusting of others.

• Neuroticism: anxious, insecure, sensitive. Neurotics are moody, tense, and easily tipped into experiencing negative emotions.

Personality traits are reflected in people's communication habits, and evidence suggests that personality traits are universal across cultures[9][10]. Now a days, Social media platforms have emerged as one of the most ubiquitous means of communication today. The Social media websites provide a unique opportunity for personalized services to capture various aspects of user behaviour. Besides structured information from profile, demographics, users on these social media platforms produce large amounts of data about themselves, based upon their own personality in the form of status updates, group posts, wall posts, tweets, comments, emoticons or audio visual content such as profile pictures, tagged pictures, uploaded photos, picture albums, picture shares and videos. Personality of an individual can be detected by extracting and mining the content on these platforms.

In recent researches, personalities, emotions and moods—which, typically, are not explicitly given by users is extracted from user generated content [11,12]. Some researchers worked on automated personality detection using univariate and multivariate regression [13]. On the other hand, others have successfully used deep convolutional networks for related tasks such as sentiment analysis[14]aspect extraction[15] and multimodal emotion Recognition[16].

3. Proposed Work

A large amount of structured data is available through information from user profile on the social media platform, demographics etc. Moreover the multi modal communication practices of user continuously generates anonymous amount of data over these platforms. After critical review at the literature, it has been found that people with similar interest respond similarly over these platforms. For instance, people with similar mindset in aspects such as politics, hobbies, religion, genres, music, movies etc have a great tendency to like, comment, share and follow same kind of posts.

In this context, a novel approach to automatically detect the user's personality traits from the interests he prevails. Fig 1. presents the framework of the proposed work. The components and sub-components of the same are explained in further subsections.

3.1 Social Media Platforms

In today's busy schedule social media platforms are the only way through which people remain connected either personally or through groups serving common interests. A lot of information regarding the users personality can be extracted by mining the interests of the particular user. This has been done with the help of User Interest Extractor Module.

3.2 User Interest Extractor (UIE)

This module crawls the pages from social networking sites such as Facebook, LinkedIn, Pinterest and tweets from Twitter. These pages are then parsed and required contents, tags, profile pictures related to the interest of the users are extracted and stored in the database of that particular user. Different user databases together form the Content Repository.

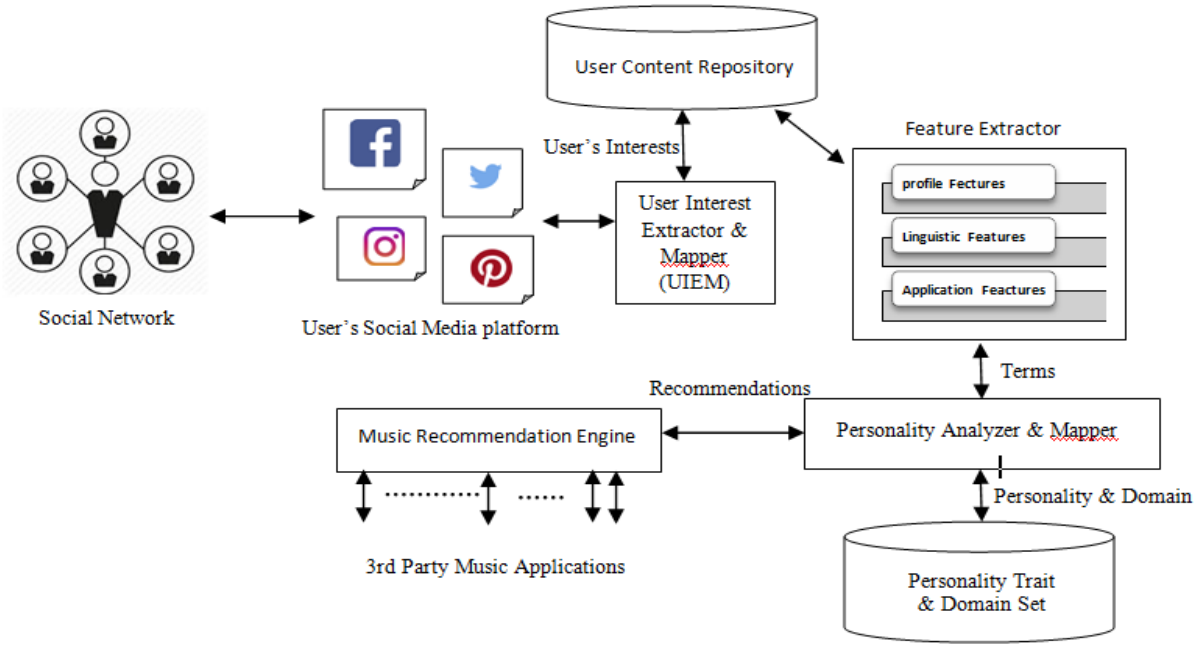


Fig 1 The Proposed Personality Detection System

3.3 Feature Extractor

Feature Extractor module considers the contents of Interest Domain Repository and extracts Profile features, Linguistic Features and Application Features which in turn is needed to predict the personality of a person. Table 1 shows a sample of the feature set that has been extracted from the pages crawled from the social media platform.

Table 1 – Extracted Features

Profile Features	Linguistic features
No. of friends/groups/followers on social media platform	Phrases (last night, looking forward, so excited, hard to do, its difficult etc.)
Frequencu ofstatus updates, shares	Internet slangs- LOL, BTW, gr8
Freqyency ofuse	Hashtags- topic or category
Time spend on the social media platform	@ 'at -mention indicating recipient
No. oflikes, people tagged	Emoticons
Analysis of profile picture - type , frequency of change	
Purpose of using the platform(Communication)	
Type of message –pokes	

3.4 Personality Analyzer & Mapper

This module takes the features from the feature extractor as input, analyzes them and then correlates them to detect unique terms from TermSet matching to the individual personality. The Termset as shown in Table 2 has been created by finding unique terms describing the features found by the Feature Extractor.

The terms from the TermSet are mapped as per the Domain and the characteristics of Big Five model in order to describe the personality of the individual.

Table 2 –Term Set

Term Set
Imagine, creative, Rude, Harsh, curios, tolerate, appreciate, repect religion, culture, outgoing, friend/solitary, society/ reserve ,active, Harmony/contradictory, Callous, Cooperate, companion, discipline, worry, adapt, guilt, depress, rely, life, fun etc...

Finally it will map the personality trait to the domain of the web user's interest. Table 3 shows the mapping of the terms from the TermSet to uniquely identify the personality based on the terms that suitable describe as per Wordnet.

Table 3 – Mapping terms to Personality Traits

Personality trait	Terms from the term set that categorize the personality
Agreeableness (A)	High scorers tend to be good natured, sympathetic, forgiving, courteous; Low scorers tend to be critical, rude, harsh, callous.
Neuroticism (N)	High scorers tend to be nervous, high-strung, insecure, worrying; Low scorers tend to be calm, relaxed, secure, and hardy.
Conscientiousness (C)	High scorers tend to be reliable, well-organized, self-disciplined, careful; Low scorers tend to be disorganized, undependable, and negligent.
Openness (O) to Experience/Intellect	High scorers tend to be original, creative, curious, complex; Low scorers tend to be conventional, down to earth, narrow interests, uncreative.
Extraversion (E)	High scorers tend to be sociable, friendly, fun loving, talkative; Low scorers tend to be introverted, reserved, inhibited, quiet.

For example: If a user who resides in Delhi has planned the vacations with his family in some other metropolitan city, rates or reviews the culture of the city, it is obvious that the person is more interested in travelling and enjoying a fast life whereas another person who planned his vacations with family in the lap of nature is more interested in travelling, relaxing and leading a peaceful life. Further, more information can be gathered about the lifestyle and interests of these two persons. There is a higher chance that the person preferring a fast life enjoys fast music tracks whereas the other one is likely to prefer soothing melodies.

3.5 Recommendation Engine: This module will consider user preferences based on criteria such as age, gender and other demographics and there after filters the domain recommendations suggested by the Domain Mapper. For example: If a person is Open to Experience or is an Intellectual person , the Recommendation Engine will suggest pages related to Art, Adventure, technology and Education.

Table 4 shows the Musical Recommendations that will be suggested by the proposed system to the user based on his predicted personality.

Table 4 –Suggested Music Recommendations

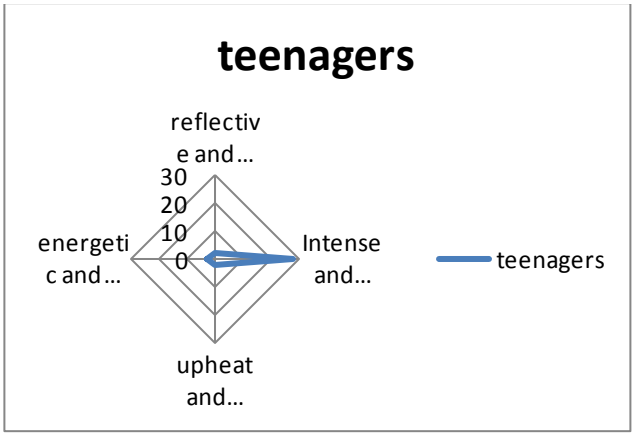
Music Preferences	Example	Positive Correlation with Big Five Traits	Negative Correlation with Big Five Traits
Reflexive and Complex	Blues, jazz, classical, folk	Openness	--
Intense and Rebellious	Rock, alternative and heavy metal music	Openness	--
Upbeat and Conventional	Country, religious and pop music	Extraversion, Agreeableness, Conscientiousness	Openness
Energetic and Rhythmic	Rap/hip hop, soul/funk, and electronic dance music	Extraversion, Agreeableness	---

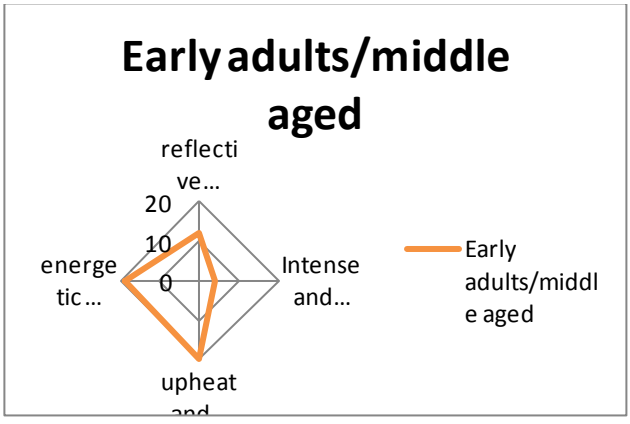
Tennagers like intense music but as their life style change with their age so is the change in their music choice. As they step into early adulthood their preference for up beat and conventional music such as pop and religious rises. In early middle age the individual like sophisticated music like jazz and classical. This is the result of their shift in lifestyle when people try to socialise through parties where dance complements music. This reflects the development of status intellect and greater emotional stability. As a person becomes more older his tastes change towards country folk and blues music.

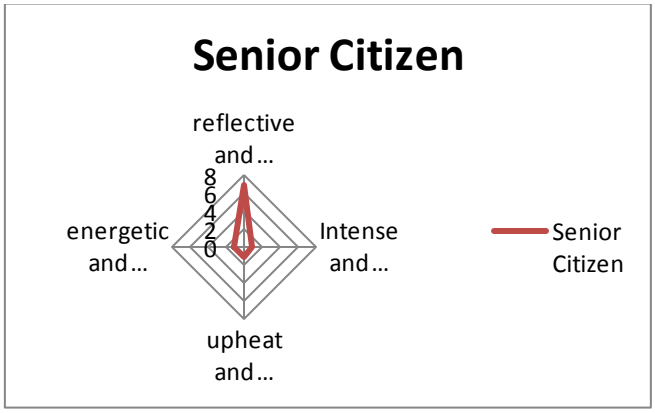
Intense music has rebellious connotations as it is tense and recognised by loud distorted sounds which attract adolescence. The hardest of all tasks is

nurturing a family and establishing long term relationships. At this stage one gets exhausted frequently due to professional and personal lifestyle, so the music requirement change to a relaxing music to regain energy. The proposed system identifies the musical notes and preferences according to the age groups and ability of a person to intermingle in society.

As per the identified preferences the recommender system makes appropriate suggestions for genres, bands etc to users for listening. This shows that music listening is related to many psychological aspects like the age and other personality traits.The following are the radar graphs showing the choice of music liked by people (sample space 100) of different age groups (tennagers, adults, senior citizen).







4. Conclusion and Future Work

In this paper, user's personality has been integrated in a music recommender system. The results prove that the different personality traits like age, gender, language features , mood swings etc. affect the affect the choice of music genres of a person. For instance, Tennagers like intense music but as their life style change with their age so is the change in their music choice. As they step into early adulthood their preference for up beat and conventional music such as pop and religious rises.

Further, in case of data sparsity, the problem can be tackled by harnessing information on the music choices of persons having similar personality. This will be the main target of our future work in this area.

REFERENCES

[1] John, O.P., Donahue, E.M., & Kentle, R.L. (1991). The big five inventory-Versions 4a and 54. Berkley: University of California, Berkley, Institute of Personality and Social Research.

[2]Back, M.D., Stopfer, J.M., Vazire, S., Gaddis, S., Schmukle, S.C., Egloff, B., Gosling, S.D.: Facebook profiles reflect actual personality, not self-idealization. Psychol. Sci. 21, 372–374 (2010).

[3]Farnadi, G., Zoghbi, S., Moens, M., De Cock, M.: Recognising personality traits using Facebook status updates. In: Proceedings of the WCPR, pp. 14–18 (2013).

[4]Golbeck, J., Robles, C., Turner, K.: Predicting personality with social media. In: CHI'11 Extended Abstracts on Human Factors in Computing Systems, pp. 253–262. ACM (2011).

[5] A. Archambault and J. Grudin, "A Longitudinal Study of Facebook, LinkedIn, & Twitter Use", Proc. the SIGCHI Conference on Human

Factors in Computing Systems, pp. 2741-2750, 2012.

[6]E. Tupes and R. Christal, Recurrent Personality Factors Based on Trait Ratings, tech. report ASD-TR-61-97, Lackland Air Force Base, 1961.

[7]J. Digman, "Personality Structure: Emergence of the Five-Factor Model," Ann. Rev. Psychology, vol. 41, no. 1, 1990, pp. 417–440.

[8] L. Goldberg, "The Structure of Phenotypic Personality Traits," Am. Psychologist, vol. 48, no. 1, 1993, pp. 26–34.

[9] McCrae RR, Costa PT Jr. Personality trait structure as ahuman universal. American Psychologist 1997; 52:509–516.

[10]McCrae RR, Allik J. (2002) The five-factor model of personality across cultures. New York: Kluwer Academic/Plenum Publisher.

[11]Golnoosh Farnadi, Susana Zoghbi, Marie-Francine Moens, and Martine De Cock. Recognising personality traits using facebook status updates. In Proceedings of the workshop on computational personality recognition (WCPR13) at the 7th international AAAI conference on weblogs and social media (ICWSM13), 2013.

[12] Jennifer Golbeck, Cristina Robles, and Karen Turner. Predicting personality with social media. In CHI'11 Extended Abstracts on Human Factors in Computing Systems, pages 253–262. ACM, 2011.

[13] J.W. Pennebaker and L.A. King, "Linguistic Styles: Language Use as an Individual Difference," J. Personality and Social Psychology, vol. 77, no. 6, 1999, pp. 1296–1312.

[14] S. Poria et al., "A Deeper Look into Sarcastic Tweets using Deep Convolutional Neural Networks," Proc. 26th Int'l Conf. Computational Linguistics, 2016, pp. 1601–1612.

[15] S. Poria, E. Cambria, and A. Gelbukh, "Aspect Extraction for Opinion Mining with a Deep Convolutional Neural Network," Knowledge-Based Systems, vol. 108, 2016, pp. 42–49.

[16] S. Poria et al., "Convolutional MKL Based Multimodal Emotion Recognition and Sentiment Analysis," Proc. IEEE Int'l Conf. Data Mining, 2016, pp. 439–448.