ESTABLISHING A FRAMEWORK FOR VISUALISING MUSIC MOOD USING VISUAL TEXTURE

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ABSTRACT. There are many researches that introduce various techniques of browsing and discovering music using "visual forms" to the listeners. "Visual forms" include album cover, colour and mood picture are used to represent music mood in a way that can be easily understood by listeners. It has been proven that visual texture can represent mood too. However there is no research that uses visual texture to represent music mood. In this research, we are proposing a framework for visualising music mood using visual texture. The framework will assist digital music service developers to design visual textures that can represent music mood in a digital music collection application or website. In order to establish the framework, we went through three different stages of the design process. In this paper, we present the three different stages and justify why they are required.

Keywords: digital music application, music mood, user evaluation, visual forms, visual element, visual grammar

INTRODUCTION

In general, music listeners search for songs either by the artist name or song title. Nevertheless, mood has become a popular segment and has been recognised as an important criterion when listeners organise and access music in digital music libraries (Hu & Downie, 2010; Vignoli, 2004). For some listeners, mood has become a way of selecting a song. A listener would select a song depending on his/her feeling or mood at a particular moment regardless of the song's genre or other preferences (Feng, Zhuang, & Pan, 2003). A new and interesting way to represent musical metadata like mood and genre is via the visual forms (Holm, 2012). For example, the most common way to represent songs and albums in digital music collection applications is to use the album covers (Holm & Siirtola, 2012). To convey the music mood, the album covers may utilise visual elements such as colours, fonts and symbols. In 2014, it has been proven that visual texture can represent angry, calm, happy and sad mood (Husain, Shiratuddin, & Wong, 2014). However, to date visual texture has not been used as a visual form to represent music mood. Due to this fact, we are proposing a framework for visualising music mood using visual texture.

In order to establish the framework, three stages of design process were developed (Figure. 1). It consisted of understanding the characteristics of the textures in Variable Stage (Stage 1), designing visual texture in Visualisation Stage (Stage 2) and evaluating the design in Assessment and Feedback Stage (Stage 3).
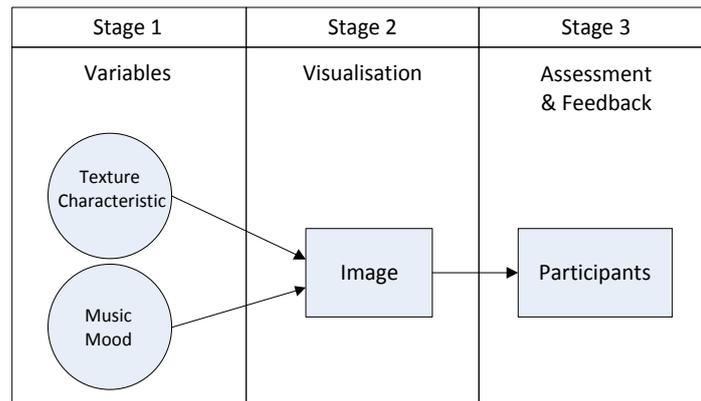
Figure 1. Stages of Design Process to Establish Framework (Husain, Shiratuddin, & Wong, 2013)

In Stage 1, the characteristics of the textures were mapped to the music mood. The type of textures and its meaning were studied to ensure which texture matched the particular mood (Husain et al., 2014). The specific type of visual elements such as line, shape, colour and colour value were then reviewed to find out their ability to represent mood (Husain et al., 2014). Finally, we conducted an online survey to confirm which specific type of visual elements represent angry, calm, happy and sad mood. We present the results from this online survey in the next section of this paper.

ONLINE SURVEY IN THE VARIABLE STAGE (STAGE 1)

Images can be broken down into visual elements that have certain meanings and the ability to express emotion. Like other images, visual textures also consist of a few visual elements such as line, shape, colour and colour value. Different types of visual elements will convey different emotions. Long, short, thick and thin lines express wide range of feelings. Curved and smoothly rounded shape appears friendly and pleasant, whereas shape with sharp angle expresses a negative mood. Certain colours are certainly able to portray certain moods (Bradley, 2010; Poulin, 2011).

In designing a purposeful texture image, these design elements have been disbanded in order to study their individual connotations towards depicting the associative mood. To confirm this, we have set up an online survey to identify which specific type of visual element is related to a particular mood (Husain et al., 2014). We displayed several different types of lines, shapes, colours and colour values for the respondents to choose. Each visual element is repeated for every mood i.e. angry, sad, happy and calm. Results obtained from the online survey are as shown in Table 1.

Table 1. Visual Elements That Represent Mood

Mood	Visual Elements	%
Angry	Line Shape Colour Colour value	Thick jagged line - 85.6% Triangle – 89.7% Red – 94.1% Bright – 84.2%
Sad	Line Shape Colour	Thin curved line - 49.8% Circle- 56.4% White – 52.8%

Happy	Line	Thick curved line – 38.7%
	Shape	Circle – 54.7%
	Colour	Yellow – 57.2%
	Colour value	Bright – 98.1%
Calm	Line	Thin horizontal line – 66.1%
	Shape	Rectangle -66.3%
	Colour	Green - 38.1%
	Colour value	Bright – 59.2%

The result shows 85.6% of the respondents chose the thick jagged line, 89.7% chose the triangle, 94.1% chose the colour red and 84.2% chose the bright colour value to represent the angry mood. To represent the sad mood, 49.8% of the respondents chose the thin curved line, 56.4% chose the circle and 52.8% chose the colour white. As for happy, 38.7% of the respondents chose the thick curved line, 54.7% chose the circle, 57.2% chose the colour yellow and 98.1% chose the bright colour value. Finally, 66.1% of the respondents chose the thin horizontal line, 66.3% chose the rectangle, 38.1% chose the colour green and 59.2% chose the bright colour value to represent the mood calm. From the result, we have confirmed the specific type of visual element for each mood. Next, we combined the visual elements and designed a visual texture for each mood in Stage 2. We discuss the process of designing the visual textures in the next section.

THE VISUALISATION STAGE (STAGE 2)

The process of designing the visual texture is based on Visual Mapping stage in the General Visualisation Reference Model (Card, Mackinlay, & Shneiderman, 1999). This model traces the path of transforming raw data to visual form that can be viewed by the listener. Through the Visual Mapping stage, data will be transformed to visual form that can be understood by the listeners. In the next sub sections we explain the underlying guideline that we use in designing the visual texture. We also present the outcome of visual texture for angry, calm, happy and sad mood by combining the specific type of visual elements.

Visual grammar

In designing the visual texture, understanding and using visual grammar is important. Visual grammar is a language that implies meanings in the form of visual design. Similar to the language that we are used to, visual grammar is made up of design elements and design principles (Kress & Van Leeuwen, 1996; Leborg, 2006). Visual grammar can be categorised into 4 major parts namely; objects, structures, activities and relations (Leborg, 2006). These four parts are used to define the basic elements, pattern and processes of designing visual textures.

Objects are the basic visual elements. Object consists of two types; namely, concrete and abstract (Leborg, 2006). In this research, the basic elements used to design visual texture are lines, forms, colour and points. Each of these basic elements has their own value to which it reproduces individual meaning to a design. Lines are divided into several values. A line can be a thin line or a thick line. In general, a thin line represents weakness, lightness and relaxation and thick lines displays power, rigidity and heaviness. Forms or shapes are made up of contour of surfaces and lines. Shapes provide the looks of a visual design. Colour differences connote different meanings to the viewer. It has a strong impact on human emotions and feelings. Though textures are meant for the sense of touch to relate or evoke the viewer, basic elements of designs is used to convey the desired meaning.

Structure is formed when we arrange the objects in the design space to depict certain values towards the whole design. Structures can be categorised as formal and informal. For for-

mal structure, objects are evenly distributed and as for informal structure, objects are not arranged in a straight structural line (Leborg, 2006).

Activities are the processes that take place in compositing the visual elements. It is more like applying design principle to design elements. There are number of activities that can be used to help designers convey meaning through their design. However, in the process of designing visual texture, we used repetition, movement and direction activities in order to create some illusions of movement (Leborg, 2006).

Relations are the way objects, patterns and processes relate to each other. Relation is the most important part in visual design because through relation in the whole composition, elements convey a concept and the user will receive the message that the designer intends to communicate (Leborg, 2006).

Visual texture for each mood

To convey anger, the thick jagged lines are arranged into a haphazard pattern. In visual grammar, this structure is informal and lacking the regularity in the arrangements of objects. Though there is a pivotal point, this structure is simply spiralling out of proportion. Just like when a person is angry, nothing seems to be in place. In this angry mood design, the patterns denote the activity of shapes moving or about to break into movement heading outwards. In essence, the designed texture image is imbalance, asymmetrical, is diffused and dominantly conveys the mood angry.

On the opposite scale of the mood, calmness is conveyed by using structured pattern and basic fixed objects such as thin horizontal lines and four-sided closed shapes. Visually this communicates a static pattern and is easily understood as a smooth texture. Just as in smooth textures, it is easy on the eyes and evokes calmness on the viewer. The desired texture image is designed to suit the calm mood of a viewer that everything is in order and symmetry. This design is also neutral in design elements, principles and colour.

Happiness is naturally represented in bright and cheery depictions. The texture image design uses thick, curved lines and round, hollow shapes. In the design, the lines are repeated with a close gap. The round shapes of variant sizes and displaced position convey upbeat energy. Movement of the round shapes along the path of the curved lines also display the connotation of delight and joy. Adding to the lines, shapes and varied displacement, the colour yellow expressively conveys a happy mood.

For a sad and gloomy mood, the utmost significant will be the colour. The colour white is naturally a neutral yet dull and sorrowful colour. As for lines, the designs are arranged using thin, curved lines with a large gap. The repeating lines signify consistency and frequency. As the round shapes are grouped together towards the bottom of the design, it creates a sense of heaviness and a sober mood is related to the viewer. The final results of the visual texture design for each mood are shown in Figure 2.
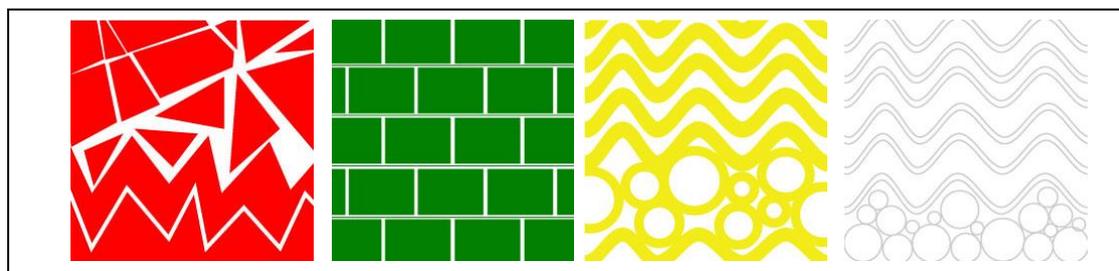

Figure 2. Visual Texture for Angry, Calm, Happy and Sad Mood

Once the visual texture for each mood has been designed, we apply it in a music application sample website to represent mood segment. To study how well the visual texture matches with the music mood we conducted a user study in the Assessment and Feedback Stage. We discuss the assessment process in the next section.

ASSESSMENT AND FEEDBACK STAGE (STAGE 3)

This stage is still work-in-progress. In this stage, we will let the participants assess the use of visual texture in browsing songs in mood segment and provide us their feedback. The objective of this experiment is to study how well visual texture matches with music mood, the change of user experience from the first time browsing music using visual texture and after using it for a longer duration of time.

The experiment consists of two separate sessions that are Session 1 and Session 2. Session 1 will be conducted face to face with the participants. Each participant will be given tasks to search for songs in the digital music collection application. After completing each task, participants will need to evaluate the suitability of visual elements in the texture image by answering the questionnaire. At the end of Session 1, the participant will need to fill in the questionnaire in the Ease of learning and Satisfaction section in order to evaluate the ease of use and their satisfaction of browsing music according to mood using visual texture

Session 2 will be conducted online. Two days after completing Session 1, participants will receive a reminder email that contains some simple tasks for them to complete. All they need to do is to log into the music application sample website using the given login name and password. They are then required to browse the website for 5 to 15 minutes and log out. They will have to repeat these steps for three more times within two weeks. This experiment is carried out more than once because repetition can increase the amount of information stored in the human memory (Raaijmakers, 2003). At the end of Session 2, participants will need to fill in the same questionnaire online as in the first session.

Once we have completed the data collection, we will start analysing how well the visual texture matches with the music mood. We will also study the change of user experience from the first time browsing music using visual texture and after using it for a longer duration of time. At the end of this research, we will develop a framework for visualising music mood using visual texture.

CONCLUSION

In order to establish the framework of visualising music mood using visual texture, we went through three different stages. In Stage 1, we reviewed the visual elements and found out their ability to convey mood by conducting an online survey. During this stage, the specific types of visual element have been confirmed for each mood. In Stage 2 we combined visual elements such as line, shape, colour and colour value to design a visual texture based on type of texture that is suitable to represent music mood. Visual texture for each mood has been designed and applied in a music application sample website to represent mood segment. To study how well the visual texture matches with the music mood we conduct a user study. The results from this study will assist the establishment of the framework for visualising music mood using visual texture.

The framework will be a useful guideline for the digital music service developers to design a visual texture that can represent music mood in a music collection application. To the wider community, this research will provide an alternative method to browse digital music collection application and assist listeners in discovering new songs and artists that might not have been discovered otherwise using conventional means.

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