

METHOD FOR CREATIVE INTERPRETATION OF MUSICAL CONTENT THROUGH PARAMETRIC MAPPING OF ART FORMS

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Abstract: Publication represents method for creative synthesis of multimedia forms through computer generated visual effects in real time. Approach is based upon two innovative aspects: 1) considering subjectiveness of perception process and building end-user conceptual paradigm for solving creative problem with interpreting musical content in visual forms. 2) author's personal defining of quantitative relations between audio and visual domains of perception as a premise for achieving increased emotional response in audience.

Keywords: MUSIC VISUALIZATION, SOFTWARE PROTOTYPE, MOTION RECOGNITION, CONTROL BY GESTURES, MULTIMEDIA.

1. Introduction

Current research proceeds from the idea for parallel in time influence of musical and visual information stimuli over perceiving audience. Autonomous perception of each channel leads to incomplete emotional reflection. Hence originates the need of entire (more fully) rendition of embedded emotional value in given musical piece through complementary involvement of other senses - in that case visual receptors which provide up to 87% of information from surrounding reality.

Quantitative transfer of information between visual and aural sensory systems results in qualitative alteration of perceiving embedded in music semantic information and respectively creates more complete emotional impact.

Existing products for harmonized interaction between music and vision bound in common functional scheme are distinguished for incomplete and poor emotional impact. Experienced emotion in the process of perceiving objectivity and art depends on current attitudes and emotional state of the perceiver [1].

The main reason is the lack of synchronizing algorithms and software application to provide adequate transfer of semantic content of music through heuristic modification. Such algorithm is needed to generate adequate corresponding changes in visual media - images.

Submitted method aims on solving this problem. Its realization will bring a qualitative change in the perception of embedded in music semantic information and a will create more complete emotional impact. To solve the identified problem in general it is necessary:

1) Design a model for transfer of information (set in music) in a form suitable for visual interpretation, i.e. finding universal means of expression adequate for both expressive media - visual and musical art.

2) Analysis of musical content and retrieval of information material, suitable for interpretation in the visual domain.

3) Compliance with the subjective nature of perception and creation of tools for manipulation of operating parameters according to style, aesthetic preferences of the audience, the emotional charge of the work.

2. Preconditions and means for resolving the problem

Main objective of the developed method is to optimize the informational interaction and to convey intensified emotional content in the system "user - music - audience - visual media." The most important task is to define the rules for translation of music into visual art. This process preceded the creation of any software technical solutions. For this reason two specific problems must be defined and solved:

1. Determination of the media on which to apply the processed digital data - a finished product visualization.

Basis for choosing the type of media will be inductive (theoretical) approach to explore the physical similarity between parameters of sound and light, their counterparts in terms of psycho-physical reactions that cause on sensory receptors, as well as the similarity between the elements of music and visual arts.

Using the human body as a media for visualization of music content is based on psycho-physiological factors. This method facilitates effective transfer of information, respectively deeper emotional resonance.

2. Meaningful interpretation of the contents of the musical work and transformation into a visual work.

Appropriate in this case is the deductive analysis of materialized emotions in music and visual arts. Their translation will be evidence of achievement of computer-aided informational interaction.

The empirical approach allows naturally and intuitively displaying the results, but on the other hand, in itself, it limits the understanding of the semantic details and links and does not allow disclosure of the nature of the problem, viewed as cybernetic model of a "black box". Such an artistic approach to the analysis of a musical work involves intellectual and cognitive terms, but is not limited thereto. Because art can have several subjective reflections on the same topic, it is therefore possible correctness of each of them - they are ideologically and aesthetically complete, logical in themselves, even compared with one another to be in contradiction. Concerns have consequences and the principles of fundamental theorem of Kurt Gödel incompleteness (described mathematically impossible to express the whole truth about a subject area with formal means). This requires a new approach, a new paradigm.

Musical transformation task is to create a new form - visual, to be aesthetically valuable and brings elements of the contents of incoming work. At the same time transformation must be adapted to the unique, ideological and subjective attitude to the topic (content) of music. Otherwise, interpretation of music will be performed in one single way that is inconsistent with the subjectivity of perception process. This means that as a result of transformation of the musical form, there will be no translation, retaining meaningful content, but a subjective interpretation by the author of visualization.

Given form of music has its own artistic content and its compositional structure is complete, dynamically evolving in time. It brings emotion and ideological message set by the author. The assessment of these components in the perceiving audience is depending on several factors: current emotional state, memories, emerging associations, musical and general culture, temperament, musical and kinesthetic intelligence and others. Hence comes the subjectivity in perception of music and the inability to develop an universal transformer of music in visual form.

Function of the required new type of transformer is significantly different from the function of the author of the music. Computer

software takes the music in pure parametric form, ignoring the psychological and emotional aspects. Compositional formulation of the musical work is not subject to manipulation or aesthetic reflection of the machine module, but only subject to parametric translation. Human intelligence should interfere here - bearing the emotional impact and giving actually "transfer effect" of music. The author manages the processing of visualization parameters extracted by a program module, while bringing artistic nuances based on subjective experience. Transformation does not serve as a second author but becomes a tool - a mediator between two original ideas laid down in the input and output form.

The expression of emotion in the final composite form is dependent on several elements:

1. Possibilities of computer software
2. Skills of the author of visualization
3. Self-identification of the audience with visualized form and emotion.

To achieve a qualitative outcome in the realization of software-generated music visualization is essential regarding aspects of communication "author-audience." The analysis showed that most existing solutions for music visualization achieve a low level of interaction between audience and author of created software visualization. Outlined trend is aimed at improving the dialogue of the creative process and go beyond the syntactic and semantic surface-level transformation set in the original music idea.

Considering of interaction "author-audience" implies creation of an adequate tool for expression, interpretation of its inherent semantic information according thesaurus of participants in this process. The project aims to give potential users an ergonomic and functional software platform that serves as a tool to realize the deep semantic and "dialogue" with creative material (music / dance).

The concept is based on the use of "language" of 3-rd and 4-th semantic type and targets deep semantic and dialog-level understanding [2]. These semantic languages generate the primary emotions and experiences (set by the author) with subsequent integration of thought and generation of fractals of ideas, associations and metaphors. Therefore, the developed concept for software toolkit offers user and audience multiple opportunities for individual interpretation and coding of messages through own body movements, visual effects and the introduction of text fragments.

3. Solution of the research problem

Existing solutions for harmonious interaction between music and vision, tied in a joint system, are characterized by poor emotional impact on the audience. The main reason is the lack of synchronization algorithms and software application to manage the analysis of the nature of musical work and by means of heuristic modification to generate corresponding changes in visual media - images.

This project proposes a working method of computer software for visualization and music-oriented study of this problem. Its realization will bring about a qualitative change in the perception of embedded semantic information in music and a full emotional impact.

General trend in the development of software solutions for music visualization is aimed at increasing interactivity. Besides adding additional tools to control the process of visualization is of particularly importance to include the audience in the process of visualization (Fig. 1).

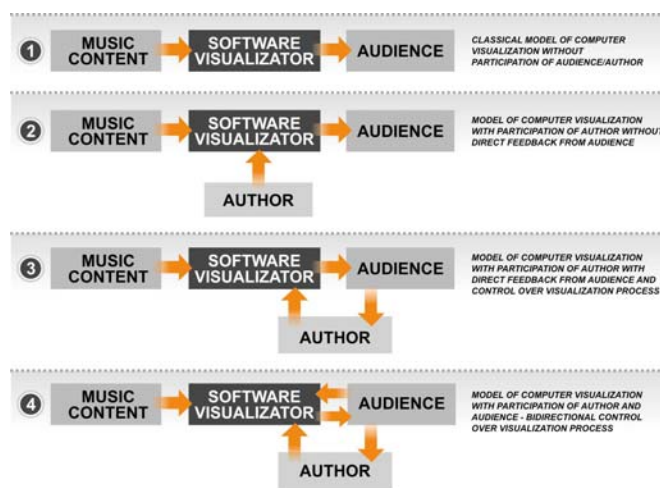


Fig. 1 Types of software visualizers according to featuring author and audience in the process of creating visualization

Recognizing this trend, a model for music software VISIC is propounded. It focuses on adding functionality to allow direct participation of audience in the visualization process. This is particularly useful for visualization in terms of cultural and entertainment activities involving groups of people because it allows the camera to be pointed at participants, so that they can be actively involved as co-authors in the dynamic visualization of music.

Aiming at improving the interaction with audience, this study defines the participation of human body as a medium with the highest potential in the field of music visualization for transmission / transfer of emotional messages (Fig. 2).

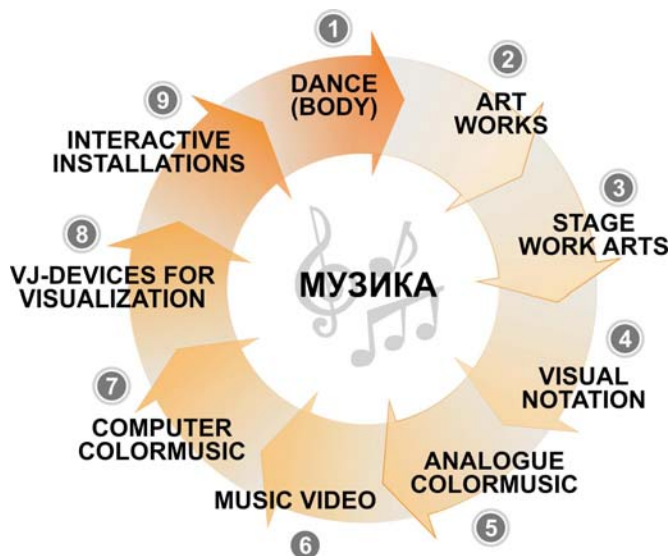


Fig. 2 Trend in the historical development of the visualization of music - using human body as a medium

The conceptual model VISIC involves human movement as a universal method for identification of music and vision. This dramatically outstands resulting multimedia output result from standard parametric methods to generate visualizations which have no embedded cognitive system for adequate transfer of emotion.

VISIC doesn't claim to offer a new, universal in terms of aesthetic evaluation final output, but rather a tool that uses media with a high potential for attracting attention and creating emotion. The actual modeling of process of visualization via digital parameters and identification of different art forms (dance and music) is a nonlinear creative process entirely dependent on personal preferences of end user.

Historical development of idea of visualizing music has evolved through various stages and combines all art forms. Striving for discovering universal art “language” for translation of musical content human culture has always realized implication of additional sensory system except auditory system.

Created bidirectional model (Fig. 3) for visualization represents VISIC software as a device generating a dynamic flow of images (animation) with different semantics of information according to the movements of performer multiplied by graphic visual effects. Presented model includes the "author" as source and generator of communication design process including the stages of analysis, interpretation of data and synthesis of new visual solutions. Systematized are the main factors motivating creative and professional designer (author), taking into account the formulation of task, goal, objectives and priorities.



Fig. 3 VISIC's bidirectional model for visualization

The model features "audience" (viewers), which in terms of interactivity perceives concept, information, messages and creative interpretation of the "author". "Audience" reacts mentally, emotionally and through body motor activity. Moreover, it is provided a functional option for the audience to participate in the creative process interactively. Thus in parallel are implemented processes of perception, evaluation and utilization of information as well as its manipulation by body movements and handling of visual parameters. Basic assumptions motivating consumers to use software product are the tools for creative manipulation of information, taking into account the purpose, objectives, priorities and values criteria and scales for each audience, to demonstrate that visualization.

The purpose of VISIC is to visualize musical content, respectively emotion through two-dimensional virtual image of "dancing" human body. Term *DANCE* here denotes subjective perceptions of user for the emotion embedded in music. Based on personal kinesthetic intelligence human body interprets personal concept of emotional content via movements in the rhythm of the music. This model will demonstrate the efficiency of transmitting artistic and emotional content between two different in physical nature aesthetical forms (music / dance). The presented concept unites the means of expression of each of the two art forms in a dynamic time based multimedia composition.

Presented virtual instrument was used to introduce the idea of natural and deeply embedded in the collective unconscious stereotype of visualizing music – the dance. In watching dancing human figure motor centers are activated in the brain, triggering an emotional response in the perceiver. In the cultural layer of humanity has been established a universal expression in terms of music through body movement techniques.

Based on the foregoing principles in perception of music is defined and the conceptual functional structure of VISIC. The software model for music visualization uses dynamic range of human movements captured with a video camera in real time. This stream digitized video information serves as a basis on which to carry out further computer visualization. The user is able to apply visual effects to video streams while synchronizing and mapping them with parametric equivalents from the music channel. These parametric data are calculated in real time during the process of playing a musical work. Preanalyzed music parameters command the intensity of used visual of the filters (Fig. 4).

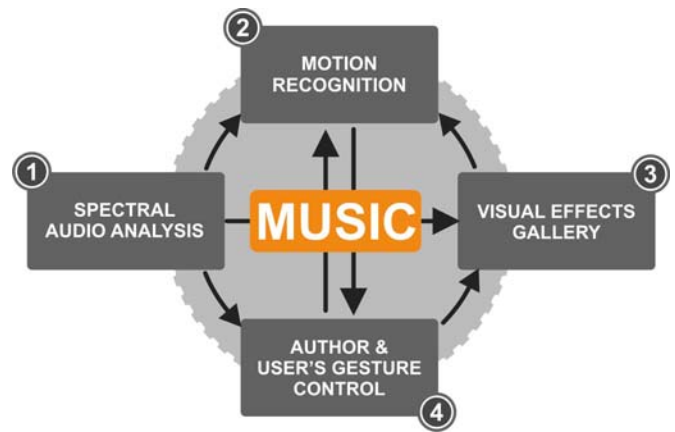


Fig. 4 Conceptual scheme displaying work flow in VISIC software

Developed graphics environment of the conceptual software model VISIC incorporates as a central focus video stream in real time capturing dancing human body. This flow of information serves as a medium through which dancer conveys reflected perception of musical emotion. In this way is realized "translation" of embedded music content in the visual channel. This appears to be visualization which is closest to human perception: transformation and interpretation of music through body-motor activity. I.e. here along with quantitative transfer of parameters from one art form to another there is a qualitative transfer of content - a visual receptors perceive nonabstract information that is directly dependent on the music playback. Moreover, this visual interpretation is the most natural way the human eye has learned to "see" music. Watching dance or dancing figure triggers a chain of emotions and associations, and encourages the observer to active participation in the perception of sound environment. It is proved that when watching dance, people virtually see themselves also dancing.

4. Results and discussion

Software application serves as a modifier of captured video of real-time human motion. Functionality for parametric acoustic analysis is built (Fig. 5). Quantitative data from this module are used to bind with a gallery of visual effects (filters). User selects according to his own aesthetic preferences which filter to use to bring emotional nuance during playback of music or to highlight specific musical piece. Graphical components are implemented on dynamically changing flow of movements.

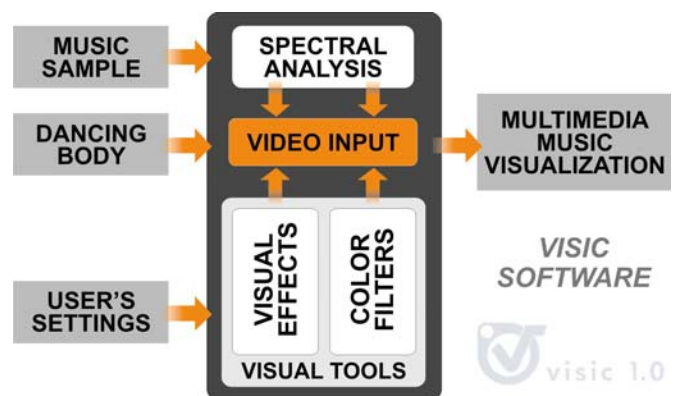


Fig. 5 Structural-functional scheme of VISIC software

Thus, each selected by the author musical component controls the implementation of a visual effect upon the video input in accordance with musical rhythmic structure. Numerical value intensity of sound parameters controls the intensity and frequency of visual effects applied on dance movements in real time. This algorithm enables parallel development of musical and visual/dance composition, ensuring transfer of semantic information between the two channels and keeping the dance feature intact. For this purpose,

the visualization is done with heuristic algorithm structured as presented in Fig. 5. sequence.

This structure provides extensive options for user control. Through the module for analysis and extraction of music parameters and a gallery of visual effects VISIC makes virtual dancing model "sensitive" to the development of musical content. The user has the opportunity to experiment with creating their own choreography, using correspondences between instruments, melodies, rhythms to ensembles of movements. During audio playback user can adjust the intensity of participation of a sound channel in the generation of composite visualization, i.e. the extent to which sound affects by quantitative means its tied visual equivalent.

5. Conclusion

The presented method for music visualization software application proceeds from the specificity of the interaction of music and dance and offers specialized tools for individual interpretation, through the digitization of common parameters. The concept of software is not contrary to the relative nature of the plastic interpretation of music, but in this aspect only supports input from an artistic dancer charged with computer effects. Unity and collaboration of dance and music is creatively superposed and combined without affecting the autonomy of dance. So called "plastic counterpoint" definitely shows that the method is intended to embody the ideological and emotional content of music, not its form.

VISIC is based on a subconscious association of audience with dancing object. Inputs musical parameters are used for application upon the video stream capturing human dance movements. These movements represent a real personal interpretation of dancing to appropriate music content, i.e. they are kind of author's interpretation. Regardless of the quality of dance performance, the program appears to be neutral creative assistant to realize their own music visualization. Software superimposes resulting quantitative properties (from the parametric audio analysis) on the video flow by applying visual effects. Actuality and parallel perception of music and its components applied on dancing body are a prerequisite for reliable delivery of content. The resulting visualization as a product of this process gives the spectator a dynamic and synchronized to quantified music parameters media - stylized, dancing human body.

6. Literature

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