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Choosing of typhlocommentator, description of subject in videocontent for sightless and visually impaired person

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Abstract. The statement of problem of choosing of typhlocommentator is considered in this article, the description of the subject among the number of possible typhlocommentator. The mathematic model of such a task is given and an approach of solving it has been worked out. When researching the problem of access of weak-sight people to the video content, it is required to understand that more than a most part of the information is provided to the viewer in the form of an image. Yes, blind people hear all words of actors, sounds of the environment, processes at the screen, but it is difficult for them to identify the person to whom the specific words belong, what happens with heroes at the very specific moment, what is depicted in the given scene, it is difficult for them to understand reaction of actors, which the latter often express with the help of movements or mimics. Typhlo-comments to video content for blind people and people with weak-sight are one of the real steps towards solution of the problem of limitation of access to such content.

Key words: typhlocomment, typhlocommentator, films for sightless, description of the subject, video content.

INTRODUCTION

There are about 600 thousand weak-sight people living in the Ukraine, of them 100 thousand people are totally blind. Overall in the world about 285 million people with visual impairment and 45 million are totally blind. Science development, society computerization and using of multimedia technologies created conditions for development of computer communication systems for weak-sight people.

One of achievements of the mankind, which is largely unavailable and not completely understandable for the blind people, is a video content – movies, popular scientific and cognitive programs. Sighted person sees through the eyes of about 80% of the information is in video content. Totally blind person can get only about 16% of the information coming through the auditory organ. Currently the matter of accommo-dation and using of achievements of the mankind in adaptation of blind people to the society is of critical importance [1].

Currently massive cinema is almost inaccessible to people with visual impairments. Here are the main problems:

– Distance from cinemas residence that our reality mobility aid for blind, is almost the main problem of access to them without assistance,

– Usually inaccessibility of the building cinema;

–Incomplete clarity of the video content,

– High prices, given that blind people usually adequate resources to be able to develop and learn through video content,

– Healthy people, often after watching a movie, reading a book, based on which the film was set in the blind is usually the opposite – one of the few available ways of such a person is reading, which is written in Braille, and often after reading this book, blind would see his screen version, which unfortunately is usually not available for this group of people.

Currently mass cinemas are almost unavailable to people with a limited eyesight due to the matter of availability of the building itself, non-adaptivity of the

content, not to mention prices as the blind man has few opportunities to provide for himself at a sufficient level, to be able to develop and learn through video content.

Nowadays when the film industry has technical capabilities being sufficient for realization of any artistic design, it seems that there is no necessity to speak, what a huge world opens to each people present in the cinema hall or sitting in front of the TV set or monitor.

When researching the problem of access of weak-sight people to the video content, it is required to understand that more than a most part of the information is provided to the viewer in the form of an image. Yes, blind people hear all words of actors, sounds of the environment, processes at the screen, but it is difficult for them to identify the person to whom the specific words belong, what happens with heroes at the very specific moment, what is depicted in the given scene, it is difficult for them to understand reaction of actors, which the latter often express with the help of movements or mimics.

Typhlocomments to films for blind people are one of the real steps towards solution of the problem of limitation of access to such content. It opens up a large space for society adaptation not only for adults, but also for children with visual problems, who could watch cartoons, learn how to count, and learn the alphabet using video with typhlocomment.

Nearly hundreds of movies produced in Europe are adapted for the blind, in China, where special departments at the professional film studios are working on the voice over process, this number varies from 10 to 15, in Russia it reaches 5 per year. Ukraine has not created this kind of video content yet.

MATERIALS, METHODS AND RESULTS

Typhlocomment is an off-screen description of the video sequence made by the script writer and read by the typhlocommentator. It is not subtitles, not an audio version of the film and not a version of the audio-book. It is a method to see a film or any other type of the video content with full or partial blindness. It represents a comment of visual effects – gestures, objects, costumes, scenery in the theatre, movies, museums and at exhibitions. Thus, blind people may imagine the whole spectrum of visual ploys used by the author. In the given situation it is also required to account that the people concerned shall have good hearing and good imagination. [1]

Typhlocommentator – the profession in the film industry, voiceover commentator who has typhlocomment for blind and visually impaired people.

Typhlocommentator is a background, "hum" simply describing the plot.

Creation of typhlocomments is a fine work of script writers and sound producers, who balance between the art of description and selection of short, but maximally informative key words.

Typhlocommentator upon preparation and further reading of the text shall comply with the following rules:

– Prior to commencement of work it is required to see the movie or other video content 1-3 times with closed eyes in order to try to understand the essence, to pick out the main leitmotif of the movie and to build all comments with comprehension of the final essence of the movie,

– To mark out moments, on which it will be necessary to focus attention, and to detach them as they are obscure without visual look,

– Typhlocommentator shall not express his own tastes, opinions about actors or their roles (beautiful, old, crooked, interesting etc.), the viewer shall make his conclusions after seeing (hearing) of the movies on his own,

– Typhlocommentator shall not express emotions; his voice shall be calm and even monotonous. It is important not to fill the emotional spirit of the movie with the intonation,

– To comply with timeframes as set between cues of actors,

– Not to overlap significant sounds having essence load in the script.

For adequate description of the plot it is necessary to build a mathematical model of such a process. Let's introduce the following designations for achievement of the given goal:

S_i – i-numbered plot,

$t(S_i)$ – duration of the i-numbered plot,

$Sem(S_i)$ – semantics of the i-numbered plot.

Any plot S_i may be described with the help of multitude of typhlocomments. Let's designate such a multitude as $F_i = \left\{ f_{i1}, f_{i2}, ..., f_{in_i} \right\}$. Where $t(f_{ij})$ – duration of the j-numbered typhlocomment describing the i-numbered plot; $Sem(f_{ij})$ – semantics of the j-numbered typhlocomment describing the i-numbered plot.

The task lies in selection from the multitude F_i of such the j-numbered typhlocomment, for which:

$$t\left(f_{ij}\right) \le t\left(S_i\right), \tag{1}$$

and the relevant semantics are almost equal:

$$Sem\left(S_i\right) \cong Sem\left(f_i^j\right). \tag{2}$$

If realization of condition (1) is obvious (attention shall be paid that the typhlocomment is not overlapping dialogues of the plot, for realization of condition (2) expert assessments are required and domain ontology.

In computer science and information science, ontology formally represents knowledge as a set of

concepts within a domain, and the relationships between pairs of concepts. It can be used to model a domain and support reasoning about entities.

In theory, ontology is a "formal, explicit specification of a shared conceptualisation" [2]. Ontology renders shared vocabulary and taxonomy which models a domain with the definition of objects and/or concepts and their properties and relations [3].

Ontologies are the structural frameworks for organizing information and are used in artificial intelligence, the Semantic Web, systems engineering, software engineering, biomedical informatics, library science, enterprise bookmarking, and information architecture as a form of knowledge representation about the world or some part of it. The creation of domain ontologies is also fundamental to the definition and use of an enterprise architecture framework.[4-7]

A domain ontology (or domain-specific ontology) models a specific domain, which represents part of the world. Particular meanings of terms applied to that domain are provided by domain ontology. For example the word card has many different meanings. An ontology about the domain of poker would model the "playing card" meaning of the word, while an ontology about the domain of computer hardware would model the "punched card" and "video card" meanings. [8-10]

An upper ontology (or foundation ontology) is a model of the common objects that are generally applicable across a wide range of domain ontologies. It employs a core glossary that contains the terms and associated object descriptions as they are used in various relevant domain sets. There are several standardized upper ontologies available for use, including Dublin Core, GFO, OpenCyc/ResearchCyc, SUMO, and DOLCE, WordNet, while considered an upper ontology by some, is not strictly ontology. However, it has been employed as a linguistic tool for learning domain ontologies [3].

The Gellish ontology is an example of a combination of an upper and domain ontology.

Since domain ontologies represent concepts in very specific and often eclectic ways, they are often incompatible. As systems that rely on domain ontologies expand, they often need to merge domain ontologies into a more general representation. This presents a challenge to the ontology designer. Different ontologies in the same domain arise due to different languages, different intended usage of the ontologies, and different perceptions of the domain (based on cultural background, education, ideology, etc.) [10-11].

At present, merging ontologies that are not developed from a common foundation ontology is a largely manual process and therefore time-consuming and expensive. Domain ontologies that use the same foundation ontology to provide a set of basic elements with which to specify the meanings of the domain ontology elements can be merged automatically. There are studies on generalized techniques for merging ontologies [4] but this area of research is still largely theoretical.

Ontology engineering (or ontology building) is a subfield of knowledge engineering that studies the methods and methodologies for building ontologies. It studies the ontology development process, the ontology life cycle, the methods and methodologies for building ontologies, and the tool suites and languages that support them [5].

Ontology engineering aims to make explicit the knowledge contained within software applications, and within enterprises and business procedures for a particular domain. Ontology engineering offers a direction towards solving the interoperability problems brought about by semantic obstacles, such as the obstacles related to the definitions of business terms and software classes. Ontology engineering is a set of tasks related to the development of ontologies for a particular domain. [12-14]

In order for the typhlocomment not to overlap dialogues of the plot let's divide the i-numbered plot by subplots, within which dialogues are absent: $S_i \supseteq S_1 \cup S_2 \cup ... \cup S_{m_i}$. Then:

$$t(S_i) = t(S_1) + t(S_2) + ... + t\left(S_{m_i}\right). \quad (3)$$

Then multitude of conditions shall be fulfilled:

$$t\left(f_{kj}\right) \le t(S_k), k = 1,2,...,m_i. \quad (4)$$

Let's select from the multitude F_i those elements, for which condition (4) is complied with. Thus, we'll build some subset of typhlocommentators $F_i \supseteq \tilde{F}_i = \left\{\tilde{f}_{i1}, \tilde{f}_{i2}, ..., \tilde{f}_{ir_i}\right\}$.

Now it is required to comply with condition (2) for elements of the given multitude.

Let we have N experts $(E_1, E_2, ..., E_N)$, who assess correspondence of the semantics of the typhlocommentator and the plot corresponding thereto. Let's designate $O\left(E_i, \tilde{f}_j\right)$ – assessment of the i-numbered expert of the j-numbered typhlocommentator. The higher assessment, the more adequate the typhlocommentator describes the relevant plot. [15] Assessment scale is the finite one. Let's designate aggregate assessment of the j-numbered typhlocommentator: $O_j = \sum_{i=1}^{N} O\left(E_i, \tilde{f}_j\right)$.

Then we shall select the typhlocommentator $\tilde{f}_k$ for which:

$$\tilde{k} = \arg\max_j O_j.$$

Thus, we'll get the algorithm of selection of the typhlocommentator for description of the i-numbered plot as set forth at Fig. 1.

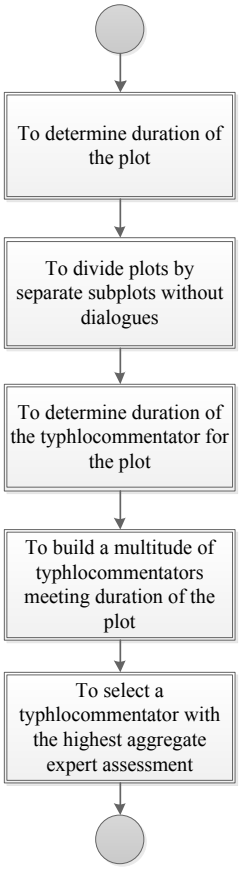

Fig. 1. Diagram of activity for selection of the typhlocommentator for description of the plot

There are two types of typhlocomment:

• Direct typhlocomment (when the commentator is working directly with the blind spectator mode "on-line");

• Prepared typhlocomment (commentary prepared in advance and applied using a special software and hardware on the video content). [16-17]

Modern digital technologies have made it possible to use prepared typhlocomment automatically by a computer with the imposition of additional scale typhlocomment on video. [18-20]

Preparing text of typhlocomment to video by using a personal computer and appropriate software.

Our software "Audio Editor" includes the following functions:

1) Analysis of both the audio and video tracks to pause in which you can well read tiphlocomments.

2) Chanting through the program's interface typhlocommentars in places that the program considers necessary to fill a Comment for the blind.

3) Edit typhlocomments and main track.

4) Overlay typhlocomments on video track.

CONCLUSIONS

Setting of the task of selection of the typhlocommentator for description of the plot among multitude of probable typhlocommentators has been considered in the article. Mathematical model of such of the given task has been adduced; approach to solution thereof has been developed.

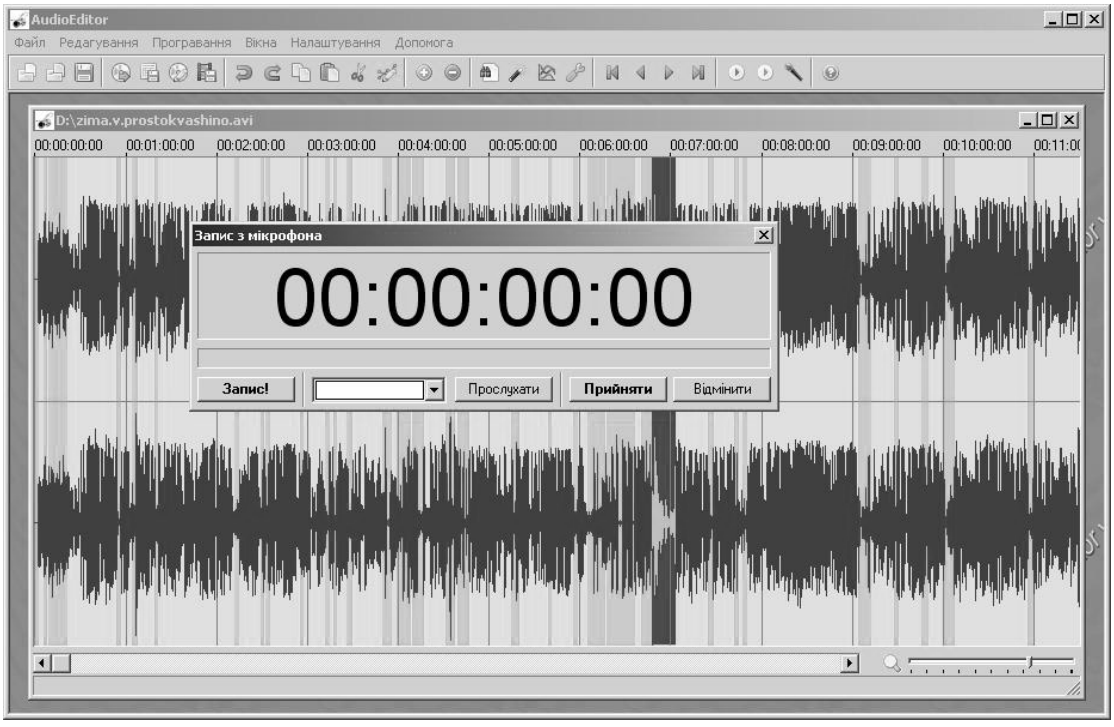

Fig. 2. Green space marked for insertion typhlocomments. Then, the recording of voice comments microphone

The definition of typhlocomment is also provided, the rules that have to be adhered to by an actor, who read typhlocomment for the video content, are defined. It is important to remember, that the text which is being read by an actor, his intonation, emotions expressed by his voice will be the "eyes" of those people watching the video content.

Implement software which allows adapting the video content for the blind and visually impaired people.

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