Designing a Crowdsourcing Platform for Generating Subtitles of Accessible Films

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Abstract

In this paper, we introduce a crowdsourcing platform that generates subtitles in order to produce barrier-free movies for people with hearing impairments. This paper describes the results of a pilot study that identifies design guidelines and approaches for generating accessible subtitles. We propose ALLSUB, a crowdsourcing platform that enables web users to produce descriptive captions of short video clips. The ultimate goal of this project is to provide opportunities for people with hearing impairment to access much more movies without barriers by gathering works from the community.

Keyword

Crowdsourcing, Movie, Subtitle, Human-powered technology, Access technology

1. Introduction

To start with, "barrier-free" concept can be viewed as the design which prevents discrimination against people with disabilities [1]. Based on that word, barrier-free movies are designed for those experiencing disabilities. It makes them able to access movies as non-disabled ones would do. There are two types among barrier-free movies which includes movies with audio-recording for visual-impaired people and addition of special subtitles such as descriptive captions for hearing-impaired people. For the former, voice actors depict all the details of movie scenes; while, for the latter, there are special subtitles which contain description of auditory elements such as music, sound effects, and dialogs.

1.1 Problem recognition

Nowadays, multimedia accessibility becomes a legal requirement in international society. For instance, iTunes has certain policy for the subtitles which states as follow: "Movies for the U.S. iTunes Store must include closed captions. [2]" However, yet such accessible media are not required in Korea. For example, only about 20 barrier-free movies are made in a year and movies are also limited to merely 20 theaters all over the country [3]. In addition to that, the production cost is one of the barrier to make movies accessible. Additional fund equal to at least of 15,000 dollars per movie. As a consequence, many of people with hearing impairments in Korea have limited access to movies in their native language. These circumstances lead us to raise the problem of accessibility of entertaining content, in this case-movies, for people with hearing disabilities in Korea.

1.2 Design direction

In this conditions, it is worthwhile to mention that the diversity, quality and amount of the entertainment content available on the film market is considerably low; and the main obstacles remain to be the need for additional budget, small amount of specialists and workers in certain field and last but not least - low level of awareness among the society. To address this issue, we propose an idea of introducing a

crowdsourcing platform to the domain of accessibility as a means of accessible media generation by people on the web.

Crowdsourcing for the needs of people with disabilities becomes commonly used practice and is involved in many other projects that target accessibility problem. For instance, an application called VizWiz was developed for blind people's daily life support through human-powered algorithm [4]. The work we explain in this paper is relevant to providing hearing-impaired people with barrier-free movie subtitles more easily. Subtitles are made via crowdsourcing site based on the web. That is, it can create barrier-free subtitles from works of majority of people who are willing to invest their time.

2. User study

2.1 Research methods

Our research primarily consists of direct one-to-one interviews and empirical and observational studies, represented via pilot study. In total our pilot study was conducted in three consecutive steps. Firstly, we explained a definition of a barrier-free movie and a guide for making subtitles. Secondly, participants made subtitles for each clip by using existing 'YouTube CC' tool. Lastly, participants watched the clip with muted sound and with subtitles which they made during experiment and then were interviewed. After watching the clip without sounds, participants naturally compared the feeling about the clip in each perspective as a subtitle maker and as a hearing-impaired person. From these interviews, we could generate the ideas for designing ALLSUB web-site.

2.2 Design rationales

The results of our research and experiment made us to develop design ideas on a crowdsourcing site which considers viewers of the movie as well as creators of the subtitles. Also, we discovered the importance of creating a guide for the crowdsourcing participants before they make subtitles and organized the main components for ALLSUB site.

The average work time that takes for making subtitles of a one-munite movie clip is 22 minutes. Also, majority participants felt that time was not long and it was worthwhile to invest. Meanwhile, based on the answers of participants the reward range for making subtitles for about one-minute video clip was anticipated to start with 0.5 dollars to 2.8 dollars and some suggested to include donation certificates or opportunities to watch movies as other forms of a reward. Another main finding was that according to the background (e.g. experience, age, interests, erudition, etc.) of each participant, the results of subtitles they made for the same video could be very different. As an example, in the video clip, there was a scene with a song which was released in 1994 and an actor mentioned about the name of the singer for the song. However, one participant who was born after the release of that song did have no idea about the name of the singer, so that she wrote it as a 'stick man', which has a similar pronunciation with the name of the singer. Considering that everyone could reach a crowdsourcing platform and contribute with their own work, a feature that allow a worker to flag 'uncertain' parts and others to correct the flagged parts should be considered.

On the other hand, as participants underwent the position of a 'subtitle worker' and a 'viewer without sounds' subsequently, they offered important design ideas for each position. First, when they were in the 'subtitle worker' position, they had difficulties about typing the barrier-free subtitle grammar for each component. They had to type square brackets, braces, colons and similar signs for dividing what was depicting music, sound and dialog parts. Since this process took away many time of their work, they suggested us to provide a format in advance. Second, in the 'viewer without sound' position, some participants felt the gap between the mood they intended to portrait and the real scene. As an example, a participant inserted a caption "a subtle background noise caused by cars in the city" to a very static and calm scene that does not have any actions and dialogs. However, after watching the clip he felt that inserting a caption to the scene distorted the reality. Therefore, they asked the guide which can deliver the scene as it

is. All of those notes and feedback helped us to define precise design guidelines as follows:

1. Providing accurate and comprehensive guide for making subtitles.

2. Designing intuitive and easy-to-use subtitle making tool within the platform.

3. Proposing moderate length of the movie clip and reward which can attract people to make subtitles without burden.

3. The Design of ALLSUB

Based on design requirements derived from user study, 'ALLSUB' is designed to generate subtitles that ultimately make accessible films for people with hearing impairments via crowdsourcing approach.

3.1 Compartmental guide for each elements

Barrier free subtitles for hearing-impaired consist of three main elements which are music, sound and dialogue and each element should be applied in proper situations. Therefore, 'ALLSUB' provides short definition of each element and separated guide to each. Also, it shows sample illustrations and detailed precautions about considering points of elements (Figure 1).

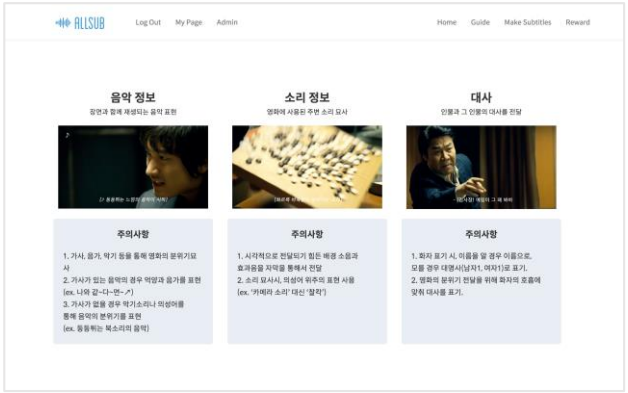

Figure 1. Guide for subtitle makers

3.2 Improving the quality of subtitles

To create high-quality subtitles, we considered two main factors. Firstly, to make participants work in less burden and focus on the task, the length of each movie clip is limited to one minute. Secondly, ALLSUB provides three different input boxes distinguished by three types of subtitles: music, sound effects, and dialogs of actors (Figure 2). This design leads participants to assort sound components in each scene and to avoid tedious work of formatting subtitles.

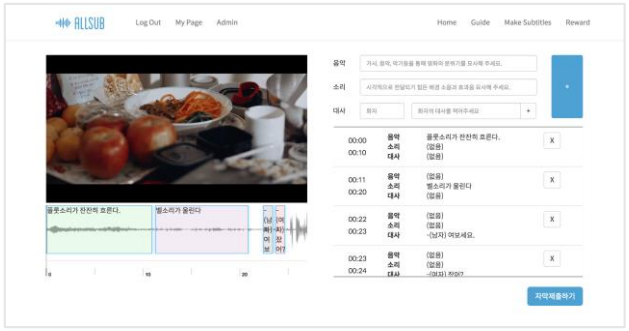

Figure 2. A subtitle making page

3.3 Raising participation by a reward system

After creating subtitles, people can purchase what they wish with virtual cash received for their work (Figure 3). Since they can select goods of diverse price range, it might motivate them to work next time.

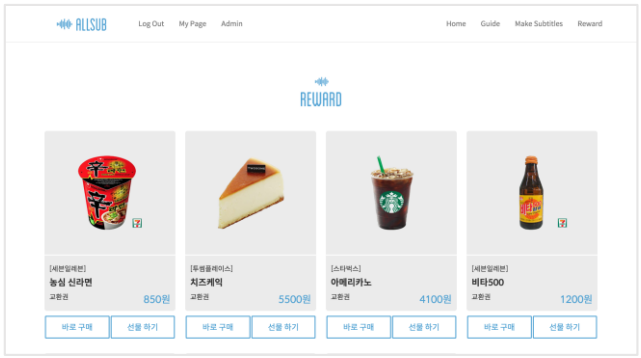

Figure 3. A reward page

4. Discussion

4.1 Accessibility and inclusiveness issues

In this section, we discuss inclusiveness of our platform which is built on our initial goal as well as on a design requirement. We see ALLSUB website as an important factor in achieving inclusiveness of a movie entertainment sector. Even through general captions on the existing films are accessible, we found that the barrier-free subtitles need improvements in terms of the granularity of descriptions (e.g. types of sound, sync of captions, expression of nuances). The

problem of accessibility does not only occur in movie industry, but as researches show common problems appear in existing opera surtitles [5]. This study suggests several ways of increasing accessibility, therefore inclusiveness, of opera subtitles. One of them reflects our approach and goal in a certain way: "In order to promote the fundamental inclusiveness notion of sharing the experience with other audience members, it is particularly important to consider including in the titles indications of audio aspects which provoke an audience response; for example, indicating any aural linguistics humor so that the DH (deaf & hard-of-hearing) tic channel."[5] In our case, we provide a sophisticated editing page that help workers recognize the different types of auditory information and classify them by presenting three divided input boxes. This feature enables including all of the sound components of the movie without additional work and time spent for correction of representation standards, e.g. typing curved brackets for marking music or dialogs. Such detailed notion of all sounds will pave the path towards inclusiveness of a barrier-free movies for deaf or hard-of-hearing people.

4.2 Limitations and future plans

Currently the platform for creating subtitles is on the final stage before releasing to full exploitation. However, despite of its comprehensive design one minor limitation exists. If to put it simple, since people editing subtitles can have different backgrounds (e.g. some would be familiar or unfamiliar with movie scenario) the flow of the story could overlap with clips edited by other people. To solve this issue, we plan to provide short description of a movie for better comprehension of each clip. In addition, we are planning to include web-forum, where participants could share their tips and know-how's for more efficient work flow.

Also, we are planning to launch test-drive of a first movie with subtitles totally edited on ALLSUB through crowdsourcing work. Our goal is to screen subtitled movie to people with hearing impairments and without it, upon completion of which we can gather feedback about experience and evaluate the quality of subtitles.

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