Keeping the User in Control: "Synchronization" vs "Being in-sync"

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***Abstract*—Media synchronization is an important part of the quality of experience of any media session. Be it lip synchronization, intra-media play out synchronization of distributed synchronization in a Social TV session. The position taken in this paper is that to provide a good user experience with respect to media synchronization it is important to keep the final control in the hands of the user for his part of the session. This position is partly based on my personal experiences while performing a set of user tests. The essential argument is that perception of synchronization is a personal taste and therefore a one solution that fits all cannot always be applied. Instead, research must focus on designing systems which are bounded at some baseline of synchronization while also providing *non-intrusive* controls to the user to (fine) tune this level.**

I. Synchronized vs In-sync

At home we have all often had arguments with our families and friends on the level of volume the TV should be set at. The choice of the volume setting is extremely personal and may be drastically distinct from person to person even though they are in exactly the same environment. In general, the personal nature of the volume control maybe true for all QoE parameters but in most cases the differences maybe too small to matter. Further research in human perception is required to establish this as a fact. In this paper, I focus on the special case media synchronization in Social TV context where I believe that this personalization of control is important. My position is justified with the help of an example motivated by the experiences of user tests performed in [1].

The example includes a mother, Sara, and her young daughter, Keira, are text chatting while watching a quiz show. The mother is a professional typist and the daughter is not really into computers. This produces an stark difference in the speed at which they respond to events on the screen in the text chatting case[1]. Sara never looks towards the keyboard while typing, so responses to questions in the quiz show are instantaneous. Whereas Keira has to type each letter individually and slowly. Furthermore, the knowledge of Sara surpasses that of Keira owing to age and experience. This results in Keira feeling left behind and Sara thinking she is ahead at low levels of synchronization difference. Now in case where Keira is viewing the content significantly ahead of Sara will they feel "in sync". While this example may highlight a somewhat "extreme" use case we can see that there are human factors which may significantly influence the feeling of being "in sync". Other factors beyond the level of actual synchronization such as, how their previous experiences of watching it together in the same physical room, the character of Sara and Keira as well as the type of questions (content) can influence this feeling. A pos-

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sible way of solving this problem would be, like the volume level control, providing a synchronization level control interface. However, doing this for every QoE parameter would over-burden the user.

The example highlights two issues: i) high influence of a large number of environmental parameters on the synchronization and ii) individuality of users. These factors are going to be important in shaping the design of Social TV (and other) applications with regards to media synchronization. The recommendations made in the next section are based on resolving these issues.

II. Future Implications

The example in the previous section explains why the final control of modifying the synchronization level must be left with the user. The question that follows is: if the synchronization control is left to the user what should research in media synchronization focus on? In my opinion there are four aspects of multimedia synchronization research for the future:

- *Providing an application specific baseline synchronization*: For each application the user still needs to be provided with some level of initial synchronization bounded by a application-specific baseline.
- *Exposing the control interface for the user to modify this level*: The user should then be allowed to modify the level of synchronization to his individual taste. For example, in the Social TV example presented earlier, Keira feeling left behind should be able to forward her session to a desired level.
- *Maintaining a constant level of synchronization*: Jitters introduced by various network factors render it difficult to maintain a constant synchronization level between the two users. Therefore, even if the users can control the level of synchronization difference this may change over time, requiring the users to re-adjust the levels. This must be avoided. Future synchronization research should look at how to keep this "jitter" in the synchronization level within acceptable bounds. User tests are required to find out what the acceptable bounds for each application are.
- *Providing non-intrusive control interfaces*: If the user must fine tune every QoE parameter then his experience may quickly become cumbersome. Thus the future research directions in media synchronization as well as in QoE, in general, should focus on automated systems to non-intrusively relieve the user of this job while still providing him full control if he needs it. This may involve automatic detection of the user's level of (un)satisfaction and an auto re-adjustment of parameters to meet that satisfaction.

In practice some examples of simple user control systems exist already. The implementation of the *delay* parameter in *mplayer*[1] in one such example. A positive value of the delay advances the audio stream w.r.t. the video whereas a negative value delays the audio. Using this parameter users can achieve the desired lip synchronization level. In this case the codec provides a base line of lip synchronization which is fine tuned by the user to his taste. Furthermore, most gaming applications already provide a myriad of user modifiable parameters as well as game play-out performance detectors to submerge the user in his gaming experience. Similarly, future applications in the media synchronization context should focus on keeping the *users* "in sync" over and above keeping the *media*

[1] http://www.mplayerhq.hu

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"synchronized".

III. Note

This work represents the author's personal ideas. Most of it is a result of work that was done when the author worked at CWI, Amsterdam.

References

[1] D. Geerts, I. Vaishnavi, R. Mekuria, O. van Deventer, and P. César. Are we in sync?: synchronization requirements for watching online video together. In *CHI*, pages 311–314, 2011.

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