
The Future of Second Screen Experience

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Figure 1: Example of a user-generated Caplt from [IntoNow](#).

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Abstract

Second screen experience refers to the use of a companion device, smartphone or tablet, while watching TV. We explore the current state of the second screen area by proposing the first categorization of typical activities. Our three categories – *social sharing*, *gamification* and *extras* and *expanded experience* – derive from how the user interacts with the second screen. We argue that the success of a second screen experience depends on all the three categories. However, the latter category, which includes algorithm-driven user interactions, is the least explored one by industry and academia alike. For this reason, we call for ideas that foster the collaboration between the user experience and data mining communities in order to build a common research platform.

Author Keywords

Second screen, companion, mobile, tablet, television, interactive, social, gamification

ACM Classification Keywords

H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous.

General Terms

Design, Human Factors

HH

Social sharing

Share and interact with your social circles, comment on events in real-time, Twitter and Facebook integration, meme generation, user generated content.

HM

Gamification and extras

TV guide, remote, behind-the-scenes looks, deleted scenes, polls, trivia, badges, rewards, editorially generated content.

MH

Expanded experience

In-depth on the content, music identification, related news, explore the cast, related content, recommendations, algorithmically generated content.

Table 1: Categorization of features of existing second screen applications.

Introduction

Just a decade ago, the water cooler was the place where discussions with friends about previous evening's TV programs happened. Today, such discussions happen in real-time on instant messengers and social networks, while the TV program is airing. As our lifestyles become more connected, the passive act of watching television is becoming far more interactive, with viewers multitasking on their mobile devices while watching television. This phenomenon, where interacting with a companion device becomes an integral part of the TV-watching experience, has been dubbed "*second screen*".

Interactive TV is an old concept, but it was not readily adopted by most viewers until recently. Previously, there was not a convenient way to encourage people to interact with television programs. The first prototypes of interactive TVs involved on-screen menus controlled via remotes, which were awkward to operate, slow and invasive. Therefore it is not surprising that interactive TV started getting traction only when smartphones and tablets became more integrated in our daily lives.

Using a second screen to create an interactive TV experience is not a new idea [2], but the technology has become mature only recently. Smartphones and tablets are common in every household today, and they have become fast and easy enough to use that they can substitute a laptop for most casual uses [5]. Consequently, a large number of mobile apps has begun to arise in the field of second screen, and is receiving a growing amount of attention from users and content producers alike.

Even before the rise of second screen apps, the habit of using a companion device while watching TV was already well-established. Nielsen and Yahoo! discovered that 86%

of mobile internet users tinker around their devices while in front of the TV [4]. About one fourth of all users in both countries *multitask* (they perform more than one additional task) while watching TV [9].

One consequence of these trends is the proliferation of smartphone and tablet apps that make the experience of watching TV more interactive and social. The goal of a second screen app is to provide a single place to aggregate all the interactions that a user has with the Web while watching TV, making the interaction smoother, or even predicting and fostering it.

The present

We surveyed a large number of second screen applications (omitted for lack of space) and classified their features according to the kind of interaction they allow: *Human-Human* (HH), *Human-Machine* (HM) and *Machine-Human* (MH).

The first category is about social actions, from human to human, such as commenting the program with a friend or sharing content with your social circles, and we name it *social sharing*. The second, *gamification and extras*, includes interactive activities where the human is the main driver, while the machine awaits user input. Such activities include answering a trivia, but also checking the TV guide (as the need arises from the user). Finally, the last category comprises activities where the machine is the driver and the human is the consumer, and we call it *expanded experience*. These activities include proposing content generated algorithmically without explicit user input, e.g., getting show recommendations, related news or factoids about the content of the program. Table 1 summarizes our proposed categorization, together with examples of common features.

Proposition 1 *Any successful second screen application needs to provide a holistic experience by integrating the three categories of activity: (HH) social sharing, (HM) gamification and extras, (MH) expanded experience.*

Proposition 2 *The future of second screen experience lies in the ability to craft the best expanded experience.*

“The main challenge posed by content in social media sites is the fact that the distribution of quality has high variance: from very high-quality items to low-quality, sometimes abusive content.”

Agichtein et al. [1]

Albeit imperfect and somewhat arbitrary, our categorization is the first ever proposed for second screen experience. Some activities fall naturally in only one category (e.g., chatting is clearly a social activity), while others might be more fuzzy (e.g., are polls more gamification or social?). Our approach tries to cluster similar features by considering the user intent. For example, a user might enjoy taking a poll even if alone, while the intent of generating a meme is definitely social

This field is still extremely new and many fundamental questions are still unanswered. Perhaps the most important one is to determine *what makes a good second screen experience*. Based on today’s usage of second screens and our experience, we argue Proposition 1.

While both social interaction [10, 7] and gamification [11] have been well studied, very little attention has been paid to studying the aspect of expanded experience. Next, we show why we think that this category (MH) is the most interesting one for research, and also the most important one for the success of a product. Based on these premises we also suggest Proposition 2.

HH. Social sharing

Social is commodity. Many apps feature integration with Twitter and Facebook. It is indeed more comfortable to aggregate your social activity via the second screen app rather than opening a separate Twitter client. However, social sharing is just commodity, and practically all the apps have such capability. Certainly this feature is appealing to users and very useful to share thoughts and user-generated content (UGC) while watching TV [10], although it is clearly not a distinctive feature. The same reasoning can be applied to in-app forums and chats.

UGC is unpredictable. UGC is sometimes incredibly high quality and user-generated memes can become instantly viral. Some applications like Miso entirely depend on UGC and crowdsourcing to generate their second screen experiences. Meme generators like [IntoNow](#)’s Caplts and Miso’s Quips allow the user to instantly add funny captions to a frame taken from the current TV program. Figure 1 shows an example of high-quality Caplt. However, UGC depends on users and many times fails to convey the intended humor of the author, this results in being offensive, or into low quality and boring content.

Overall, while UGC is an important ingredient in the formula, by itself it is unable to enrich the TV viewing experience for an entire show, and it leaves the user at the mercy of an experience with unpredictable quality.

HM. Gamification and extras

Editorial does not scale. On the opposite end of the spectrum from UGC, editorially curated content has usually very high and predictable quality. Certainly, a second screen experience designed by an expert human editor is likely to be engaging and fulfilling.

However, editorially generated content depends on partnerships with content providers such as TV networks and big advertisers. In general, it requires considerable effort to be designed, created, implemented and monitored, as each experience is unique. Therefore, producing editorial content becomes quite expensive, both in terms of time for the editors and the team charged with implementing the experience, and in terms of money for the content provider. Furthermore, editorially curated content gets stale rapidly. While this format is probably the best for one-time special events, it is clear that this model is unable to scale to very large numbers. Thus, it

Yes, we can. While the promise of algorithmically generated content that is novel, interesting, and delivered in real-time might seem unreachable, we have reasons to believe that the goal is within reach.

Automatic algorithms are already smart enough to drive a car (Google's self-driving car), or to beat humans at Jeopardy (IBM Watson). Indeed, "algorithms are shaping our world" [8].

IntoNow currently provides the following features in the expanded experience category:

- related news (selected from a live stream of news);
- music identification (and option to purchase it);
- real-time fact checking in debates with [politifact](#);
- finance tickers and related financial news;
- sport teams news and statistics;
- athletes' bios and statistics.

cannot provide coverage for all the shows airing concurrently on the numerous TV channels, and cannot be the sole backbone of a second screen experience.

Extras are marginal. Features like TV guide are useful but are not unique to the second screen experience, nor they are compelling enough to justify the use of an app by themselves. Rewards, points and badges add an element of challenge to the experience that can make it more engaging [11]. However, rewards like coupons usually attract a specific class of users, including those that like to game the system and take monetary advantage of it [6, 3].

MH. Expanded experience

Arguably, a good expanded second screen experience will contain elements of novelty. For example, the experience while watching two different episodes of the same show shall be different, and tied to the themes and the contents of the episode. In the ideal case the suggestions will be relevant, interesting and serendipitous.

The experience should also be able to provide enrichment throughout the entire show, dynamically, rather than providing only static information. The best strategy to provide additional content is to tap into the largest data repository in human history: the Web. Using algorithmically identified content is the simplest way to scale an expanded experience, and to provide content that is always fresh and interesting.

However, more research is needed in this area. Even if algorithms are ready, what makes a good experience is still unknown. This topic calls for collaboration between the user experience (UX) and the data mining communities.

UX-driven algorithm design

The rise of second screen as a widespread paradigm is a great opportunity for the UX community as it provides new research opportunities in a field that has the potential to greatly impact people's lives. Many algorithms for powering the right second screen experience are already in place but need more work to express their full potential. Other algorithms have not even been thought of, because the user experience that needs them does not exist yet. For this reason, we advocate the need for *UX-driven algorithm design* in this domain. This is a promising field for collaboration, and we see the need of a platform for it. Yahoo!'s IntoNow is a first step in this direction.

Technically, IntoNow uses audio fingerprinting to perform automatic content recognition (ACR) and identify the television program being watched. ACR removes the need for any manual input. Then, the app retrieves metadata about the show from a database. This metadata can be used to perform actions on social networks: post a Facebook status, Tweet a fan message or connect to the right message board. In the back-end, IntoNow's servers capture the closed captions associated with all the channels being monitored, and process them via a content understanding system. This system analyses the text, and finds related content by using a mix of natural language processing, text matching and data mining algorithms.

Current challenges and future directions

We see three key future directions of research in the domain of expanded experience, which should converge and integrate with one-another to build a better user experience: *interaction and interface*, *ubiquitous computing* and *algorithmic improvements*. Next, we propose some example ideas and questions by using IntoNow as a case study.

Interaction and interface.

What kind of new user interactions are possible given the platform described in the previous section? Which additional content would the users like to see on their second screen? How should all this expanded content be presented to form a compelling yet non-intrusive experience? How do users currently engage with the application?

Ubiquitous computing.

Can we detect when the user is not paying attention to the TV, and present more content? If the user starts interacting with the device, is it a good time to show more content? Can we use the sensors in companion devices to enhance the experience?

Algorithmic improvements.

The existing algorithms rely on dynamically matching named entities or text against external content. In the future, deeper *content understanding* will play a bigger role. Can we identify a list of nominees for an award during the Oscar ceremony and present it as a real-time poll to the user?

Conclusion

We have explored the issues arising in the field of second screen experience. We have presented the first categorization of features in this domain based on three different types of user interaction: social sharing, gamification and extras, extended experience. Each of these categories is bound to be important to develop a holistic experience. However, while the first two have been studied extensively, the latter has received little attention from academia and industry.

For those working in the UX community, this area provides an opportunity for novel and challenging research of high impact. Furthermore, it is a fertile ground for collaboration between the user interaction community and with the data mining one. We have made a case for a platform in this research field, and shown how IntoNow is a first step in this direction.

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