
Understanding User's Behavior for Developing Webtoon Rating System Based on Laugh Reaction Sensing through Smartphone

SungHyuk Yoon

Dept. of Industrial Design, KAIST
291 Daehak-ro, Yuseong-gu
Daejeon, Republic of Korea
niceboy@kaist.ac.kr

Soyoung Kwon

Dept. of Industrial Design, KAIST
291 Daehak-ro, Yuseong-gu
Daejeon, Republic of Korea
kwon.sso@kaist.ac.kr

Kun-Pyo Lee

Dept. of Industrial Design, KAIST
291 Daehak-ro, Yuseong-gu
Daejeon, Republic of Korea
kplee@kaist.ac.kr

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Abstract

In this work-in-progress study, we aim to understand the users' behavior for developing the webtoon(web cartoon) rating system using with users' laugh reactions when they read webtoons by smartphones. First, we conducted an online survey in order to understand general reading environment of a webtoon. Second, we executed a pilot experiment in lab based environment to observe which reactions come from readers and which sensors can use for detecting laugh reactions. Lastly, we exploited an observation experiment to sense participants' laugh reactions and evaluate with manual rating scores of each webtoon episode. For the preliminary finding, we analyzed the laugh reactions from randomly selected 20 sample data out of 1300 episodes, and it exhibits significantly correlated with the manual score.

Author Keywords

Content rating; webtoon; smartphone; reaction sensing; laugh; user observation;

ACM Classification Keywords

H.5.0. Information interfaces and presentation (e.g., HCI): General

Introduction

Since 2009, various contents are consuming through smartphones more and more. Compared with desktop computers, users can consume the contents at multiple places with smartphones which have the mobility as the strong advantage.

Meanwhile, content rating is kind of a standard to choose the appropriate contents to users in online. 5 star rating from the viewer is still popular in the film industry. However, the distrust of subjective reviews and the suspicion of rate-fixing cases are common problems among the rating based content platforms. Another case of the like button in Facebook is a limited way to express the user's emotion for the contents.

In previous research, Pang and Lee [4], and Leung et al. [3] investigated automatic rating inference using with sentiment patterns from reviews of films or products. Text 2.0 [2] is the project that interactive text responds information which readers need based on estimated time and reading position from readers' eye gaze data. Xuan et al. [1] developed the *Pulse* system which can make content rating automatically through reaction sensing when users watch movies on tablets. However, there are no content rating research using users' reaction sensing from smartphone when users read text contents. In case of movies, it takes that consuming time is usually at least one hour, and it prefers to play in wide screen. It is not appropriate to exploit the smartphone's advantage effectively.

Cartoon is different. Especially, the webtoon which is compound word with the two words web and cartoon from South Korea since 2004 provides mobile and web optimized layout to users [5]. Unlike existing cartoons,

webtoons uses the scrolling down as the standard control method for reading ways rather than flipping over (Figure 1). It has good accessibility for any extra time or the commuting time because of consuming short time for reading one episode. The webtoon is typical to upload one to two episodes on a week. It is one of the most active online content which has the strong communication channel with readers and authors by real time comments. In South Korea, webtoons are very popular for time killers with 20s and 30s. 6.2 million people use the Naver Webtoon service per day [6].

In this work-in-progress study, we aim to understand the users' behavior for developing the webtoon rating system using with users' emotional reactions from reading webtoons by smartphones. We try to investigate how users read webtoons and what kind of emotional reactions come from. Especially, we focused laugh reactions which is related to the cartoon context in the middle of various emotional responses.

Phase1: Online Survey

In this phase, we conducted an online survey in order to understand general reading environment of a webtoon.

Survey Procedure

An online survey was conducted during a week made by Google Docs form and 53 participants who like webtoons were recruited on Facebook voluntarily. The survey answers were processed to be anonymous. The following six questions were asked:

- Q1.** How many webtoons do you read in a week?
- Q2.** Which device do you use for reading a webtoon?
- Q3.** Where do you usually read a webtoon?



Figure 1. Traditional cartoon layout (top), and webtoon layout (bottom)

- Q4.** What kind of webtoon genre do you read??
- Q5.** Do you know your reactions when you read funny webtoons?
- Q6.** Do you recommend funny webtoons you have read?

Survey Results

The result appeared to show that 34% of participants read less than five webtoons in a week. 21% read less than 10 webtoons, and 19% read less than 20 webtoons. Some participants read more than 70 webtoons in a week (Figure 2). The most reading device for a webtoon was a smartphone first (51%).

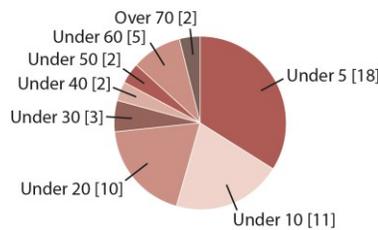


Figure 2. How many webtoons do you read in a week?

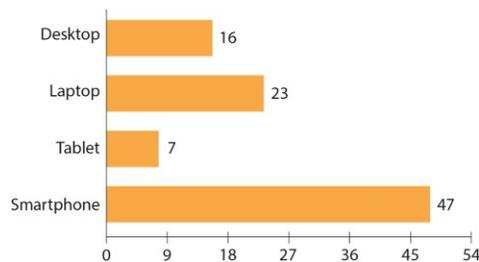


Figure 3. Which device do you use for reading a webtoon?

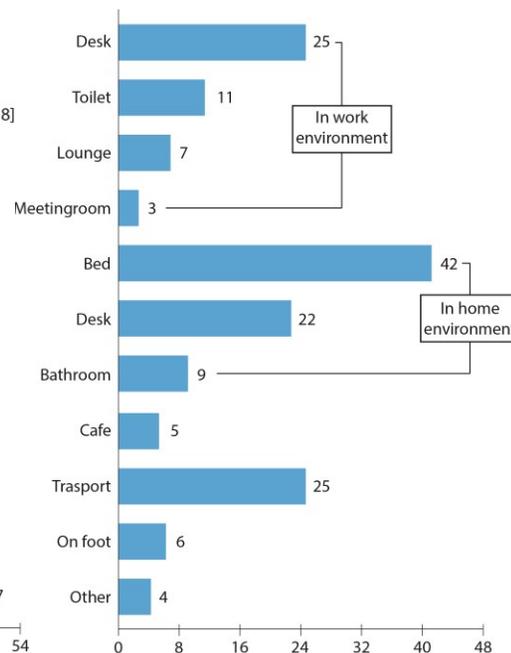


Figure 4. Where do you usually read a webtoon?

Then a laptop (25%), a desktop (17%), and a tablet (8%) were followed (Figure 3). From this results, consuming contents mainly appeared in smartphone even the webtoon started from web environment at the first time. The most common reading place for webtoons was in the bedroom (26%). 16% of participants read a webtoon in their office desk and in the middle of using public transport vehicles each. 14% of participants read webtoons at their personal desk at home. Furthermore, 13% of participants read webtoons in a toilet (Figure 4). Since reading a webtoon with a smartphone, it is possible to consume online contents during travel time or before bedtime. Next, the order of the genre of webtoon were comedy (19%), slice of life (18%), fantasy (16%), thriller (13%), and so on. In case of laugh reactions, 60% of participants showed giggle, 25% of participants hide a smile, and 15% of participants showed laughter. There were five cases for laughing situations: (a) Ordinary smileless (9 participants), (b) Participants did not mind to express their reactions when they are alone, but hide a smile when they are with someone (8 participants), (c) Smileless when they are alone, but laugh a lot when they are with someone (2 participants), (d) Show the funny part to beside someone, and laugh together (2 participants), (e) Always laugh a lot even there are someone or not (1 participant). Lastly, we used the recommended 36 funny webtoons to select subjects on phase3. Based on this survey results, we explored the participants' reactions when they read webtoons in lab based environment.

Phase2: Pilot Observation

In this phase, we executed a pilot experiment in lab based environment to observe which reactions come

from readers and which sensors can use for detecting laugh reactions.

Observation Procedure

We recruited five graduate students in the department of industrial design who like webtoons and read over 20 webtoons in a week (2 males and 3 females, M=26.00, SD=1.22). In the experiment room, a sofa and a folding cot were placed. We asked the participants to read the usual webtoons and take the usual posture. (Figure 5). We set a camcorder to record a participant's overall posture. And, we installed a smartphone application which can record the screen. We used the smartphone, Google Nexus 5, and the application, Recordable, for recording the smartphone screen. The observation was conducted one by one participant. While the participant read webtoons, a moderator were waiting outside in the experiment room.

Observation Results

5 participants read total 37 episodes of 30 different webtoons. We analyzed camcorder and screen videos to count participants laugh reactions. 94 laugh reactions were appeared for reading the webtoons. Table 1 shows the reaction number of each participant occurred. There were 10 times that the participants do not laugh once while reading an episode. The most reaction number was 7 times in one episode which was the 34th episode of Magical 12th Graders (Authors: Seri and Biwan, Content provider: Naver) from P4.

From the observation, the participants showed the variances of facial expressions, laughter, body movements. We matched these three components in the middle of the smartphone sensors: front camera for

smile expression, mic for laughter, and accelerometer for body movement.

| Participant | Laugh Reactions | | | Episode |
|-------------|-------------------|----------|---------------|---------|
| | Facial Expression | Laughter | Body Movement | |
| P1 | 13 | 13 | 3 | 6 |
| P2 | 3 | 2 | 0 | 2 |
| P3 | 4 | 3 | 0 | 7 |
| P4 | 22 | 14 | 4 | 13 |
| P5 | 12 | 1 | 0 | 9 |
| Total | 54 | 33 | 7 | 37 |

Table 1. The number of laugh reactions from an pilot observation

For findings, we observed that the participants read the webtoon with fixed and stable body posture. There were not many reactions from reading webtoons. We also found that all laugh reactions started from facial expression.

Phase3: Experiment

In this phase, we aim to sense participants' laugh reactions and evaluate with manual rating scores of each webtoon episode. This step consisted of an interview and a user observation.

Experiment Environment

The basic experiment environment was same with phase2. We let the participants to freely choose between a sofa and a bed, then pose as usual to read webtoon with the provided smartphone. Furthermore, to record the following three elements: (1) general posture using with a camcorder (2) facial expression using with the application, IP Webcam, which capture



Figure 5. Participants who read webtoons with natural postures

the video from the front camera (3) sound and screen using with Recordable application. However, during the pilot study we found that the front camera could not cover the whole face when the participant was lying down. Therefore, we decided to supplement this problem by having the smartphone equipped with a wide angle lens clip on the front camera to capture users' facial reactions. The observation was conducted one by one participant. While the participant read webtoons, a moderator were waiting outside in the experiment room as same as phase2.

Webtoon list

| Platform | Name | Episode | |
|----------|-----------------------------|---------|-----|
| | | From | To |
| Naver | The sound of your heart | 618 | 627 |
| Naver | Natural born dumb brothers | 12 | 21 |
| Naver | Turn around! Pseudo cooking | 74 | 83 |
| Naver | Gaus electronics | 476 | 485 |
| Naver | SM player | 31 | 40 |
| Naver | Lee MaInyun series | 90 | 99 |
| Naver | The life story of Narm | 376 | 385 |
| Naver | Meddle in life | 519 | 528 |
| Daum | Accoustic life | 136 | 145 |
| Daum | Cartoon diary of Ludbicco | 11 | 20 |

Table 2. Webtoon names and episode numbers for the observation experiment

Participants

We recruited 15 participants among 20 to 27 years old Korean students in the department of industrial design who enjoy reading webtoon with their smartphones. The average age was 23.13(SD=2.17); 10 of them were male and 5 were female. However, we used the initial two participant's data as a pilot study to improve errors of the experiment. All of the participants have been reading webtoon at least for 2 years or more. Moreover, the average amount of episode they read per week were 40.31 (range from 1 to 148 episode per week, SD=43.34).

Experiment Procedure

According to the online survey results, we selected the episodes among the most recommended funny webtoon. We selected the webtoons which were an episode type rather than a story type in order to let users understand the episodes regardless of the whole storyline. And they were all composed of comedy genre with various drawing styles. Given 13 participants, a total of 100 episodes from 10 different webtoons were provided during the observation (Table 2). To prevent the participants already read the episode, we selected

the episodes at least one year before because they were not able to remember the contents. The experiment contained two sessions for each participant. In first interview session, we asked the participants 14 questions to understand their background related to webtoon (Table 3). In observation session, participants were asked to read the selected webtoons in sequence and then score each episodes by 5-point Likert scale (from not funny: 1 to extremely funny: 5) after finished reading the episode. In addition, prior to the start of the second session, we gave the participants instructions including that they can change their posture and position whenever they want while reading webtoon. The average time for each participant to read one episode was 1.8 minutes. Thus, the total elapsed time of the whole experiment averaged 3 hours and 30 minutes per person. We collected 1300 of recorded data (= 10 episodes X 10 webtoons X 13 participants) and manual rating scores each.

Preliminary Data Analysis

We selected 20 episodes for one participant to analyze the data for sample results (P2, The sound of your heart: EP No. 618-627, Natural born dumb brothers: EP No. 12-21). We aligned three videos and set the same time. We played all three videos together and counted

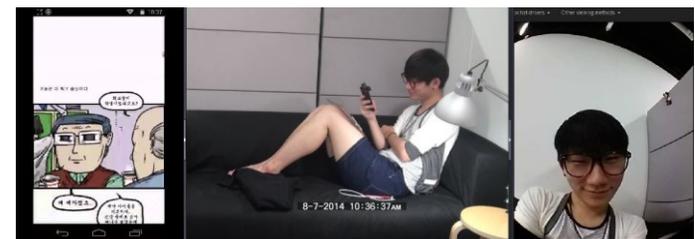


Figure 6. Three recorded videos from observation experiment:screen capture app, a camcorder, a front camera

Question list of Interview

1. When did you start to read a webtoon?
2. Why do you like to read a webtoon?
3. Which genre of webtoon do you mostly read?
4. What is your favorite webtoon?
5. Which webtoon are you currently reading these days?
6. From the webtoon list, which webtoon have you read before?
7. Where do you mainly read webtoon?
8. How do you pose when you read a webtoon?
9. Which webtoon platform do you usually use?
10. How many webtoons do you read in a week?
11. Which device do you use for reading a webtoon?
12. Which factor is the most important when you read a webtoon?
13. What is your reaction when reading a webtoon?
14. What is your humor code?
15. Where do you get the new webtoon information?

Table 3. Interview question list

the smile, laughter, and body movement from laugh. First video which was recorded by front camera used to check the facial expression and device movement. Second video which was recorded by a camcorder used to check the change of body posture of the participant. Third video which was recorded by a screen recording application used to check the laughter sound and content position. From that, we conducted Spearman correlation analysis to evaluate the validity of counted laugh reactions compared with a participant's manual score for the 20 sample episodes. The results exhibit that laugh reactions are highly correlated with participant's manual rating scores ($p = 0.82$, $p < .01$).

Preliminary Conclusion

We found the environmental factors for reading webtoons by a smartphone and five situations of laugh reactions through the online survey. From the pilot observation, we extracted the kinds of laugh reactions and three smartphone sensors for detecting laugh. Lastly, we checked the possibility of using laugh reaction rating score instead of manual rating score through the preliminary sample analysis using with Spearman correlation.

Future Works

We will finish to analyze interview qualitative and observation data from all the participants. After that, we will develop and evaluate the automatic webtoon rating system. For detailed, we will improve the analytic matrix to distinguish level of each reaction. For example, facial expression, it can give weighted score for big smile, rather than giggle.

There are several applications ways of this rating system. First, it can distinguish readers' laugh pattern

or humor code from analyzing log data of laugh reactions. Second, it can recommend specific preference webtoons which are loved by the readers who have similar taste. Third, webtoon authors can get the specific feedback from the real-time emotional reactions. Especially, the authors can notice the exact scene which the readers laugh or show no response. It can provide to check that their intention for inserting humor codes work or not. It will help to make effective follow-up episodes. Compared with a movie, a webtoon has short contents for one episode, and also has frequent upload period. Therefore, emotional reaction can apply to make for the next episode.

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