



# AniReco: Japanese Anime Recommendation System

Syoichiro Ota<sup>1</sup>✉, Hayaki Kawata<sup>1</sup>, Masahumi Muta<sup>2</sup> ,  
Soh Masuko<sup>2</sup> , and Jun'ichi Hoshino<sup>1</sup>

<sup>1</sup> Graduate School of Systems and Information Engineering,  
University of Tsukuba, 1-1-1, Tennodai, Tsukuba-shi, Ibaraki, Japan  
{ota.shoichiro,  
kawata.hayaki}@entcomp.esys.tsukuba.ac.jp,

jhoshino@esys.tsukuba.ac.jp

<sup>2</sup> Rakuten, Inc., Rakuten Institute of Technology, Rakuten Crimson House,  
1-14-1, Tamagawa, Setagaya-ku, Tokyo, Japan  
{masafumi.muta, so.masuko}@rakuten.com

**Abstract.** Along with development of animation works and their market, it has become more difficult for users to find out works corresponding to their own preference from among huge number of animation works as well as to recognize the whole picture of contents related to them. Therefore, “AniReco” is proposed in this paper which is an animation work recommendation system capable of recommending animation works and their related contents in a cross-sectional fashion while reflecting users’ potential preference. As a result of evaluation experiment performed aiming at verifying the system usability and contents of recommendation; it has been proved that the recommendation system is capable of recommending animation works which reflect users’ preference.

**Keywords:** Recommendation system · Interface design · Anime

## 1 Introduction

With more than 200 pieces of animation works broadcast annually in Japan in recent years, animation market scale in a broad sense including contents such as related goods has reached approximately 1.8 trillion yen [1]. In addition, places where animation work and manga titled as “Pilgrimage” was set and locations related to it have been frequently taken up as a topic these days because of many people visiting there, having impacts on regional industries including local governments which develops goods and services in collaboration with animation works. Moreover, about 30% of the animation industry market as mentioned above is shared by overseas sales and animation makes up the largest share in export value of Japanese broadcast contents [2]. In consideration of the situations above, animation is believed to be one of important industrial markets.

Animation is content with various elements including genre, scenario, drawing, music and voice actor, however, the related contents such as goods and sacred places may expand along with the development of works. Therefore, it has become not easy

for audiences to find out works corresponding to their own preference and recognize related contents in a cross-sectional manner from among increasing works.

In order to resolve these problems, it is believed that such system is necessary for users capable of finding out animations corresponding to their preference easily, to recognize what kind of constituent elements of animation they prefer, and to enhance their interest in related contents. In this paper, “AniReco” is proposed which is an animation work recommendation system capable of recommending animation works and their related contents in a cross sectional fashion while reflecting users’ potential preference.

## 2 System Overview

AniReco is a recommendation system via visualization using a network diagram based on calculation of user’s preference from history of watching works and evaluation for them by using information regarding constituent elements of animation works. General outline of the system is shown in Fig. 1. (A) is a screen to display recommended works. User is represented by the center of the network spread in a radial fashion, and the closer to the center is a work located the higher is the rank of recommendation of the work. (B) is a screen to display information of works and related contents as well as to enter evaluation. User profile is updated and contents of recommendation vary when users watch animation works and evaluate them.

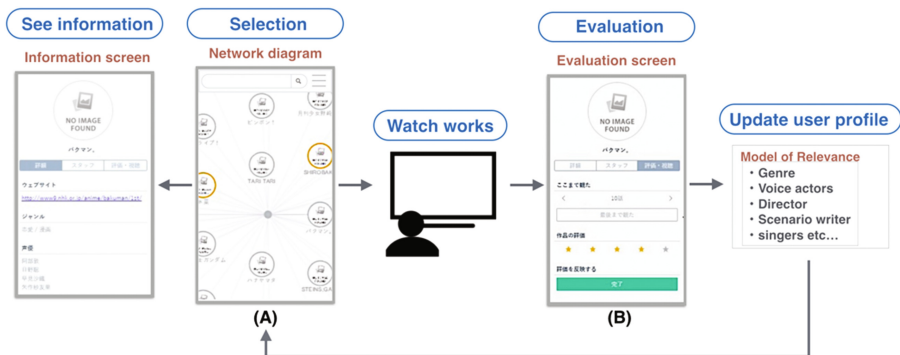


Fig. 1. System view and system configuration

With a recommendation approach by content-based filtering adopted, the system has defined similarity and association between animations using a vector space model expressing metadata of each animation by n-hot vector in reference to [3]. Users are able to recognize recommendation rank of each work visually and intuitively by suggestion of recommendation using a network diagram as described above. In addition, low diversity of content-based filtering recommendation has been resolved because even works with low recommendation rank are available as selection candidates.

### 3 Experiments

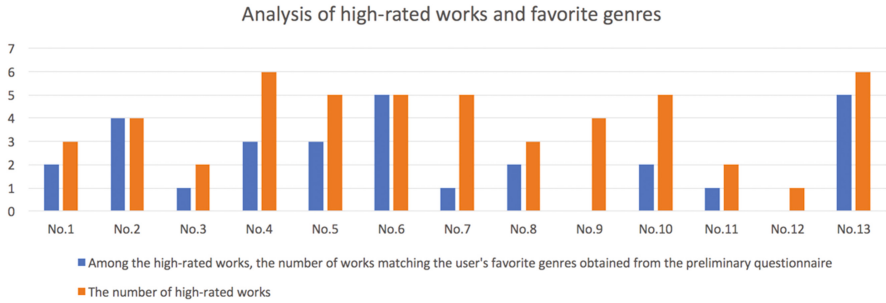
An evaluation experiment was performed to examine usability and recommendation accuracy of AniReco. The experiment was performed for 13 subjects aged from 22 to 28 (male: 11, female: 2) for two weeks (14days). Contents of the questionnaire and the results are shown in Table 1 and Fig. 2, respectively. Evaluation method of the questionnaire was five-level Likert scale.

**Table 1.** Questionnaire

Questionnaire		Mean	sd
<b>About the system usability</b>			
Q1	Was AniReco easy to use?	3.54	0.66
Q2	Was the network diagram easier to find the work?	3.54	0.88
Q3	Compared to searching on the internet, is it easy to find favorite works?	4.15	0.90
Q4	Do you want to continue using this system in the future?	4.23	0.83
<b>About the content of recommendation</b>			
Q5	Among the recommended works, did you have favorite works you have watched?	3.77	0.83
Q6	Among the recommended works, did you have works you did not know?	4.46	0.52
Q7	Among the recommended works, did you have favorite works you did not know?	3.77	0.60
Q8	Among the constituent elements of works you never thought of it as favorites, did you have anything favorite newly?	3.39	1.56
Q9	Were you interested in the suggested goods and pilgrimages?	1.85	1.14

From a result that scores in all questions (Q1 ~ Q4) regarding system usability were more than middle score 3, it has been proved that the system tends to be easier to search works with better usability. In consideration of such an opinion that “it is easy-to-grasp because it focuses only on proximity in addition to high visual exploratory performance”, recommendation suggesting method using a network diagram may be said to be suitable for recognition of difference in recommendation rank and exploration of works. In addition to descriptions suggesting resolution of selection from large number of animation works which is a background of the study such as “it’s useful because it was difficult to determine which animation was interesting due to large number of animations”, an effect to enhance animation watching were also suggested by opinions such as “recommendation provides an opportunity to watch animations,” and “it is possible to encounter unknown works.”

Q5 ~ Q8 are questions regarding content of recommendation. From a result of Q5 and Q7, it is understood that no recommendation of works has been made which is greatly departed from user’s preference. such a trend is recognized from Q7 and Q8 that recommendation with novelty and serendipity has been made reflecting potential preference of users. In addition, it is understood from Fig. 3 that some of works with



**Fig. 2.** Analysis of high-rated works and favorite genres. No. is subjects' number.

high evaluation obtained from many subjects include animations in genres which have not been recognized by them to be preferable in advance. From those mentioned above, it has been suggested that the system is capable of recommending both preferences which users have and have not recognized in both subjective and objective evaluations.

Result of Q9 with a score greatly lower than middle score 3 indicates that the system has less effect to enhance interest in related contents of works such as goods and sacred places. The reason why is believed that presentation of related contents information just with animation works information had less effect to draw attention to related contents.

## 4 Conclusion

With a problem presentation that it has become difficult to find out animation works corresponding to individual preference from among tremendously increased works as well as to recognize expanding related contents in a cross-sectional manner in recent years, an animation work recommendation system “AniReco” has been proposed which reflects users' potential preference. Consequently, recommendation presenting method using a network diagram has obtained a high evaluation in system usability clarifying that the system has an effect to reduce burden for animation works exploration and leads to new discovery of works as well. In addition, it has been proved that the system is possibly capable of making recommendation of animation works reflecting not only users' known preference but also potential one by preference extraction using frequency of watching of works and evaluation for the works.

## References

1. Anime industry report (2016). [http://aja.gr.jp/jigyouchousa/sangyo\\_toukei](http://aja.gr.jp/jigyouchousa/sangyo_toukei). Accessed 30 Mar 2017
2. Analysis on overseas deployment of broadcast contents (2014). [http://www.soumu.go.jp/menu\\_news/s-news/01iicp01\\_02000045.html](http://www.soumu.go.jp/menu_news/s-news/01iicp01_02000045.html). Accessed 30 Mar 2017
3. Fleischman, M., Hovy, E.: Recommendations without user preferences: a natural language processing approach. In: Proceedings of the 8th International Conference on Intelligent User Interfaces. ACM (2003)