Building Community: Report on KidRec Workshop on Children and Recommender Systems at RecSys 2017

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Abstract

We present in this manuscript a report on KidRec 2017 workshop, the first edition of the international workshop on *Children & Recommender Systems*, co-located with the 11th ACM Conference on Recommender Systems (RecSys) held in Como, Italy. While research focused on recommender systems is prolific and addresses issues pertaining to multiple domains–from music, restaurant, and movie recommendations to scholarly publications or news–little has been done to explore the constraints and limitations that existing strategies must face when applied to non-traditional stakeholders, such as children. The first edition of our workshop was aimed at providing a venue dedicated to building community in this area and identify future research paths to nurture and grow this emerging community.

1 Introduction

Recommendation systems (RS) have traditionally been focused on serving adults [1, 7, 14]. Adults can directly and explicitly identifying their wants and needs and are often willing to provide feedback in the form of ratings or reviews. As they can purchase items themselves, this indirect type of feedback can be utilized to inform RS. While research for adult RS have targeted items such as movies, books, and other forms of entertainment, RS for other areas and populations are still emerging. In particular, there is a need for researching the specific population of children due to their increased use of technology [8, 11].

Popular systems such as YouTube and Netflix are utilized by children and have both taken forays into recommending content for children, however, their focus has primarily been on filtering content so as not to include unsuitable content for children [12]. While filtering content is part of the issue related to providing content, there are a plethora of other considerations and factors that will influence the design of effective RS for children. When focused on this particular audience, the role of a RS needs to be reformulated, as it is not sufficient for recommenders to identify items that match users preferences and interests. Instead, it is imperative that they also explicitly consider their needs from multiple perspectives: educational, developmental, and engagement, to name a few. RS for education have started to consider other aspects of recommendation [16, 17], but there remains a rich set of questions to answer: What are the benefits of child-specific recommendations? What role does personal history, age, developmental stage, or even curricular standards have in RS for children? What are the goals of RS for children: persuade, educate, guide, and support their well-being, or something else entirely? What are the ethical or privacy challenges associated with this type of recommendation? What are the domains in which recommendations make sense for children? Are they the same as for adults?; How should we model personalization given that traditional mechanisms of explicit feedback, writing reviews, and purchasing items (directly) do not match this particular population whose literacy levels are growing and who generally do not directly have the ability to purchase items? Are their specifics concern, from the point of view of developing technology that should be considered?

In addition, the interests and needs of this population are rapidly evolving, as they are still refining their interests as they get to know new things, and as their educational horizons broaden. Given the increasing use of technology by children, and the breadth of issues already identified, we felt it was necessary to bring researchers from diverse backgrounds to work to build this community, collectively map out the field of RS for children, and to begin to address these issues together.

Need. To the best of our knowledge, there are have been no workshops on Children & Recommender Systems. However, a number of workshops have been held in the past few years in closely-related or complementary areas, which provide evidence of the interest of the research community in such a topic. EdRecSys [19], attracts researchers focused on RS tailored to education. Search as Learning (SAL) [9], held last year at ACM SIGIR, assembled researchers interested in information retrieval, natural language processing, and education. Neither of the aforementioned workshops focus on K-12 populations and focus primarily on learning not the full range of RS that children are exposed to or use. The ACM-sponsored conference Interaction Design and Children (IDC) offered a number of workshops last year that emphasized designing with and for children [2, 5], however, the focus was on how to design technology for children, not RS for children.

Goal. The main goal of this interactive workshop was to congregate researchers and experts from multiple disciplines, in order to understand the ethical, pedagogical, and technical implications of designing and developing RS that can be of use by children, whether for leisure or educational activities.

Why at RecSys? RecSys is a venue that historically encouraged academia and industry participation and there are academic and industry interests in RS for children. Furthermore, due to the interdisciplinary nature of this domain, researchers from varied disciplines are brought together, from machine learning and information retrieval to human computer interaction and privacy. Because diversity is welcomed at RecSys, we felt it was an ideal venue to discuss and start to address the growing needs and issues related to child-centered RS.

2 Workshop Description

In this section we address the diversity of disciplines required to address the issues related to KidRec, the interactive format of our workshop, brief descriptions and abstracts of the accepted contributions, and perhaps most importantly the discussions and challenges that were raised during the workshop.

2.1 Audience of Interest & Format

Since workshop objectives included sharing and discussing research and projects that reach beyond classic recommender techniques and discuss the many child related challenges of RS; we reached out to researchers with diverse expertise: Technology for children; Human computer Interaction; Information Retrieval; Assessment; Personalization; and Gamification, to name a few. By reaching out to members from these communities and building a community of KidRec researchers, we aimed to foster a multidisciplinary perspective that can initiate a conversation of the challenges, limitations, and needs related to the design and development of recommendation systems that can be directly and widely adopted by children.

KidRec was purposefully designed to *not* follow a traditional workshop pattern, but instead adopted a highly participatory approach meant to generate discussions and connections among researchers interested in topics that applied to RS targeted towards young audiences. With that in mind, we elicited submissions discussing novel work in progress and position papers that focused on open challenges, promising research directions, or speculative or innovative work in progress.

In our program, we reserved around 45 minutes for a round of short "lightning"-style presentations for each of the accepted contributions (see a brief discussion of each of these accepted publications in Section 2.2). The rest of our program was focused on open discussion about current research related to KidRec, identifying problem areas, identifying community needs and expectations, and agreeing on directions for future work.

2.2 Accepted Contributions

For this first meeting, we accepted six submissions. The topics of these submissions are varied and come from researchers in informatics, human computer interaction, gaming, music, design, and visualization. We outline below the major take-aways from the "lightning"-style presentations. This is followed by the abstracts of each of the accepted contributions.

- Monica Landoni [13] discussed how aesthetic relevance influences the decision making process when it comes to recommend multimedia items for children.

- Yashar Deldjoo [3] focused instead on the personalization aspect of recommendation to enhance children's experience with these systems. He specially focused on how attention patterns can bias the recommendation selection of items in the movie domain.

- Christine Bauer [18] brought up important points to be considered when it comes to recommending musing to adolescents; including the influence of music genre preference and preference homogeneity.

- Min Zhang [15] lead the discussion into the educational aspects of recommendations, by presenting her research work on the use of RS for vocabulary development among children learning a second language.

- Federica Delprino [4] focused her discussion on the importance of understanding children's interest through game to then inform the recommendation process.

- Michael Ekstrand [6] opened up the discussion on how to evaluate RS tailored to younger audiences, given the lack of existing benchmarks and what are the main challenges: from gathering data for implicit feedback to conducting user studies for explicit feedback.

Aesthetic Relevance when Selecting Multimedia Stories - *by M. Landoni and E. Rubegni*
We explore the concept of Aesthetic Relevance in order to study how children choose short multimedia stories to read for leisure. We gathered data via observations and questionnaires in order to understand what are the main factors and dimensions to affect selection and here compare our findings with those emerging from a seminal work looking at how children select books in a digital library. We observed how the social dimension played a strong role on selection with few children, perceived as more knowledgeable, influencing others and their choices.

Enhancing Childrens Experience with Recommendation Systems - *by Y. Deldjoo, C. Fr, M. Valla, M. A. Tuncel, F. Garzotto, P. Cremonesi, A. Paladini, and D. Anghileri.*
Recommender systems (RS) offer a personalized support in exploring large amounts of information, assisting users in decision making about products matching their taste and preferences. Most of the research to date on RS have focused on traditional users, i.e., adult individuals. However, childrens patterns of attention and interaction are quite different from those of adults. This paper presents the first results of a research-in-progress that can be suited to bridge the barrier between children and RS by providing a child-friendly interaction paradigm. Specifically, a web application is developed that employs real-time object recognition on movie thumbnails or DVD cover-photos in a real-time manner. The tangible object can be manipulated by the user and provide input to the RS to generate movie recommendations.

Online Music Listening Culture of Kids and Adolescents: Listening Analysis and Music Recommendation Tailored to the Young - *by M. Schedl and C. Bauer.*
Abstract: In this paper, we analyze a large dataset of user-generated music listening events from Last.fm, focusing on users aged 6 to 18 years. Our contribution is two-fold. First, we study the music genre preferences of this young user group and analyze these preferences for homogeneity within more fine-grained age groups and with respect to gender and countries. Second, we investigate the performance of a collaborative filtering recommender when

tailoring music recommendations to different age groups. We find that doing so improves performance for all user groups up to 18 years, but decreases performance for adult users aged 19 years and older.

A Game-based Data Collecting Framework for the Recommendation of Kids Second Language Learning - *by W. Ma, M. Zhang, C. Zhang, Y. Chen, Q. Xie, W. Sun, Y. Liu, and S. Ma.*

Under the background of globalization, more and more people are learning a second language. Word learning is essential in language learning. It is valuable and helpful if a recommendation system for the language word learning is proposed for learners. In previous work, the research of language cognition is often based on the dataset of kids rst language development, such as: Word Bank, to summarize and study the word learning process. However, there lacks proper large-scale second language vocabulary development dataset, and it is very difficult to collect a big dataset with traditional collecting methods. is limits the study of second language learning and the construction of words recommendation systems. In this paper, we designed a data collecting framework for kids based on the idea of games with a purpose, to collect kids vocabulary development status and his/her attributes. We have implemented the second language vocabulary development collecting system for English. Moreover, we proposed an idea of word learning recommendation system for kids.

Playing Outdoor, Recommending New Content: Stimulating Kids Learning Through the ABBOT Smart Object - *by F. Delprino, O. F. Bravo, M. Mariani, C. Piva, N. Izzo, M. Matera, and R. Tassi.*

This paper describes the design of a smart service that aims at stimulating kids learning by combining smart objects for outdoor playing with recommendations. A tangible object, ABBOT, is proposed as a companion for kids in the first years of primary school. This toy–equipped with a photo camera activated by an accelerometer that intercepts object shaking–helps kids record what they find interesting in the physical environment where they play. In a following phase (typically occurring at home) kids can play with the digital materials collected during outdoor play and related contents using simple interactive games on a tablet (with the support of caregivers, e.g., parents). The system exploits (i) an image recognition service to extract features from pictures (e.g., a leaf or wood of a specific plant) and (ii) a mixed-recommender technique (content-based and rule-based) to create associations between the images collected during play and semantically-relevant visual contents (selected from a pre-defined collection of material and from online sources).

Challenges in Evaluating Recommendations for Children - *by M. Ekstrand.*

Recommender systems research and development cannot advance without robust evaluation strategies. While many evaluation strategies have proven effective for deploying and testing recommenders for general audiences, child-oriented recommendations pose unique challenges, and adult-oriented evaluation strategies do not necessarily translate. In this position paper, I briefly describe several of the challenges I see in evaluating recommender systems for children, how they relate to similar problems for general audiences, and why existing solutions from the recommender systems community are insufficient. Significant progress in building compelling, useful, and personalized information experiences for children will require new developments in evaluating their effectiveness.

2.3 Discussion and Challenges

An initial break-the-ice session to present background and areas of expertise of attendees was followed by an exchange of ideas resulting from presentations outlined in Section 2.2 and a brief presentation of research work currently being conducted at the Politecnico di Milano focused on children with neuro-developmental disorders and the corresponding findings that can inform design of RS for children. These activities lead to rich interchanges among attendees, the outcomes of which are summarized below.

Data Sets. There is a paucity of datasets for children. Unlike datasets like MovieLens [10] or Book-Crossing [20], which are available to the community at large and thus facilitate assessment and comparison among recommendation strategies for a general audience; there are no publicly available datasets that can be used to validate design and performance of recommendation strategies tailored to children. This lead us spotlight the need for this particular community to create and share a dataset that can encourage and facilitate research discoveries. We discussed that gathering historical (i.e., logged) data from every day activities or collecting everyday routines–not just "usability" test data– might be the next step; but at the same time large user studies can be time-consuming and difficult to carry out when the studied population are children. In addition, surreptitious observations of children can have ethical ramifications. In summary, we agreed that it is imperative that we create and share dataset for this population with regards to recommendation tasks, but, at the end of the day: *What are the good ingredients for data sets for child recommendations?* and, *What is the best way to gather this data?*

Expertise. Building a community that can properly and holistically address the challenges of the task of interest for KidRec, requires looking at the problem from multiple perspectives. Therefore, people with a diverse set of skills and areas of expertise must be a part of this community in order to address the breadth of issues related to children and RS. Among the most prominent areas discussed, we highlight: Human-computer Interaction (HCI); Information Retrieval (IR); user experience (UX); ethics; cognitive psychology; creativity, and educational development. We discussed the need for interdisciplinary research among these areas. For example, HCI and IR both strive to enable personalization, but from different perspectives. Working together, these perspectives can strengthen the end result. The need to continue to grow this community is particularly important as there is such a wide array of expertise that can positively benefit RS for children.

Application Domains of Interest. Given that we are dealing with an emerging community, we focused some of our discussions on trying to identify the application domains of interest that could most benefit from algorithms, technologies, and strategies that facilitate the decision making process for children. Immediately, RS that could complement educational tasks–specifically reading and learning–were at the top of the list. Other domains of interest included recommenders for entertainment (e.g. cartoons, comics, or movies), and promoting healthy habits or the next "best" everyday activity to complete.

Future Challenges. Throughout the day we identified a number of challenges, which we outline below, evidencing the need to continue to build community around RS for children.

- *Which is the first target area or product we should focus on as a community?* The agreement in this case was that ideally, we should focus on a specific topic or item that we could build upon. Books (and libraries) seemed like the best alternative as it crosses into several domains (e.g., entertainment and education). The benefit of a shared target area was that we could share data and information allowing us to collectively create more effective solutions.

- *How does the context of use effect RS usage?* Adult and child expectations may change based on the context of use. Are they using a RS at home or school? Are they using them in a shared setting on a large display or individually such as on a mobile device?

- *How does child development impact RS usage?* Also, with regards to children, because they are developing at a more rapid pace, preferences can change quickly. How can this rapid change of preferences and needs be adequately addressed in the design of RS?

- *How do we evaluate RS for children?* With no datasets to compare, one alternative is to conduct user studies. Unfortunately, these tend to involve small-size populations and can sometimes not reflect real-world usage scenarios. Alternatively, if we indeed focus on creating a dataset and conducting empirical analyses, then questions arise pertaining to what type of assessment data to collect and how to properly collect it: do we rely on the effectiveness of questionnaires or direct feedback? how reliable are these options given that children might be less willing that mature counterparts in filling out surveys or expressing their opinions? This phenomena is observed in adults, but how is this magnified or skewed when dealing with children remains unanswered.

- *In determining what is a relevant recommendation, are children's opinions enough?* One of the main challenges in creating RS for children pertains to the issue of "relevance". When it comes to more mature audiences past preference is one of the most influential factors in identifying items to recommend. However, when it comes to younger audiences we wondered if that is still true: how do these recommenders balance what adults (e.g., parents, educators, librarians) expect from recommended items for their children versus the child's wants and preferences?. In the end, how can these systems generate "good" recommendations that simultaneously balance caregivers expectations and children's likes and dislikes?

- *What are the ethical ramifications of RS for children?* While listed here as the last challenge, ethics is definitely not an "add-on" issue. Ethical considerations are critically important, particularly when researching with children. RS for children raises several challenging questions, including: Is monitoring children's activities an invasion of privacy? What biases do RS have? How might that influence child behavior? How ethical is it to persuade children? Whose educational, ethical, moral values do these recommendations align with: the children, their parents or guardians, their teachers, researchers, developers, companies, etc.? These questions and others must be addressed as RS progressively target and can potentially alter children's behaviors.

3   Future Workshop

Since such a broad diversity of perspectives are needed in considering recommendations for children, we discussed how to continue to build the community through future workshops at appropriate venues where this kind of diversity would be embodied and embraced. Some of

the possible venues included: ACM Recommender Systems (RecSys), Computer-Supported Cooperative Work and Social Computing (CSCW), CHI-Play (the international and inter-disciplinary conference), and Interaction Design and Children (IDC). This year, KidRec's second edition is set to occur at IDC 2018 in Trondheim, Norway. It is worth noting that the discussion presented in Section 2.3 was instrumental in helping us identify the "theme" of KidRec 2018, which will be on *RS in the educational domain.*

4   Acknowledgments

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