

Defining and Supporting Narrative-driven Recommendation

Toine Bogers

Department of Communication & Psychology
Aalborg University Copenhagen
Denmark
toine@hum.aau.dk

Marijn Koolen

Huygens ING
Netherlands
marijn.koolen@huygens.knaw.nl

ABSTRACT

Research into recommendation algorithms has made great strides in recent years. However, these algorithms are typically applied in relatively straightforward scenarios: given information about a user's past preferences, what will they like in the future? Recommendation is often more complex: evaluating recommended items never takes place in a vacuum, and it is often a single step in the user's more complex background task. In this paper, we define a specific type of recommendation scenario called narrative-driven recommendation, where the recommendation process is driven by both a log of the user's past transactions as well as a narrative description of their current interest(s). Through an analysis of a set of real-world recommendation narratives from the LibraryThing forums, we demonstrate the uniqueness and richness of this scenario and highlight common patterns and properties of such narratives.

KEYWORDS

Narrative-driven Recommendation, Query-driven Recommendation, Complex Recommendation, Conversational Recommenders

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1 INTRODUCTION

Over the past decade, recommendation algorithms for ratings prediction and item ranking have steadily matured with matrix factorization and other latent factor models emerging as the state-of-the-art algorithms to apply in both existing and new domains. However, these algorithms are typically applied in relatively straightforward and static scenarios: given information about a user's past item preferences, can we predict whether they will like a new item or rank all unseen items based on predicted interest?

In reality, recommendation is often a more complex problem: the evaluation of a list of recommended items never takes place in a vacuum, and is often a single step in the user's more complex background need. These needs place a variety of constraints on

which recommendations are interesting to the user and when they are appropriate. There is relatively little research on how to elicit rich information about these complex background needs or how to incorporate them into the recommendation process. In this paper, we focus on one particular scenario where users provide more information about their recommendation needs than just a log of their past preferences. We define a specific scenario called *narrative-driven recommendation* (NDR), where the recommendation process is driven by both a log of the user's past transactions as well as a narrative description of their current need and the context of use. An example of such a narrative request is the following: "I'm looking for manly books about manly issues, that aren't too gritty, but make you think as much as you laugh. So far these examples I have on my bookshelf: 'About a Boy' and 'High Fidelity' by Nick Hornby, 'Train Man' by Hitori Nakano. Have you any other manly books for manly men such as I?" (ID-B24040). It describes both different aspects of the desired books as well as providing an overview of relevant past preferences.

We argue that NDR represents a distinct scenario for recommender systems research that requires more study. One reason for this are the lessons that these narrative descriptions can teach us about recommendation in general. In addition, specific fields like conversational recommendation could also benefit from a better understanding of narrative descriptions of user needs and vice versa. This paper represents a first step in the study of NDR through the following contributions:

- (1) A principled, operational definition of NDR.
- (2) A motivation of NDR as a meaningful research problem by providing a quantitative analysis of its prevalence and composition.
- (3) An analysis of the common patterns and properties of narrative recommendation requests to guide future research.

The rest of this paper is organized as follows. We define NDR and explain how it differs from other tasks in Section 2. Section 3 discusses the relevant related work. Section 4 then provides evidence for the importance of this recommendation scenario and attempts to map the common patterns and properties present in these rich narratives. We conclude in Section 5.

2 NARRATIVE-DRIVEN RECOMMENDATION

The focus of this paper is on supporting *narrative-driven recommendation*, which can be seen as a complex recommendation scenario where the recommendation process is driven by both a log of the user's past transactions as well as a narrative description of their current needs or interests. That is, what would make suggested items relevant to them and why are they requesting recommendations, i.e., what is the background task and context? Example scenarios could include explicitly soliciting recommendations for

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a contextual need, steering generic recommendations towards a current interest, or posting a narrative description of their need on a forum, asking other forum members for suggestions.

This type of recommendation could also be seen as a form of personalized search. Recent years have indeed seen a convergence of information access paradigms. Back in 1992, Belkin already discussed the similarities between information filtering and IR [3] and more recently Furner [9] also argued that recommendation and retrieval are two sides of the same coin. The aim of this paper is not to debate whether recommendation is simply query-free search or whether search is in fact query-driven recommendation. We do, however, wish to argue that this information access problem can be effectively studied from a recommendation perspective, and to present an operational definition of NDR. We argue that NDR has two essential components:

- (1) **Information about user preferences** One of the main data sources for recommendation are transaction logs containing user preferences. These can either be expressed explicitly by the user in the form of ratings or they can be captured implicitly in the form of usage information, e.g., which books has the user read? Naturally, other data sources can also be integrated into recommendation algorithms, such as information about the users, the items, or the relationships between them. However, for NDR we believe that only user preference data is essential for defining this as a recommendation problem as opposed to search. We argue that these are scenarios where a user has little trouble identifying which items are broadly relevant for them, but would instead like to know which ones are closest to their preferences, preferably with an explanation of why.
- (2) **Narrative description of user need** The other component in NDR is a textual description of the user's recommendation need. One of the major differences between personalized search and NDR is the length of description provided to the system: instead of a set of 3-4 query terms [23], we are typically dealing with a longer description of one or more natural language sentences in NDR. Often, such narratives describe the type(s) of items that the user would find interesting or relevant as well as (part of) the context for requesting the recommendations. Users tend to mention one or more aspects that separate the interesting and relevant items from the irrelevant ones. Narratives combining multiple relevance aspects can be seen as complex examples of constraint-based recommendation [8], such as users who are looking for bestseller novels set in World War II for their book club. Another way users can describe which type(s) of items they would like, is by providing positive or negative example items in the hope that other users familiar with one or more of these items can identify the latent properties that connect these items to relevant unseen items. These examples can also be seen as a sparse representation of user preferences. Many narratives also describe the context (of use) for the desired recommendations: is the user asking for suggestions for a friend, is it part of a larger background task such as triggering discussion in a book club, or should it help pass the time during traveling? This element may not always be present nor necessary to provide accurate recommendations.

We wish to argue that *both* of these components have to be present for the scenario to involve NDR. An example of such an NDR need is this example from the movie domain, where the user is looking for “*films where a regular person (not a cop, spy, etc) has a mystery to solve, not related to crime or conspiracies, but still has to do “detective work” following clues and leads. An example would be last year’s Walter Mitty, where the protagonist tracks down a photographer to recover a photo negative he needs. Any ideas?*” (ID-M225531765). In this case, the user describes the plot and genre elements that single out which movies could be relevant. By providing a positive example, the user indicates that this example should take precedence over their general user preferences. In cases without specific examples, the user’s preferences should typically play a bigger role.

A scenario where we only have a narrative description without any information about user preferences is an example of complex search, whereas recommendation based on user preference information without a narrative description is traditional recommendation. Another, perhaps obvious requirement, is that the user must have a need for recommendations, as opposed to a *known-item* need where the user is looking for a specific item, but not able to remember the essential metadata to locate it again [14]. This allows us to formulate the following definition of NDR:

Narrative-driven recommendation is a recommendation scenario that contains (1) a narrative description of the aspects of items desired by the users (≥ 1 sentence) along with an optional context of use; and (2) information about user preferences, either in the form of a transaction log of user preferences or user-provided positive and/or negative examples of other items. The narrative must describe a open request for recommendations as opposed to locating a specific item.

3 RELATED WORK

One avenue of related research is the work on query-driven recommendation. Adomavicius et al. [1, 2] introduced REQUEST, a structured query language for customizing recommendations, which can be used to specify more complex recommendation needs than just “give me items I would like”, although it does not consider textual representations of recommendation needs. Hariri et al. [12] proposed a query-driven context-aware recommender system that provides recommendations based on a user’s preference profile, adapted to a given situation or context that represents short-term interests or needs of a user in a given situation.

Narrative descriptions of needs and interests are typical of (human) conversational recommendation, where one person describes the kind of items they like and what they would be interested in, and others come up with suggestions and possibly explanations for why. In this sense, NDR is related to conversational and critiquing-based recommender systems, which aim to elicit more information about user needs through dialog and interaction [6, 20, 21].

Narrative requests for recommendation share similarities with product reviews in terms of their composition and complexity, in that they cover different aspects of a product with the author describing likes and dislikes. O’Mahony and Smyth [22] investigated ways of recommending reviews that offer contrasting views to help users choose between items while Dong et al. [7] extracted topical

and sentiment information from reviews to identify the most informative reviews. The key difference between reviews and narrative requests is that reviews represent an evaluation of *experienced items*, whereas requests describe *unspecified items* that would fit the user's current interests.

There is a renewed focus in Information Retrieval on complex search tasks and how best to support them [11, 18]. Some of these tasks are found on the boundary between search and recommendation [17]. Complex narratives have been used in interactive IR [10] to study how users perform complex search. They are also commonly used in IR evaluation and test collection building to guide assessors [13]. However, Koolen et al. [19] found that the narratives that are written to assess artificially created topics for IR evaluation are different in nature from the narratives that users write when they ask peers for recommendations. The Social Book Search campaigns at INEX [16] and CLEF [15] found complex, narrative-focused information needs to be common in online book discussion forums, such as GoodReads and LibraryThing. We build on their work in this paper. Finally, Bogers [4] performed a similar analysis of narrative movie requests on a collection of IMDB forum threads.

4 ANALYZING NARRATIVE REQUESTS

4.1 How common are they?

Our aim with this paper is not to convince the reader that NDR is as common as regular recommendation. Formulating an explicit request takes more effort by the user than deriving implicit interests from their transactions does. The same is true for explicit user preferences: ratings and reviews are harder to come by than usage information, due to the effort required. However, NDR is not a niche problem either. Users are perhaps not as vocal about it and might simply give up before asking their peers, but we believe that if NDR systems were available, we would see many more users trying to express their complex needs, interests and preferences to such systems. Even if it were a niche problem, an analysis of such narratives could still teach us about what people might need from recommender systems in general, but cannot (yet) express.

However, there are places on the Web where we can expect to find people expressing such complex requests and where they turn to other people for help in solving their problems that current systems cannot offer: discussion forums. In this paper, we use the book domain as the setting for our analysis, but note that other domains have similar forums, such as the IMDB message boards for movies (*I Need To Know*¹ and *Lists & Recommendations*²), and the subreddit *Tip of My Tongue*³ for all kinds of items.

We analyze narratives asking for recommendations on the LibraryThing (LT) discussion forums. LT is a social cataloging website with an active user community dedicated to all aspects of book cataloging, reading, and discussion. The forums are for any kind of discussion about books, with no specific group for narrative requests as they occur in many different groups. Currently, there are close to 190,000 threads in the LT forums⁴, of which many are dedicated to book clubs and reading challenges. For the SBS Mining

Track [5] a random sample of 3,934 threads were annotated, of which 13.1% ($n = 517$) were book request narratives, showing that needs for recommendations are common. It also means there are potentially nearly 25,000 book request narratives on LT already. It is worth noting that GoodReads has many more users (55 million)⁵ than LT (2 million). We assume that the GoodReads user base is not fundamentally different in the complexity of the recommendation needs, so potentially many more users with similar needs exist. Since many book readers use neither platform, the total user base for NDR is potentially even larger in the book domain alone.

In this paper, we re-use a collection of 115,899 LT discussion threads originally used for the INEX 2014 Social Book Search Track [16], which contains all threads initiated between August 15, 2006 and November 6, 2012. Figure 1 shows the temporal distribution of thread starting dates (blue bars) as well as distribution of starting dates of narrative request threads (red line) from 2006 to 2011. In this period, an average of 51 threads were started every day. The number of narrative requests threads per month is significantly lower, because only around 13% of all threads contain narrative requests and because these frequencies represent a small sample of all request narratives. Data for the year 2012 was excluded from Figure 1 due to a bug in the crawler not dealing properly with a change in the thread format. However, narrative requests from 2012 were included in the rest of the analysis in this paper, because they occurred in the same proportion to all threads as the 2006-2011 data. Figure 1 shows that thread creation frequencies in general have stayed relatively constant, and that the posting frequency of requests for book recommendations follow the general trends pretty well ($r = 0.532$, $p < .001$). Forum activity in general is higher around the holiday periods, probably because users have more time to read and discuss reading on the LT forums.

4.2 What do they look like?

In the previous section we showed that NDR is a common scenario and, as such, deserves our attention. In this section we analyze these recommendation narratives to uncover common patterns in the kinds of aspects and contexts people describe in them. To this end, we annotated a random sample of the first posts of 1,457 narrative LT requests⁶ according to whether they (1) represent a known-item search or a narrative recommendation request, (2) are at least a full sentence, (3) mention example books or authors, and (4) mention the context of use (i.e., does the reader have a specific purpose for the requested book recommendations)?

4.2.1 Narrative length. Our analysis of narrative length revealed that posts below 70 characters consist mainly of one or two short conversational sentences, and ask for topical suggestions without adding any further detail to the request. An example of such a narrative is “YA books about Time Travel. Any recommendations?” (ID-B64934). However, there are only 30 such posts. For 8 of these, the message body only contains the words *any suggestions* or *any recommendations* and the request is covered by the thread title. Note that for narrative length we only consider the message body. The mean (median) length of a narrative is 527 (417) characters.

¹<http://www.imdb.com/board/bd0000001/threads/>, last accessed February 17, 2017

²<http://www.imdb.com/board/bd0000122/threads/>, last accessed February 17, 2017

³<https://www.reddit.com/r/tipofmytongue/>, last accessed April 1, 2017

⁴<http://www.librarything.com/zeigeist>, last accessed March 30, 2017

⁵<https://www.goodreads.com/about/us>, last accessed on March 30, 2017

⁶Available at <http://social-book-search.humanities.uva.nl/#/overview>

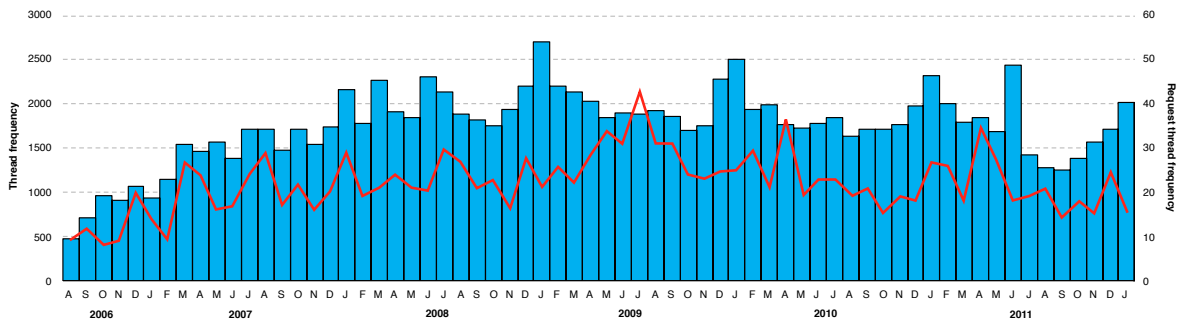


Figure 1: Thread creation frequency on the LibraryThing forums over time (blue bars, left axis), measured by the number of unique threads initiated each month. The red line (right axis) shows the creation frequency of narrative request threads.

Table 1: Distribution of examples and context-of-use over the 974 narrative requests.

		Context		Total
		Yes	No	
Examples	Yes	209	352	561
	No	170	243	413
Total		379	595	974

4.2.2 *Examples & Context of use.* As per our definition of NDR in Section 2, we do not consider known-item requests to be examples of valid recommendation needs. Of the 1,457 forum requests, 483 (or 33.2%) are known-item needs, leaving 974 pure narrative requests. Table 1 shows a further breakdown of these 974 requests according to whether they include examples and/or an intended context of use. This gives us a better understanding of how common the different elements of narrative requests are. Users provide at least one relevant example in 58% of these narratives and an intended context of use in 39% of all cases. There are 209 (21%) narratives that contain both examples and the context of use. It is important to note that most of the 243 narratives that do not provide either, are not traditional recommendation needs as these requests still provide a long narrative describing the user’s need.

4.2.3 *Narrative aspects.* The final element of our exploratory analysis focuses on the aspects that make recommended items relevant to the user. We used a comprehensive set of annotations for a subset of the 1,457 narratives, taken from the Suggestion task of the INEX Social Book Search evaluation campaign [16]. These topics were labeled according to eight relevance aspects, seven of which were previously identified by Reuter [24] and defined in more detail by Koolen et al. [17]: **Content**, **Metadata**, **Familiarity** (e.g. related to a previous reading experience), **Engagement**, **Accessibility** (e.g. language, difficulty, availability), **Novelty** and **Socio-cultural** relevance (i.e., related to the socio-cultural background of the user). We leave out the requests that have a **Known-item** aspect, because it represents a pure *search* task and requires different system support, leaving 742 requests for analysis. While different classification schemes could also be applied to our narrative requests, they provide a first

Table 2: Aspect distribution and overlap in 742 requests

	A	C	E	F	M	N	S
Accessibility	137	96	41	48	28	8	27
Content		598	157	267	176	26	98
Engagement			196	88	40	11	24
Familiarity				326	74	17	45
Metadata					179	11	25
Novelty						34	10
Socio-cultural							133

step towards a meaningful differentiation between narratives and thereby the development of recommendation algorithms for coping with these different aspects.

Table 2 shows the distribution and co-occurrence statistics of these seven aspects over the 742 topics. Most narratives have a **Content** aspect where the user describes preferred characteristics of any next book(s) to read. The second-most frequent aspect is **Familiarity**, where narratives contain either examples of previously read books or authors and a request for similar, complementary or dissimilar items, or explicit references to previous reading experiences (e.g., books that scarred the requester or made them think). Many narratives combine **Familiarity** with **Metadata**, **Content** or **Engagement**, where the user desires focused recommendations based on examples, but is also trying to express what it is about those examples that they found salient, so using temporary ‘mini-profiles’ based on those examples alone is not enough. In narratives with a **Novelty** aspect, user express a preference for something different from what is in their profile, yet the profile may still reflect preferences for style, difficulty, language, and other aspects.

We claim that our analysis demonstrates the complexity of these narrative requests. To develop recommender systems that can support this kind of recommendation scenario, one significant challenge is coming up with solutions to transform such requests into useful input for recommendation algorithms. One way could be to define a list of interface features that allow a user to express such complex needs in a machine-readable way. Another way could be to use text mining techniques to extract such features automatically.

5 DISCUSSION & CONCLUSIONS

We believe that the time is ripe in the recommender systems field to start diverting some of its research attention to investigating more complex recommendation scenarios. Narrative-driven recommendation represents such a scenario. Its combination of traditional recommendation based on user preferences combined with a focused narrative description of the user's current interest(s) and context of use calls for new approaches that merge the best of different information access paradigms, such as recommendation, search, and text mining. NDR is not a niche problem: we believe that the tens of thousands of examples already available on the Web represent just the tip of the iceberg when it comes to more focused recommendation needs that existing systems cannot adequately meet. NDR is perhaps not as common as regular interaction with recommender systems, but this is partly the result of the inability of current systems to meet more complex recommendation needs. A better understanding of these narrative needs can teach us more about how to approach recommendation in general as well as help benefit other recommendation scenarios. Forums are just one way of eliciting complex recommendation needs. Conversational recommendation, for instance, is another elicitation technique that shares many of the underlying problems with NDR: how can we use natural language understanding to better extract the relevant signals that represent the underlying complex need? NDR are a promising resource, because they could enable easy offline experimentation with such techniques.

Promising directions for future work could therefore be to use text mining to extract more meaning from the narratives as well as the development of hybrid recommenders that can tackle both the user preference and narrative components. Another direction could be the development of interfaces to elicit these complex aspects from the users directly, bringing it closer to true conversational recommendation. Finally, in addition to books and movies [4] other domains should be studied as well, such as product discussion forums, travel forums, gaming forums, and so on.

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