Towards Explanations of
Anti-Recommender Content in Public Radio

ABSTRACT

Other than private broadcasters, publicly financed broadcasters have to fulfil a public-service remit. Personalization and the risk of emerging filter bubbles however stands in direct conflict with neutral media coverage and other values of the public-service remit. The design of recommender systems therefore turns out to be a challenge for public broadcasters. Our contribution is two-fold. First, we elicited the requirements of the public-service remit at the example of one country. Second, on the basis of these requirements, we identified an approach that gives indication how to design transparency and explainability of recommender in direct connection to the public-service remit.

1 INTRODUCTION

A lot of countries run a dual broadcasting system, where public and private broadcasters jointly shape the nation's broadcasting landscape. The mission, funding and obligations of public and private broadcasters are however very different, and so is their relation to recommender systems.

In order to receive public funding, public broadcasters have to fulfil a public-service remit, written down in Broadcasting Acts or Broadcasting Agreements. Broadcasting Acts represent a democratically legitimated formulation of requirements that the society expects from its public broadcasters. The requirements written down in these legal documents are however somehow vague in their formulation. As a consequence, complying with the public-service remit is also a rather abstract affair: Public broadcasters do not have and never had quantifiable indicators to measure how much they comply with the public-service remit. Rather, the broadcaster's mission statement and self-understanding – which are derived from the public-service remit – are transported to all employees, especially journalists and editors, with the confidence that all the produced content, all the assembled radio shows, and finally the resulting radio program will match the requirements of the public-service remit. As a control mechanism, periodically, e.g. once a year, a report is written how the program complies with the public-service remit and presented to the nation's Broadcasting Council.

Now as personalization and individual playouts enter the innovation labs of public broadcasters, questions arise how personalization can go in line with the public-service remit [1]. Public broadcasters fear that filter bubbles might emerge and lead to a biased information reception of individual listeners. An algorithmically produced, systematic bias of information represents the exact opposite to the values recorded in the public-service remit. Emerging filter bubbles, produced by thousands of simultaneous individual playouts, might remain unnoticed by both the user (inside the filter bubble [2]) and the broadcaster (who might lack control of a multitude of possible filter bubbles).

To date, no clear picture exists how to bring personalization in line with the public-service remit. Subjective positions in practice range from black to white: some experts warn that personalization is a risk or even a no-go for public broadcasting; others think of personalization as an amendment to the linear program, therefore being nothing new and nothing different. Both no-care and no-go positions do have their reasons, but they do not help to discuss the middle part in-between – which contain probably the most realistic scenarios for the future. At the latest, when non-linear consumption will outperform linear consumption and account for more than 50% of all radio playouts, personalization and recommender in public service offers need to be discussed. Broadcasters need to figure out mechanisms that can help avoiding filter bubbles and biases. Within those, transparency and explainability of recommender can fruitfully add to the discussion. Hence, we ask the following questions:
What are the requirements of the public-service remit with regard to personalization? And how to design transparency for public radio with close relation to the public-service remit?

2 BACKGROUND AND RELATED WORK

2.1 Radio Brand Communication and the Public-Service Remit

Currently, public broadcasters find themselves in an odd situation: Whereas they have to comply with the public-service remit, at the same time, they are also forced to create or maintain a specific profile, which they communicate to listeners as part of their brand. Users have their favorite news magazine and favorite radio channel, that addresses their interests, their feelings and beliefs, and their political orientation. In this regard, all public media companies have to do the splits between public interests and target group interests. Though brand and profile might stand in conflict with the public-service remit theoretically, in practice public broadcasters manage to bring both requirements together. While differentiating their offer from other radio programs, they still comply with the idea of neutral media coverage to the satisfaction of the Broadcasting Council. So to speak, the corridor of the public-service remit is rather wide than narrow.

2.1 Filter Bubbles within Personalization

Personalization through algorithms is largely invisible. While this has advantages in terms of ease of use, it is problematic at the same time: users' opinions may be influenced without them being aware of it [1]. Conventional recommender systems that pro-actively suggest items of potential interest to the user make it often difficult to understand their outcome [2]. The algorithms' central position as an intermediary between information and users makes them information providers, such as search engines, which are able to influence the presented results [3]. The informational sphere that emerges when non-transparent algorithms influence the opinions and preferences of users has been labelled Filter Bubbles by Pariser [4]. It relates to the concept of Echo Chambers [5] that describe the informational sphere when individuals are exposed only to information from like-minded individuals. Pariser argues that the root of human intelligence consists in the ability to adapt to new information, but a system of recommendations turns a user into an immutable environment that they have shaped. The filter bubble reduces a user's creativity and learning ability and strengthens his/her beliefs [4]. The iTunes study of Hosanagar et al. confirms this assumption - they found out that users tend to consume similar content because recommender systems help to expand existing interests [6]. Iaquinta et al. see the main hazard in overspecialization, caused by a lack of serendipity [7].

Public broadcasters who want to integrate recommendation systems into their services in order to meet the changing reception habits of their listeners with a modern and attractive non-linear broadcasting service are confronted with this problem in particular [8]. But there are also voices against the fear of filter bubbles. For example, Linden, one of the authors of Amazon's recommender system, believes that personalization does not limit user selection, but rather serendipity. Recommendation systems help users discover content that they would not otherwise have searched for because they did not know about it [9].

In addition to the algorithmic influence, streaming services also have a human component that influences which content is consumed by the user. Self-selected personalization is strongly associated with selective exposure [10]. Selective exposure occurs when a person deliberately seeks messages that support his/her own point of view and thus creates a feeling of confirmation [11]. Even if algorithms propose fully balanced news, the user could be free to view only those items that match his preferences. This would lead to a lack of perceived diversity as well as the filtering out of various topics. On the other hand, there are users who use a news portal with filtering and still seek additional information or information that does not correspond to their opinions from another source in order to be well informed [10].

When considering the influence of a filter bubble on information formats, it is noticeable that the predisposition of a user is of particular importance for news: How motivated a user is to look for various information from several sources or different points of view strongly depends on how much he is interested in the topic [13-15].

Broadcasters are gatekeepers who control the floss of information [4]. This means that there is already a certain degree of filtering in the public media institutions. E.g., not all daily events are reported or can be reported. Also, the time slot of each radio show may influence the probability of a program's audience being large or small [15]. Which topic makes it into the show is ultimately decided by the editors. Algorithms would primarily replace human gate keepers. The difference between editors and algorithms is that people follow ethics and have an eye for the public interest [4]. But, as Friedman elucidated, technology may have ethics, too: Algorithms are not neutral and the opinions and values that developer hold will manifest themselves in the product [16].

2.2 Approaches to Avoid Filter Bubbles

Several approaches exist to avoid or reduce the risk of filter bubbles. Ekstrand et al. propose a way to prevent filter bubbles by giving the user control over the algorithmic settings. This can be the selection of algorithms, or a variant for combining one algorithm with another. It is also possible to give the user control over the degree of diversity or the used information from the user profile using adjustable variables [17]. Interactive Recommender Systems have been proposed that aim to give the user more control over the recommendation process and to improve transparency (e.g. [18]), though not explicitly for public broadcasting.

Liu et al. propose a combination of personal interests with local trends. Their study shows that users often click on the articles recommended to them in this way, but then search less for articles in the topics they subscribe to [19]. Li et al. propose a system called "SCalable two-stage pErsonalized News rEcommendation system" (SCENE) to avoid filter bubbles. SCENE is a two-level algorithm whose first level divides articles into topic categories relevant to the user and whose second level recommends individual articles from these categories [20].

Iaquinta et al. present a concept of a hybrid recommender system that combines a content-based approach with serendipitous heuristics in order to avoid filter bubbles with surprising suggestions. Required for their serendipity method is a content-based recommender

system, that implements their "anomalies and exceptions" approach. They follow the idea that content should not be recommended if it is too similar to items the user has already consumed [21].

Burke applies the technique of "heuristic similarity". This approach takes into account the semantics of the assessments. The similarity of users is examined on a rating scale in order to highlight qualitative differences between ratings [22].

Pöchhacker et al. investigated on algorithms with regard to the challenge of public service broadcasting and propose the possibility of using an anti-recommender system to send out other content to users. Furthermore, they point out that the stakeholders in the broadcasting system need to be reconsidered. For personalized broadcasting, the committees should be expanded to include developers, data scientists, database administrators, web designers and network technicians who were not previously associated with the work of journalists [15].

Looking into practice, the National Public Radio (NPR) in the U.S. manages to reduce the risk of filter bubbles in its personalized service NPR One by also playing out non-recommender content next to recommender content. NPR's so-called "flow" always starts with a news sequence. This is skippable by the user, but is initially offered [23].

3 METHODOLOGY

We carved out requirements from the German Broadcasting Act, the "Staatsvertrag für Rundfunk und Telemedien", more commonly known as "Rundfunkstaatsvertrag" (RStV), in its 19th version[*] from June 1st, 2016, by means of qualitative data analysis [24].

Before coding the document, we set up a coding frame. Considering the requirements for public broadcasters, we found two levels of requirements addressed by the RStV: requirements concerning a) content production and b) content composition.

Content production: Content has to be produced according to requirements mentioned in the RStV, e.g. media coverage has to be independent and objective, content checked for truth, produced according to journalistic standards etc.

Content composition (recommendation): The sequence of the content items is what makes up the radio program. Therefore, the program composition might also account for the emergence of filter bubbles.

In a non-linear playout, the produced content pieces themselves cannot be changed as they are given as atomic items; the only possibility to create a multitude of personalized programs automatically is by composing content pieces in different ways. Therefore, we focus on the content composition and neglect requirements for content production. For coding purposes, we established a simple coding framework with just two codes: a) concerns content production and b) concerns content composition. Two coders performed the coding procedure independently. After coding, assigned codes were discussed, and differences resolved.

4 REQUIREMENTS OF THE PUBLIC-SERVICE REMIT

In the following, we present the requirements that concern the content composition only, i.e. the program compilation. In the end, we elicited 7 requirements.

R1. Comments must be separated and clearly distinguishable from reports (§ 10 (1)).
R2. The service offer of public broadcasters should include information, education, culture, and entertainment (§ 11 (1)).
R3. The service offer should give a comprehensive overview over international, national, and regional events in all essential areas of life (§ 11 (1)).
R4. The service offer should be balanced (§ 11 (2)).
R5. The service offer should reflect the diversity of opinions (§ 11 (2)).
R6. The service offer should support the process of forming a free and individual opinion and therefore fulfil the needs of a democratic, social and cultural society (§ 11f (4)).
R7. Broadcasters must offer counterstatements of an affected person in equivalent way free of cost. For the non-linear program in telemedia (especially internet), the counterstatement must be offered uncut in equivalent form and length as the original statement. It must be offered as long as the original statement is available and in direct connection to it (§ 56 (1)).

4 AN APPROACH TO DESIGN TRANSPARENCY WITHIN PUBLIC RADIO

After eliciting the requirements of the public-service remit, the next question is, how to derive recommender system design requirements? The answer is more an interpretation than a strict derivation of system design requirements. Even though it is just an interpretation, this interpretation needs to be done, and we need a deliberative discussion about it in detail, in order to finally form a

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[*] The full treaty can be found under http://www.gesetze-rechtsprechung.sh.juris.de /jportal/?quelle=jlink&query=RdFunkStVtr+SH&psml=bsshoprod.psml&max=true

picture of recommender system design for public radio that is supported and accepted by a majority. Here, we focus on the design of transparency and explainability of recommender systems.

Generally, in public radio, the question is not only what has been selected for playout, but also who made the selection. While the user is free so select whatever he wants, the broadcaster is not – a public broadcaster will not only play content that meets the interests of the user (sometimes called anti-recommender). This however emerges not only in a duty for the broadcaster, but also in a right for the listener. The listener should have the right to know why which content is offered to her/him. In classic radio, the user does not have to question the content selection, because either a) in linear radio, this is done by professional editors or b) in on-demand media she/he does the selection himself. If an algorithm however carries out the selection, the user must have the right to know how the recommendation came to be and if her/his information need is affected by systematically biased playouts.

In a public radio context, which is a combination of recommender (to meet the users' interests) and anti-recommender (to meet the public-service values), questions will arise on the side of the listener, independent of the exact recommender algorithms in place. In the same way that users ask in recommender settings "why this recommendation?", in an anti-recommender setting, they might feel even more the urge to ask "why this recommendation?". Explainability and transparency can therefore be an important acceptance factor in public-service recommendation.

While users are familiar with explanations "because you like sports", "because you like speaker x", or "because you consumed item y", explanations of anti-recommender are rather unfamiliar.

The requirements of the public-service remit give indications, how explanations for public radio recommendation may look like to closely meet the ideas of the public-service remit.

T1. For an anti-recommender, the broadcaster may keep track of the mixture of the playout in terms of culture, entertainment, information and education. A recommender could explain: "to provide you a good mix, we now recommend some educational content instead of more entertainment", or "it's already more than 4 hours that you listened to news, so now it's time for news again" (meeting R2 in conjunction with R4).

T2. Also regional, national or international matters make a good explanation for recommender, e.g. "after regional news, now for national news" or "because you haven't listened to international matters today" (meeting R3 in conjunction with R4).

T3. The diversity of opinions is probably the core requirement of the public-service remit. Recommender systems could explain a recommendation this way: "now let's hear a different statement on this topic", or "because you consumed content x, here is a different view on this" (meeting R5 and R6).

T4. Counterstatements make a good reason for a recommender as well. "Because you listened to content y, here is a counter statement to this" (meeting R7).

T5. Similarly, the necessity to distinguish comments from reports may serve as an explanation: "because you listened to report x, here some comments on this" (meeting R1).

Following this approach, the requirements of the public-service remit could directly be addressed in the communication with the user and reflected in recommender explanations. Of course, for these explanations, the according metadata of the radio content and a certain length of user history is necessary.

5 DISCUSSION AND CONCLUSION

In public radio, transparency and explainability seems important on two levels: the *individual level*, to make the listener aware of individual program selections and the reasons behind it, and the *societal level*, to justify the recommender systems and its mechanisms in front of the Broadcasting Council.

Considering the individual level, broadcasters may consider transparency as a way to increase the acceptance of their playouts. Also, the broadcaster can give a certain extent of responsibility back to the user. Going back to the question "who made the selection", the answer is still the broadcaster – but the user has a chance to understand why. As a conclusion, transparency and explainability is not only an acceptance factor for traditional recommendation context, but has similar potential in anti-recommender contexts.

Considering the societal level, with personalization in place, it is not possible anymore to carry out expert opinions on a program level (as has been done in the previous decades), as every single individual playout looks different. Justifying personalized playout needs to be fundamentally different – by transparently describing the algorithms and mechanisms in place, and how they help to avoid filter bubbles. As a result, both the expert (writing the report) and the Broadcasting Council (checking the report) need some sort of technical understanding. Expert opinions might therefore cover two parts in the future – one part for the linear program, as traditional, and one new part for the personalized playouts, justifying the personalized service offer of the broadcaster. The approach depicted in this paper may help to justify broadcasters their efforts for transparency in close relation to the public-service remit.

In this paper, we discussed transparency and explainabilty in the context of public radio. Our contribution was two-fold. First, we elicited the requirements of the public-service remit at the example of one country. Second, on the basis of these requirements, we

identified an approach that gives indication how to design transparency and explainability of recommender in direct connection to the public-service remit.

Still, as transparency alone probably cannot make a personalized playout comply with the public-service remit, it can be one approach in the set of measures to make public broadcasters in line with public-service values.

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