# Enabling Users' Control on Recommender Systems for Short Videos: A Design Proposal for the Implementation of the Requirements of the Digital Services Act*

Matteo **Fabbri**[1], Jingyi **Jia**[2] and Wolfgang **Woerndl**[2]

[1]*IMT School for Advanced Studies, Lucca, Italy*

[2]*Technical University of Munich, Munich, Germany*

**Abstract**

In the contemporary information age, online platforms influence users' behaviour through recommender systems (RSs), the algorithms that suggest content to them. The Digital Services Act (DSA) of the European Union is the first supranational regulation that sets specific transparency and design requirements for RSs with the aim of enhancing users' autonomy: apart from explaining the functioning of their RSs in the terms and conditions, online platforms are now required to provide a functionality that allows users to modify the parameters on which recommendations rely. However, the standards on how to design DSA-compliant RSs have not been published yet, leaving the regulatory ground open to conflicting interpretations. In this work, we introduce an interactive, controllable short video recommendation platform that will be used to carry out user studies aimed at clarifying how the user control features in RSs can be designed so that users understand and are willing to intervene on the recommendation process. Our contribution proposes original algorithmic and interface design features that can be adopted by the main short-video platforms with minor refinement to comply with the DSA.

**Keywords**

Recommender systems, Meaningful control, Interface design, Digital Services Act

## 1. Introduction

In the contemporary information age, the influence of online platforms on people's behaviour is widespread: from scrolling through series of short videos on TikTok, to purchasing a product suggested by the personalized feed on Amazon, individuals' choices are increasingly informed by stimuli coming from digital interfaces. This influence is enabled mainly by recommender systems (RSs), the algorithms that suggest content to users of online platforms. The Digital Services Act (DSA) of the European Union [1] is the first supranational regulation that sets specific transparency and design requirements for RSs with the aim of enhancing users' autonomy: in particular, "Providers of online platforms that use recommender systems shall set out in their terms and conditions, in plain and intelligible language, the main parameters used in their recommender systems, as well as any options for the recipients of the service to modify or influence those main parameters" (DSA, art. 27.1). While explanations must be granted in any case, the "easily accessible functionality" that allows users to change the parameters of recommendations shall be provided just when "several options are available [...] for recommender systems that determine the relative order of information presented to recipients of the service (DSA, art. 27.3).

Such regulatory focus is justified by the concern that the nudging potential of RSs represents a risk, especially for vulnerable users: indeed, judicial cases involving platforms' responsibility for displaying

* *EWAF'24: European Workshop on Algorithmic Fairness. July 01-03, 2024. Mainz, Germany*

matteo.fabbri@sns.it (M. Fabbri)

*© 2023 Copyright for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).*

CEUR-WS.org/Vol-3908/paper_49.pdf

CEUR Workshop Proceedings ceur-ws.org ISSN 1613-0073

recommendations that may lead to political radicalization or endangerment of minors have recently caught public attention [2]. In fact, adapting the concept of nudging developed by Thaler and Sunstein [3], RSs can be defined as "digital nudges", because they "influence which information is easily accessible to us and thus affect our decision-making processes through the automated selection and ranking of the presented content" [4]. As a result, digital nudging through RSs "may lead to undesirable outcomes, such as manipulation, if users' perception of the recommendation process is not informed by the knowledge of how it unfolds" [5] and how they can influence it. The black-box character of RSs can cause users' inability to verify the quality of a recommendation or to challenge an inappropriate outcome. Therefore, to be effective, the application of the new legal requirements for RSs transparency should be supported by the understanding of how their nudging mechanisms affect users' choices.

In order to comply with the DSA, very large online platforms (VLOPs) have progressively provided explanations of their RSs and developed additional user control mechanisms [6], whose effectiveness depends mainly on the level of users' active engagement [7, 8], which is, in turn, strongly influenced by the design of the interface. However, research in this field is at its initial stage, and the existing control features are not popular with users [9], probably due to poor design [10] and lack of incentives. To explore the interactive design of meaningful user control in RSs, this paper introduces an interactive, controllable short video recommendation platform that will be used to carry out user studies aimed at answering the following research question: *how can the user control features in RSs be designed so that users understand and are willing to intervene on the recommendation process?* Short videos have been chosen as the target domain of recommendations because they are among the most popular and attention-consuming online content nowadays, especially among young users.

## 2. Designing for users' agency and control of recommender systems

When designing our interactive interface, particular consideration was given to ensuring that the system is transparent and has a low cognitive load. Transparency is a prerequisite for user control: users need to understand how the RS works and how they are profiled before they can intervene on the parameters of the recommendations to inform them according to their preferences [5]. This can be achieved by introducing appropriate explanations [11], as the user experience is optimised when both controllability and explainability are provided at the same time [12]. Thus, we added implicit and explicit explanations to let users know how their actions can affect the system. We also attempted to strike a balance between providing users with control features and limiting their cognitive load: indeed, an overabundance of control options and complex functions can lead to users' confusion, worsen their experience, and even lead to low-quality recommendations [13, 14].

Users' characteristics were also considered: Knijnenburg et al. [15] have shown that users' expertise and digital literacy often influence their understanding of the RS, thereby affecting their mode of interaction. People who are familiar with social media applications or have prior knowledge in the field of computer science tend to use personalized RSs more effectively [16, 17, 18]: consequently, it is essential to design recommendations considering the needs of both experts and inexperienced users. A promising approach is to differentiate the interface design by offering offer both elementary and advanced control features but presenting them in distinct interface spaces [15]. The design guidelines adopted include:

- using common visualizations,
- simplifying the complexity of the interaction,
- implementing dynamic feedback to assist comprehension, and
- presenting control features with different levels of complexity in separate interfaces.

## 3. Building an interactive recommendation interface: a three-layered approach

Mainstream short-video platforms were chosen as the primary design references for our platform, which recommends short videos retrieved from the YouTube API[1]. The decision of adopting this API was based on the idea that users would find a familiar interface for short videos more straightforward. User controls on the interface are categorized into low-, medium-, and high-level, following the three-layered approach proposed by Jin et al. [20]. Figure 1 shows the interactive components used in this project and the level of control to which they belong:

- Low-level: Users interact with the recommendations through an evaluative feedback mechanism. Users can express how much they like the item and why. The RS uses this feedback to compute the updated user preferences by itself.
- Medium-level: Users can modify their user profile through interactive components, view and adjust the personalized metrics calculated by the system and make secondary adjustments to the aggregated preference results.
- High-level: Users directly intervene on the recommendation algorithm. In this project, users can adjust the relative weights of the two models adopted by a hybrid RS at any time.

To produce recommendations, we adopted a hybrid RS based on a personalized Topic-Based algorithm and a non-personalized Top-Popular algorithm, which provide candidate recommendations before a re-ranking algorithm generates the final list of videos. The proposed interface consists of two main pages: the video page, where short videos are displayed, and the user profile page. Following the design strategy recommended by Knijnenburg et al. [15], simple and complex interaction components are presented in separate spaces. The video page primarily features low-level controls, while the user profile page contains medium and high-level controls. This design assumes that, as the video page will be seen by all users, it should contain only simple control components for low-level customization. Expert users can switch to the user profile page for more advanced controls, depending on their interests.

On the video page (Figure 2), users participate in the recommendation process through low-level control components: as they watch videos, they can directly express their preferences using like and dislike buttons, or provide more detailed feedback, such as reasons for disliking a video, using a supplementary button. The information button allows users to see why a video has been recommended (explicit explanation) and the topic tags associated with the video, which, if hovered over, display a word cloud in which users can understand the range of topics underlying the tag (implicit explanation). Users can also click on either a green or red button under the word cloud, which correspond, respectively, to a *Topic Preference: Like Button Dislike Button* feedback: colours are used to convey immediately the positive or negative feedback on the corresponding topic. As the controls available on this page are primarily low-level, users do not directly interfere with the recommendation process, but instead express their preferences and allow the RS to update itself accordingly.

The user profile page (Figure 1) contains medium- and high-level controls. The medium-level controls allow users to change their topic preferences. We used a pie chart to show the composition of topic groups in the user profile, with labels indicating the name of the topics within the videos: here, users can view the scores corresponding to their interest level in the top-ten preferred topics calculated by the model, and can directly change such scores so that subsequent recommendations will be based on these user-modified preferences. For the high-level control, users can adjust the algorithmic parameters to increase or decrease diversity in the personalized Topic-Based algorithm, as well as the number of recommendations provided by each of the two algorithms.

[1] YouTube Data API [19]: https://developers.google.com/youtube/v3

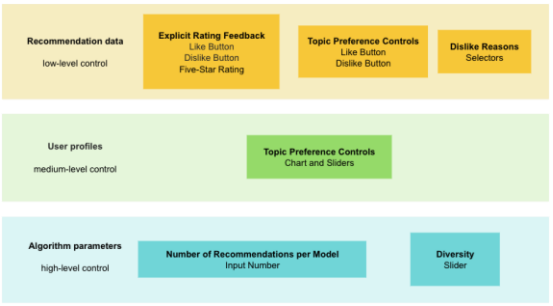


**Figure 1:** Interactive Control Features in Three Levels

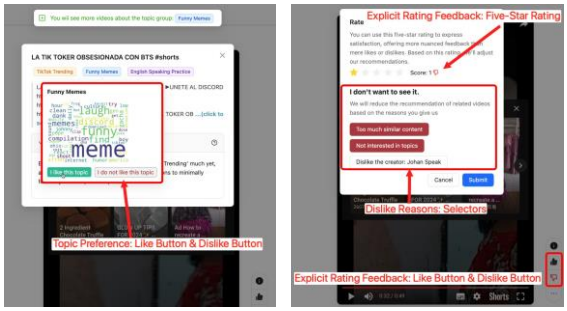


**Figure 2:** Video page

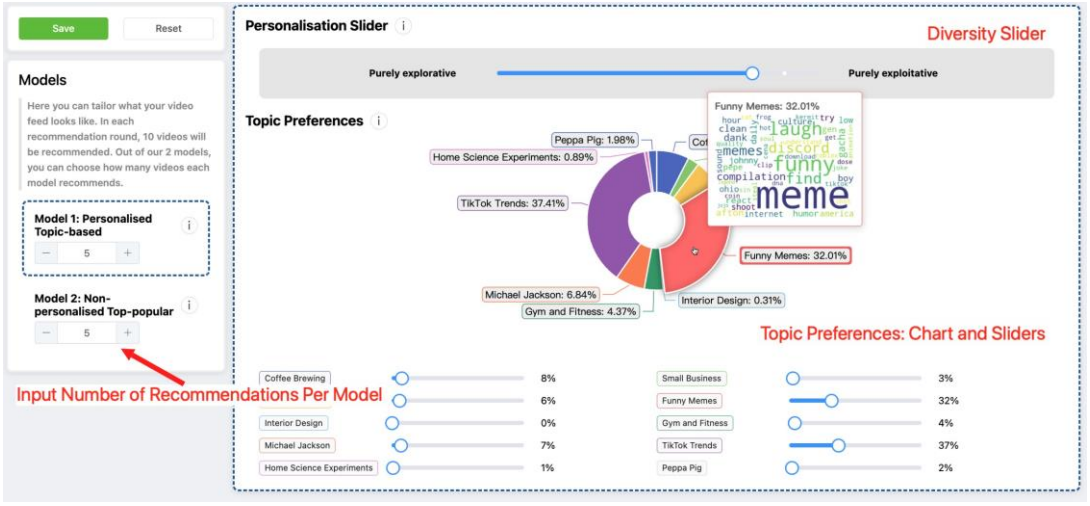


**Figure 3:** User Profile Page

## 4. Conclusion and future work

In this work, we presented interactive control features for a recommendation-based interface in the domain of short videos. Our contribution traces a novel perspective for the application of the transparency requirements for RSs of the DSA and sets the ground for testing the effectiveness of users' empowerment through active and meaningful control, which is a prominent goal of this European regulation. To continue in this research direction, we are developing and refining the RS models underlying the interface so that users' actions are realistically reflected in subsequent video recommendations. Moreover, our current work focuses on designing a user study to test the effectiveness of the proposed interaction components. We are planning to analyse users' behaviour, including the usage of the interactive control components of the interface and video watch times, and participants' explicit feedback collected through post-experiment questionnaires. Such user study, enabled by the interface presented above, will contribute to understand how meaningful users' control can be achieved effectively through the new regulatory incentives.

In conclusion, the design features of this short video recommendation platform can represent a guideline for the technical standardization of the DSA requirements on RSs, which has not happened yet. The European Commission has already opened two proceedings under the DSA against a prominent short-video VLOP like TikTok, the first of which focuses, among other things, on the "negative effects stemming from the design of TikTok's system, including algorithmic systems, that may stimulate behavioural addictions and/ or create so-called 'rabbit hole effects'" [21]. Therefore, there is a pressing need for clear design guidelines and standards allowing online platforms to adapt the control and feedback features of their RSs in compliance with Articles 27 and 38 of the DSA. Our

contribution traces a direction in this regard, by proposing original algorithmic and interface design features that can be adopted by the main short-video platforms with minor refinement.

## References


[1] Regulation of the european parliament and of the council on a single market for digital services (digital services act) and amending directive 2000/31/ec, 2020. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020PC0825&from=en.

[2] A. R. Sarkar, Tiktok's 'blackout' challenge linked to deaths of 20 children in 18 months, report says, The Independent (2022). URL: https://www.independent.co.uk/tech/ tiktokblackout-challenge-deaths-b2236669.html.

[3] R. Thaler, C. Sunstein, Nudge: Improving Decisions about Health, Wealth, and Happiness, Yale University Press, 2008.

[4] M. Jesse, D. Jannach, Digital nudging with recommender systems: Survey and future directions, Computers in Human Behavior Reports 3 (2021) 100052.

[5] M. Fabbri, Self-determination through explanation: An ethical perspective on the implementation of the transparency requirements for recommender systems set by the digital services act of the european union, in: Proceedings of the 2023 AAAI/ACM Conference on AI, Ethics, and Society, AIES '23, Association for Computing Machinery, New York, NY, USA, 2023, pp. 653–661. URL: https://doi.org/10.1145/3600211.3604717.

[6] C. Busch, From algorithmic transparency to algorithmic choice: European perspectives on recommender systems and platform regulation, in: Recommender Systems: Legal and Ethical Issues, Springer International Publishing Cham, 2023, pp. 31–54.

[7] C. Starke, L. Metikoš, N. Helberger, C. de Vreese, Contesting personalized recommender systems: A cross-country analysis of user preferences (2023).

[8] F. Bakalov, M.-J. Meurs, B. König-Ries, B. Sateli, R. Witte, G. Butler, A. Tsang, An approach to controlling user models and personalization effects in recommender systems, in: Proceedings of the 2013 International Conference on Intelligent User Interfaces, IUI '13, Association for Computing Machinery, New York, NY, USA, 2013, pp. 49–56. URL: https://doi.org/10.1145/2449396.2449405.

[9] Y. Jin, B. Cardoso, K. Verbert, How do different levels of user control affect cognitive load and acceptance of recommendations?, 2017.

[10] J. Stray, A. Halevy, P. Assar, D. Hadfield-Menell, C. Boutilier, A. Ashar, C. Bakalar, L. Beattie, M. Ekstrand, C. Leibowicz, C. Moon Sehat, S. Johansen, L. Kerlin, D. Vickrey, S. Singh, S. Vrijenhoek, A. Zhang, M. Andrus, N. Helberger, P. Proutskova, T. Mitra, N. Vasan, Building human values into recommender systems: An interdisciplinary synthesis, ACM Trans. Recomm. Syst. (2023). URL: https://doi.org/10.1145/3632297.

[11] N. Tintarev, J. Masthoff, Explaining recommendations: Design and evaluation, in: Recommender systems handbook, Springer, 2015, pp. 353–382.

[12] C.-H. Tsai, P. Brusilovsky, The effects of controllability and explainability in a social recommender system, User Modeling and User-Adapted Interaction 31 (2021) 591–627.

[13] S. M. McNee, S. K. Lam, J. A. Konstan, J. Riedl, Interfaces for eliciting new user preferences in recommender systems, in: P. Brusilovsky, A. Corbett, F. de Rosis (Eds.), User Modeling 2003, Springer Berlin Heidelberg, Berlin, Heidelberg, 2003, pp. 178–187.

[14] Y. Jin, N. Tintarev, N. N. Htun, K. Verbert, Effects of personal characteristics in control-oriented user interfaces for music recommender systems, User Modeling and User-Adapted Interaction 30 (2020) 199–249. URL: https://doi.org/10.1007/s11257-019-09247-2.

[15] B. P. Knijnenburg, N. J. Reijmer, M. C. Willemsen, Each to his own: How different users call for different interaction methods in recommender systems, in: Proceedings of the Fifth ACM

Conference on Recommender Systems, RecSys '11, Association for Computing Machinery, New York, NY, USA, 2011, pp. 141–148. URL: https://doi.org/10.1145/2043932.2043960.

[16] A. Chernev, When More Is Less and Less Is More: The Role of Ideal Point Availability and Assortment in Consumer Choice, Journal of Consumer Research 30 (2003) 170–183. URL: https://doi.org/10.1086/376808.

[17] X. Zhang, M. Chignell, Assessment of the effects of user characteristics on mental models of information retrieval systems, Journal of the American society for information science and technology 52 (2001) 445–459.

[18] C. Conati, G. Carenini, E. Hoque, B. Steichen, D. Toker, Evaluating the impact of user characteristics and different layouts on an interactive visualization for decision making, in: Computer Graphics Forum, volume 33, Wiley Online Library, 2014, pp. 371–380.

[19] YouTube, Youtube data API. URL: https://developers.google.com/youtube/v3?hl=en, accessed 05-10-2023.

[20] Y. Jin, N. Tintarev, N. N. Htun, K. Verbert, Effects of personal characteristics in control-oriented user interfaces for music recommender systems, User Modeling and User-Adapted Interaction 30 (2020) 199–249. URL: https://doi.org/10.1007/s11257-019-09247-2.

[21] European Commission, Commission opens formal proceedings against tiktok under the digital services act, 2024. URL: https://ec.europa.eu/commission/presscorner/detail/en/IP_24_926, accessed 05-05-2024.