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Evaluation of Fairness in Recommender Systems: A Review

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Abstract. Recent advances in Recommender Systems have shifted the attention of researchers towards fair and unbiased recommendations. A growing number of users use Recommender Systems for decision making and information retrieval and in turn have a significant impact on public opinion. Therefore, it is of pivotal importance to address the unfairness issue in recommender systems for fair inclusion of disadvantaged groups. The study of fairness in recommender systems is a relatively new field with a vast scope for further research and improvement. This study presents a thorough investigation of existing metrics in fairness evaluation from different contexts like user fairness, item fairness, group fairness, individual fairness, multi-sided fairness, etc.

Keywords: Fairness · Recommender systems · Multi-sided fairness

1 Introduction

Recommender systems are part of our lives as these help in decision making, information retrieval, listening to preferred music, and a lot more. Recommender systems mostly rely on historical interactions, so accuracy is increased as users interact with the system [37]. However, with newly added interactions the inherent bias of users like cognitive bias, cultural bias, gender bias, etc. [4] is transferred into machines as well. A recommender system should be fair enough in recommending relevant items to users and it should help users to find what they need even if they are unaware of their needs. The items of advantaged groups are more likely to get recommended irrespective of their quality or user's preferences [1] which makes fairness a critical issue in recommender systems.

The majority of existing works focused on the algorithmic aspect, leaving the non-algorithmic aspects behind. There is a need to consider different approaches in making the recommendations neutral by considering both algorithmic, as well as non-algorithmic approaches [11]. Recommendations could generate unfair results as these are data-driven systems that rely on huge amounts of data and algorithms which may be biased [22]. Non-algorithmic aspects mentioned in [5] has been used by [35] in his work.