

# MUSIC RECOMMENDER SYSTEMS AND CHILDREN

How demographic features impact the accuracy of recommendations

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## 1. Introduction

- Problem: Recommendations fail to reflect preferences of children, as they are optimized for adults.
- Gap: Demographic features are researched to improve recommendation accuracy for a general user group, however this is still unexplored for child-centric recommender systems.

## 2. Research Question

“How do demographic features, such as age, gender, and country, and profiling features impact the performance of music recommender systems tailored for children?”

## 3. Methodology

- Filtered subset of the LFM-2b dataset with annotated demographic features (age, gender, and country).
- Compute profiling features on the listening history of the user.
  - Exploratoryness: Captures how much a user explores music.
  - Concentration: Captures how balanced a user listens to their favorite artists.
  - Replayness: Captures how much a user returns to their favorite songs.
- Baseline model trained solely on implicit-feedback interactions using Neural Matrix Factorization (NeuMF)
- Extend the baseline model by incorporating additional input features

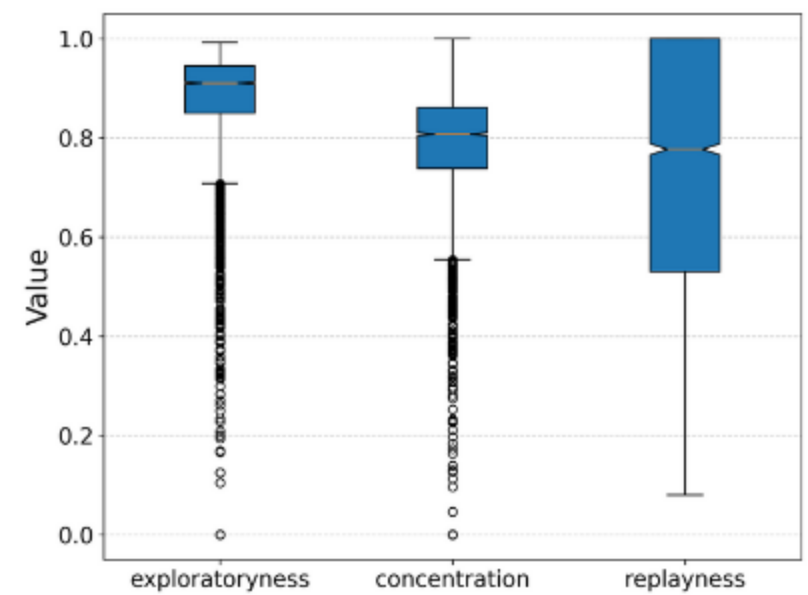


Figure 1: Distributions of the computed profiling features.

## 4. Results

- **Demographic features:**
  - Performed worse than expected, as accuracy was reduced significantly.
  - Model combining all still performed worse than the baseline model.
- **Profiling features:**
  - Models incorporating these features improved recommendation accuracy.
  - In particular, replayness achieved an improvement of 18.1% compared to the baseline.
- **Combinations of both feature groups:**
  - Models incorporating replayness dominated the top-performing models
  - Interestingly: combination of exploratoryness and all demographic features saw significant improvement in recommendation accuracy

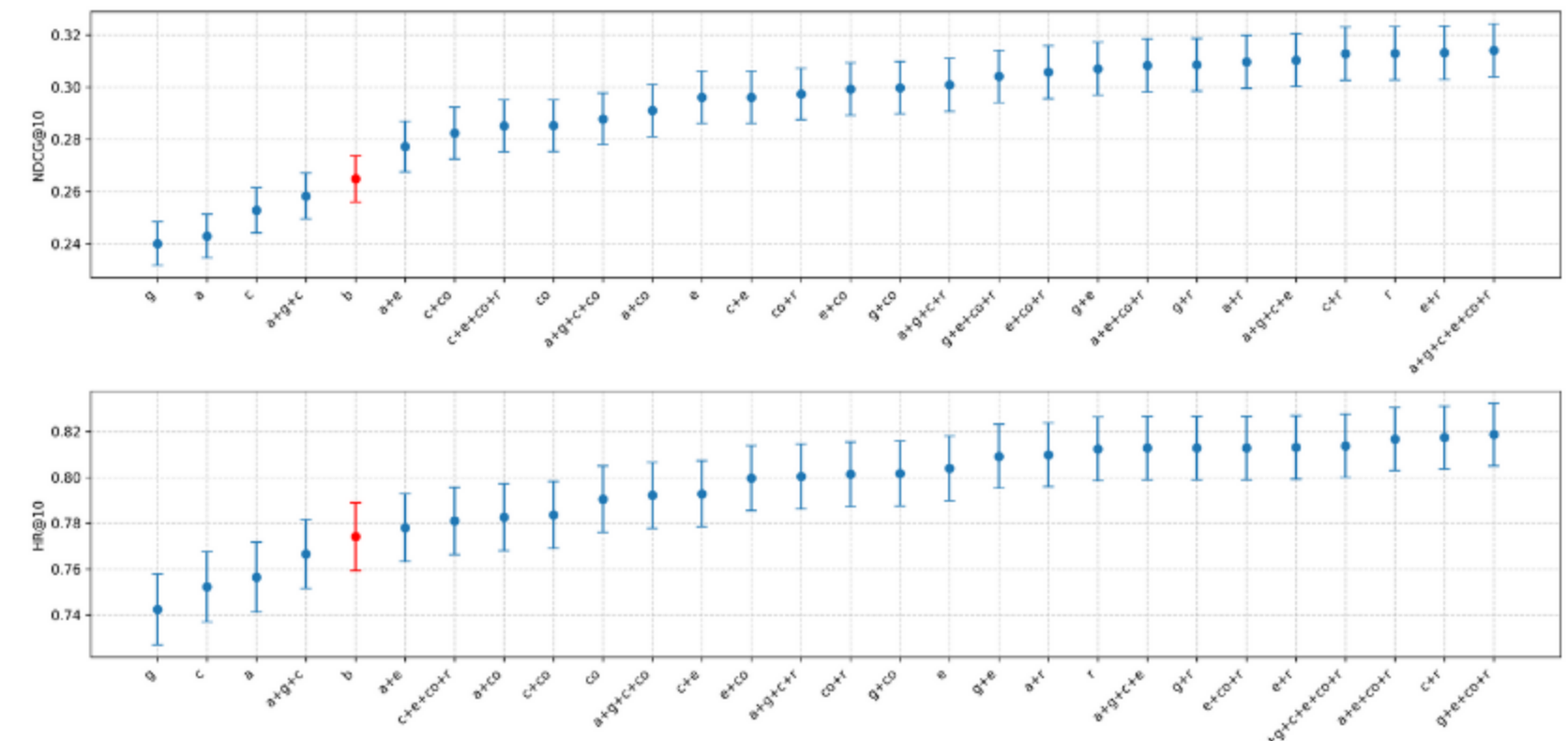


Figure 2: HR@10 (top) and NDCG@10 (bottom) with 95% CI intervals on the test set across all experiments. Experiments are indicated with the initials of the features incorporated in the model, with c standing for country and co for concentration. The baseline model is highlighted in red and indicated with a b.

## 5. Discussion

- **Demographic features:**
    - Children are easily influenced by global trends, diminishing performance given by country.
    - Children's musical preferences evolve continuously during adolescence, meaning that two children can be the same age and still be in different stages of how they engage with music.
  - **Profiling features:**
    - Profiling features were able to capture developmental stages and preferences of children.
    - Listeners replay favorite songs for mood regulation and identity formation, which is especially pronounced for children.
  - **Combinations of both feature groups:**
    - Previous research has shown that the combination of exploratoryness and demographic features improve recommendation quality for a general userbase.
- Takeaway:** Demographic features provide, at best, marginal improvements and, at worst, reduce recommendation performance for children, and recommender systems based on behavioral listening patterns improve recommendation quality and accuracy for children.