

BiRating - Iterative averaging on a bipartite graph of Beat Saber player skills and map difficulties

Juan Casanova

January 13, 2025

Abstract here

1 Introduction

Unsupervised learning, iterative algorithms in graphs. Differences with this. Beat Saber, maps, players, scores, BeatLeader. Previous star algorithms. Differences with this (e.g. supervised vs unsupervised).

2 Algorithm description

Basic principles, what the algorithm does, and why. Talk about the error here.

Subsection on convergence.

3 Data preparation and implementation

Implementation details, data preparation, what data I have, what did I do. Talk about hyperparameter search

4 Results

Actual results, direct discussion and its meaning. Talk about convergence again.

Evaluation of results compared to star rating algorithm and community discussion.

5 Limitations

Inherent algorithm limitations: Convergence.

Data limitations: Data quality, need scores, abuse, not suitable for live system, which scores to pick, irregularity of scores.

Application limitations: Multidimensionality of skill and difficulty, curve shape matters.

6 Related and future work

ALS and other more advanced algorithms.

Mention existing approaches again.

Pattern recognition with neural networks: Supervised data issue, and what is authoritative. Feature selection. Data preprocessing. Curve shape estimation.

7 Conclusion

Interesting approach. Why it is interesting compared to other approaches. Works to some degree. Limitations. More work needed. Helped identify some core difficulties with the approach.