

Abstract – In the digital landscape of social networking, the challenge of improving friend recommendation systems is pivotal for enhancing user interaction and fostering social connections. Addressing this challenge, the current study innovates by fusing Bayesian Personalized Ranking (BPR) with Matrix Factorization (MF), culminating in a novel BPR-MF model designed for the intricacies of social network relationships. The study harnesses a rich dataset from LastFM, comprising 27,806 interactions among 7,624 users, to analyze mutual follower patterns and augment the precision of friend recommendations. Through rigorous preprocessing and systematic evaluation of the BPR-MF model against different numbers of latent factors, the research uncovers that a configuration of 20 latent factors is most effective, achieving an RMSE of 0.156 and an AUC ROC of 0.800. This discovery addresses the critical problem of balancing computational complexity with prediction accuracy in recommendation models. It also demonstrates the necessity for a nuanced, data-driven approach to generate relevant social connections. The research sets a new direction for future studies aiming to capitalize on user interaction data to offer precise friend suggestions, all while upholding user privacy and avoiding reliance on personal data.

Keywords: Recommendation system, Social network, Bayesian personalized ranking, Matrix factorization, Alternating least squares