

AR2S2: A Trust-Aware Graph-Based Content Ranking Algorithm for Hyperlocal Campus Social Networks

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Abstract

Campus information is scattered across messaging groups, notice boards, and general-purpose social platforms whose feeds are ranked by global engagement rather than local relevance or source credibility. This paper presents AR2S2, the ranking engine of Campus Nexus, a college-only social network. AR2S2 models students and their campus relationships as a weighted graph and scores each candidate post for each viewer by combining viewer-author trust, contextual relevance, engagement quality, and temporal freshness in a transparent weighted function. Trust itself blends graph proximity with author reputation, so reputable authors outside a viewer's immediate network are not suppressed. The four ranking weights were selected by a grid search over the weight simplex (step 0.05) using NDCG@10 on a synthetic campus validation set, and a sensitivity analysis shows that shifting any single weight by ± 0.05 lowers NDCG@10 by at most 0.0082. Because the synthetic relevance labels share their components with the scoring function, these results are an internal consistency check rather than evidence of real-world gains; validation with real student data is the immediate next step. Every ranking decomposes into four interpretable terms, which makes AR2S2 a practical, explainable starting point for hyperlocal feed personalization.

Keywords

Campus social network, trust-aware recommendation, graph-based ranking, reputation system, hyperlocal social media, personalized feed, explainable ranking.