

SWAN: A Modular Ensemble Similarity-Weighted Aggregation Network for Robust and Interpretable Topic Modelling

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Abstract

Unstable topic models can undermine the reliability of insights drawn from marketing-relevant text data such as reviews, social media posts, and customer feedback. We introduce SWAN, a modular ensemble framework that addresses the instability of single-run LDA by identifying topic structures that recur across multiple model specifications. SWAN filters low-quality topics, detects recurring themes through similarity network clustering that empirically determines the number of topics, and aggregates them with coherence weighting and lift adjustment to enhance interpretability. Across two corpora, SWAN outperforms the strongest single-run LDA in coherence, distinctiveness, and human and AI rated interpretability. By generating clear and reproducible consensus topics, SWAN provides a more robust analytical foundation for marketing modelling and improves the reliability of text-driven insights used for understanding and predicting marketing phenomena.

Track: Methods, Modelling & Marketing Analytics