Personalized Advertising Optimization: Bridging Generative AI with Interpretable Consumer-Creative Dual Clusters

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This research examines how firms can use Generative AI (GenAI) to optimize personalized advertising. Using large-scale native advertising data and a two-study design combining consumer-creative dual clustering with a controlled experiment, we test whether mapping consumer clusters to creative feature combinations improves GenAI-based ad modification. Results reveal a dual engagement structure: creative feature structures show both local resonance and global effectiveness across consumer clusters. In a randomized A/B test survey (n = 384; 3,840 observations), GenAI-adapted ads were preferred in 58.1% of cases on average, with strategic optimization producing additional uplift. Findings suggest that scalable personalization depends on interpretable consumer-creative cluster structures, strategic implementation, and semantic congruence.

Keywords: Generative AI, Personalized Advertising, Consumer Segmentation, Creative Optimization, Unsupervised Clustering, Advertising Effectiveness