

## Life Stage Customer Segmentation by Fine-Tuning Large Language Models

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**Abstract :** This paper addresses the critical challenge of accurately categorizing customers within the customer base of a retailer. Precise categorization is paramount for devising targeted marketing strategies that effectively resonate with this valuable demographic. To tackle this challenge, we propose an innovative method leveraging the capabilities of Large Language Models (LLMs). Using LLMs, we analyze the meta-information of product purchases extracted from historical data to identify critical product categories serving as distinguishing factors. These categories, such as baby food, eldercare products, or family-sized packages, offer valuable insights into the likely household composition of customers, including families with babies, families with kids/teenagers, families with pets, households caring for elders, or mixed households. We segment high-confidence customers into distinct categories by integrating historical purchase behavior with LLM-powered product classification. This paper asserts that life stage segmentation can significantly enhance e-commerce businesses' ability to target the appropriate customers with tailored products and campaigns, thereby augmenting sales and improving customer retention. Additionally, the paper details the data sources, model architecture, and evaluation metrics employed for the segmentation task.

**Keywords :** LLMs, segmentation, product tags, fine-tuning, target segments, marketing communication

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