

# RevieWeaver: Weaving Together Review Insights by Leveraging LLMs and Semantic Similarity

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Applied Machine Learning Best Buy

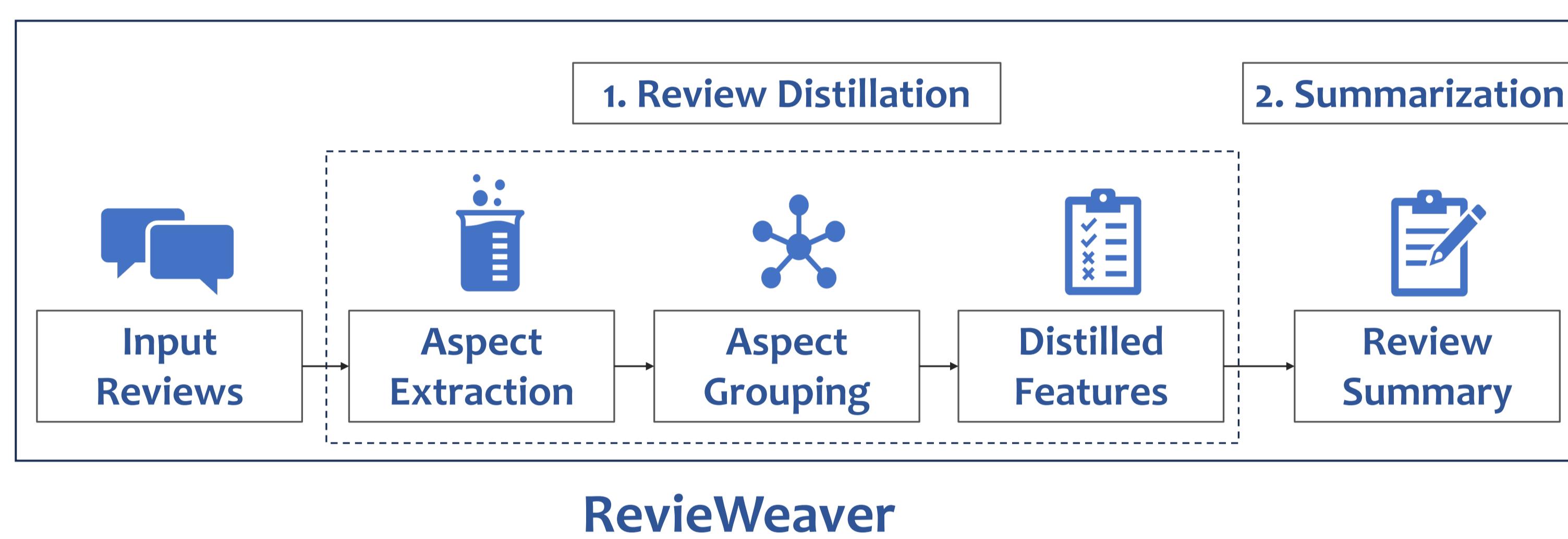


## The Problem

- Online retail generates massive customer reviews, overwhelming consumers.
- Sifting through thousands of reviews to understand a product's strengths and weaknesses is time-consuming and inefficient.
- Existing methods struggle with identifying implicit product aspects and scaling to large datasets.

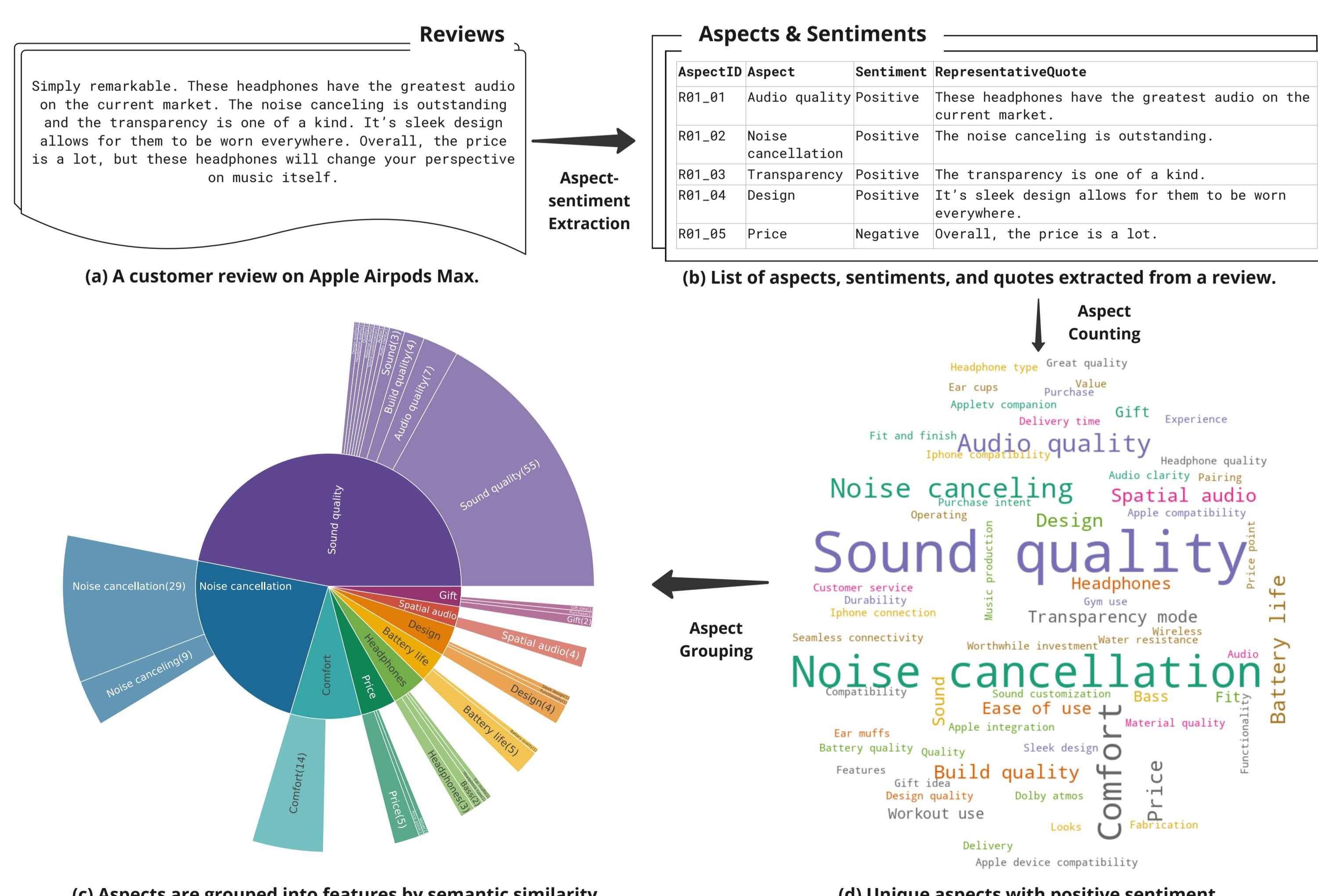
## The RevieWeaver Framework at Best Buy

- Utilizes a large language model (LLM).
- Provides a scalable solution for extracting positive and negative product features and summarizing reviews.
- Consists of two components:
  - Review Distillation
  - Review Summarization



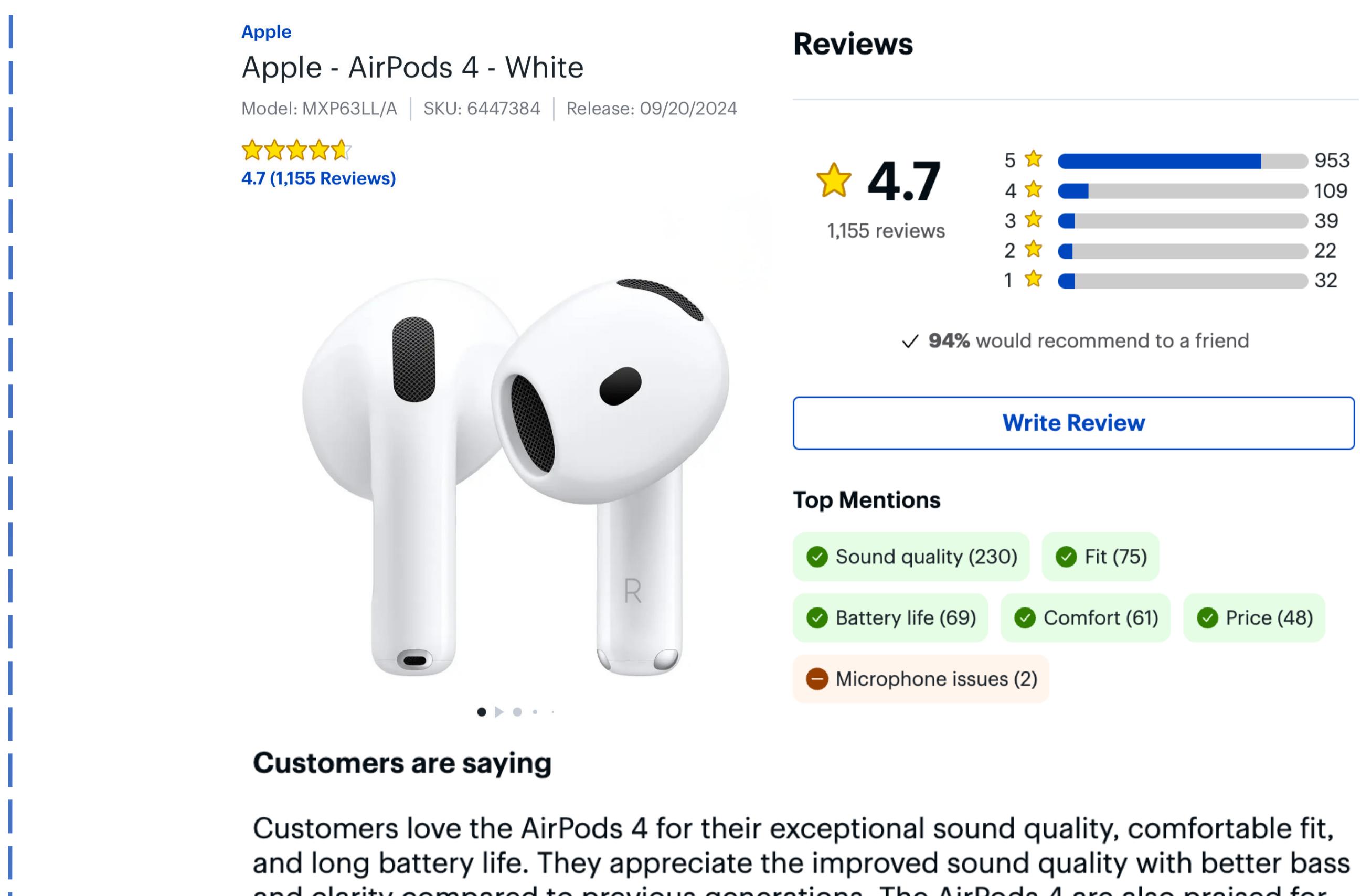
## Review Distillation

- LLM identifies aspects, sentiments, and representative quotes from each review.
  - Identifies both implicit and explicit aspects.
  - Example: aspect- *Portability*, sentiment- *Positive*, representative quote- *They are very convenient to use on the go.*
- We group aspects by sentiments.
- We count each unique aspect, their frequencies, and consider each unique aspect a node.
- A modified union-find algorithm groups similar aspects based on semantic similarity of aspects and representative quotes.



## Review Summarization

- LLM creates a summary using the top positive and negative features and their representative quotes.
- Avoids processing the entire review corpus.



## Evaluation

- Dataset**
  - 10103 reviews across 167 best-selling products.
- Review Distillation**
  - Modified union-find algorithm outperforms DBSCAN and HDBSCAN based on Silhouette coefficient, Calinski-Harabasz index, and Davies-Bouldin index.
- Review Summarization**
  - LLM judges rate summaries generated using distilled features vs. full reviews based on coherence, consistency, fluency, and relevance. No significant difference in quality is found.

## Production Deployment

- Deployed on Google Cloud Platform, processing ~30 million reviews across 200,000 product categories.
- Three-stage Vertex AI pipelines: aspect-sentiment extraction, review distillation, and review summarization.
- Modular design enables independent processing of reviews and scalable experimentation.

