

## **Aspect-Based Opinion Mining for Headphone Reviews**

### **1. Project Summary**

This project focuses on building an aspect-based sentiment analysis system for headphone reviews. Instead of assigning a single overall sentiment to a review, the system identifies specific product features and determines the sentiment expressed toward each aspect.

### **2. Data Preparation**

All reviews were converted to lowercase, cleaned using regular expressions, tokenized into words, and filtered using stopwords while preserving negation terms for accurate sentiment detection.

### **3. Custom RAKE Implementation**

A custom implementation of the RAKE algorithm was developed to gain transparency in keyword scoring and to handle informal and code-mixed user reviews effectively.

### **4. Negation Strategy**

A proximity-based negation handling rule was applied. When negation words appeared near adjectives, their sentiment polarity was reversed to avoid incorrect interpretations.

### **5. Sentiment Estimation**

Sentiment scores were computed using adjective synsets from SentiWordNet, as adjectives carry the strongest emotional meaning in opinionated text.

### **6. Aspect Linking**

Extracted aspects were linked with nearby adjectives, and their sentiment scores were averaged to obtain a reliable sentiment value for each aspect.

### **7. Weakness Discovery**

Low-rated reviews were analyzed separately to identify genuine problem areas and recurring negative feedback.

### **8. Processing Flow**

Cleaning → RAKE → Negation Handling → SentiWordNet → Aspect-Based Sentiment Analysis → NSS

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