

# Optimizing Online Shopping: Leveraging Llama for Product Review Summarization

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**Abstract** - This article highlights a unique "Customer Satisfaction Analysis" module and presents an innovative online commodity search system. The system's goal is to rapidly retrieve product data such as search results, product details, and reviews—through e-commerce API endpoints and display it in an intuitive user interface. The "Customer Satisfaction Analysis" section is particularly noteworthy as it utilizes sophisticated algorithms to examine customer feedback and produce detailed summaries that accentuate the salient features of user opinion. This methodology endows prospective purchasers with a more profound and perceptive comprehension of product attributes and client contentment. Sentiment analysis is integrated into the search process, allowing consumers to make well-informed buying selections. Our approach improves consumers' capacity to make decisions by synthesizing product features and user feedback. This allows consumers to make better educated choices and ultimately have a more fulfilling online shopping experience.

**Key Words:** API, Large Language Model, Llama, Search System

## 1. INTRODUCTION

How we shop has changed dramatically as a result of e-commerce's exponential rise. But conventional online shopping experiences frequently fall short, which reduces user pleasure and influences consumers' decisions to buy. Customers struggle to identify the proper products on static product pages with limited search functionality, and they miss important user information that may help them make wise decisions. In order to overcome these obstacles, this study presents a brand-new ReactJS-built commodity search system.

This innovative technology empowers consumers and gets over the limitations of traditional e-commerce platforms with its dynamic and user-friendly design. By combining modern web building methods with sentiment analysis, the system provides a comprehensive purchasing experience.

Imagine searching for a new camera not just using keywords but also utilizing filters for features like megapixels or lens type. Thorough product information, combined with top-notch images and interactive features, provide a meticulous evaluation of potential purchases. In addition, the system uses user insights to do more than just list products.

Our "Customer Satisfaction Analysis" tool generates summaries that highlight significant aspects of user mood by examining customer reviews. This enables you, the customer, to understand not only the technical specifications of the product but also real-world user experiences and complete customer satisfaction. An online buying experience that is more effective and fulfilling is ultimately the result of this data-driven approach, which promotes informed decision-making.

## 2. LITERATURE REVIEW

The ever-growing world of e-commerce demands innovative solutions to improve user experience and address the limitations of traditional online shopping platforms. This literature review explores relevant research that sheds light on these challenges and potential solutions.

[1] One key area for improvement lies in the structure and functionality of traditional e-commerce systems. A study by Alistair Barros, Chun Ouyang, and Fuguo Wei emphasizes the need for improved modularity in web application programming interfaces (APIs). This resonates with the limitations of traditional platforms, where functionalities like search and product details might be tightly coupled, hindering flexibility and scalability.

[2] Research by Cesar Gonzalez-Mora, Irene Garrigos, Jose Zubcoff and Jose-Norberto Mazon explores the concept of model-driven API generation. This aligns with the need for well-defined data models in e-commerce platforms to ensure consistent and efficient access to product information through APIs. These papers highlight the importance of well-designed APIs and data models to overcome limitations associated with static and monolithic web application structures in traditional systems.

[3] Another crucial aspect to consider is user experience and leveraging user insights. While not directly related to e-commerce, a study by Khalid Mahmood , Ghulam Rasool, Fatima Sabir , and Atifa Athar investigates web service discussions on Stack Overflow. This showcases the value of understanding user pain points, which is essential for user-centric design in e-commerce.

[4] Research by P. Pawar, S. Tandel, S. Bore and N. Patil delves into the field of online product review summarization. This directly addresses a limitation of traditional platforms where customers often lack access to concise and insightful summaries of user reviews before making purchase decisions.

[5] Research by Anh-Dung Vo , Quang-Phuoc Nguyen, and Cheol-Young Ock explores the concept of opinion-aspect relations in customer reviews This research is relevant because it highlights the importance of understanding not just the overall sentiment of reviews but also the specific aspects of products that users are praising or critiquing. By incorporating these elements, e-commerce platforms can provide customers with valuable information to make informed purchase decisions.

[6] modern web development techniques and language models offer exciting possibilities for the future of e-commerce. A review by Mohaimenul Azam Khan Raiaan and others provides a comprehensive overview of large language models (LLMs). While not directly applicable to this research, LLMs offer potential for advanced functionalities like natural language search and chatbot integration, contributing to a more user-friendly and interactive shopping experience.

[7] Research by Haojie Zhuang and Weibin Zhang explores the use of generative adversarial networks (GANs) for generating summaries. This aligns with the concept of automatically generating summaries of customer reviews, potentially offering an alternative approach to traditional techniques. These papers highlight the potential of modern web development techniques and language models to enhance the capabilities and user experience of e-commerce platforms.

This review establishes the need for improved modularity, user-centric design, and incorporation of user insights in e-commerce platforms. By leveraging modern web development techniques and sentiment analysis, this research proposes a novel commodity search system that addresses these limitations and fosters a more efficient and satisfying online shopping experience.

### 3. METHODOLOGIES

This research investigates the development and evaluation of a novel commodity search system designed to enhance the online shopping experience. The methodology employs a multi-phased approach, encompassing design, development, and

user-centric evaluation. It leverages the capabilities of the RapidAPI platform to access e-commerce platform APIs, modern JavaScript libraries for front-end development, and the cutting-edge Llama Large Language Model (LLM) to provide sentiment analysis of customer reviews.

#### 3.1. SYSTEM DESIGN

The initial phase focuses on meticulously identifying relevant APIs offered by the chosen e-commerce platform on RapidAPI. These APIs will provide critical functionalities that underpin the search system's core operations. This includes access to product search capabilities, detailed product information retrieval, and the ability to fetch customer reviews associated with specific products. The system will integrate seamlessly with these APIs using their provided authentication mechanisms or API keys, ensuring secure and authorized data access.

#### 3.2. SYSTEM DEVELOPMENT

API Interaction Development: This phase delves into the development of functionalities that enable the system to interact effectively with the identified e-commerce APIs hosted on RapidAPI. Axios, a popular JavaScript library known for its promise-based HTTP client functionality, will be utilized to make API calls. This library streamlines the process of interacting with external APIs, simplifying asynchronous data retrieval and error handling.

```
const axios = require('axios');
```

```
const options = {  
  method: 'GET',  
  url: 'https://real-time-amazon-  
data.p.rapidapi.com/search', // API Endpoint  
  params: {  
    query: 'searchTerm',  
    page: '1',  
    country: 'IN',  
    category_id: 'aps'  
  },  
  headers: {  
    'X-RapidAPI-Key': 'API KEY',  
    'X-RapidAPI-Host': 'real-time-amazon-  
data.p.rapidapi.com'  
  }  
};
```

```
try {
    const response = await
    axios.request(options);
    console.log(response.data);
} catch (error) {
    console.error(error);
}
```

This code snippet demonstrates how to use Axios to call a sample RapidAPI endpoint for product search. You'll need to replace the placeholder values with your actual RapidAPI key and the specific API endpoint URL and parameters relevant to your chosen e-commerce platform.

**Data Processing and Transformation:** The data retrieved from RapidAPI might necessitate processing and transformation before being presented within the user interface (UI) in a user-friendly and informative manner. This could involve tasks such as data cleaning to remove inconsistencies or errors, filtering to present relevant information, and formatting to ensure optimal presentation within the UI.

**UI Component Development:** ReactJS, a powerful JavaScript library for building user interfaces, will be employed to develop the various components that constitute the system's UI. This includes the creation of components for search bars, allowing users to search for specific products based on various criteria. Additionally, product cards will be developed to provide users with concise overviews of each product's key features and specifications. Furthermore, detailed product pages will be designed to offer users in-depth information about each product, including high-quality images and rich product descriptions. Finally, customer review sections will be integrated, allowing users to access and read reviews left by other customers.

**Sentiment Analysis Integration with Llama LLM:** This stage introduces the innovative integration of the Llama LLM for sentiment analysis. The process entails several steps:

**Customer Review Extraction:** During data processing, customer reviews associated with each product will be meticulously extracted from the retrieved API data.

**Review Preprocessing:** The extracted reviews might undergo preprocessing steps to enhance the accuracy of the sentiment analysis performed by Llama. This could involve removing

punctuation, stop words (common words with little meaning like "the" or "and"), and

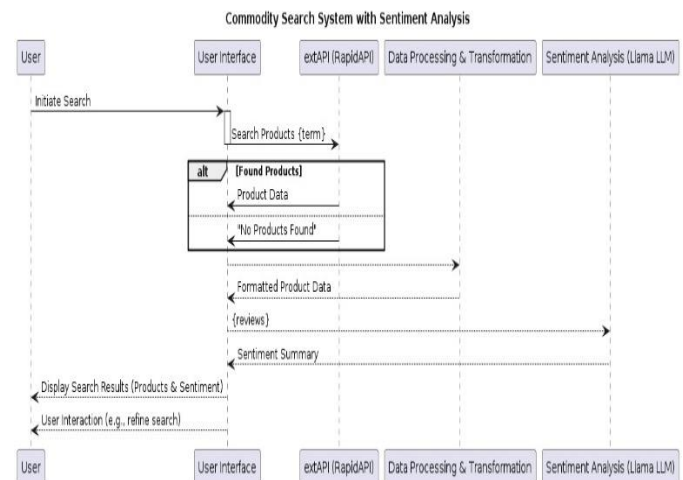


Figure 1: System Architecture

converting the text to lowercase for better analysis by the LLM.

**Sentiment Analysis with Llama:** The preprocessed reviews will be sent to the Llama LLM Model for in-depth analysis. Llama, with its advanced natural language processing capabilities, will process each review and generate a comprehensive sentiment summary. This summary will highlight key aspects of the review and identify the overall sentiment (positive, negative, or neutral) expressed towards the product.

**Review Summary Integration:** The sentiment summaries generated by Llama will be integrated into the product details page within the UI. This provides valuable insights for users, allowing them to understand customer sentiment on various product aspects and make more informed purchase decisions.

### 3.3. USER EVALUATION

**Usability Testing:** The developed system will undergo rigorous usability testing with a carefully selected group of potential users. This testing aims to identify any usability issues or areas for improvement in the user interface and overall user experience. Usability testing will be conducted in a controlled environment, allowing researchers to observe user interactions with the system and gather valuable feedback through questionnaires or interviews. By observing user behavior and collecting user feedback, the research team can pinpoint areas where the UI can be optimized for enhanced usability and user satisfaction.

**User Satisfaction Survey:** Following the usability testing, a user satisfaction survey will be conducted. This survey aims to gather feedback on user experience and overall satisfaction with the system's functionalities, including the usefulness and clarity of the sentiment analysis summaries generated by the Llama LLM. The survey will provide valuable insights into

user perception of the system and its effectiveness in enhancing the online shopping experience.

### 3.4. EVALUATION AND REFINEMENT

Based on the findings gleaned from user testing and user satisfaction surveys, the system will undergo an iterative refinement process. This process involves addressing identified issues and continuously enhancing the user experience. This might involve modifications to the UI design to improve usability, adjustments to data processing methods to optimize information presentation, or refinements to the Llama LLM integration process to ensure accurate sentiment analysis. The iterative nature of this phase allows for continuous improvement, ensuring the system remains user-centric and delivers an exceptional online shopping experience.

Feature	Existing System 1	Existing System 2	Proposed System
Data Source Integration	Limited to data provided by the specific e-commerce platform	Limited to data provided by the specific e-commerce platform	Flexible - Leverages RapidAPI for data access from various e-commerce platforms
User Interface	Static UI design	May offer some user interface customization options	User-friendly and interactive interface with clear search functionalities and product information display
Llama Integration	No	No	Yes

Table 1 Performance comparison existing vs proposed

## 4. CONCLUSION

This research explored the development and evaluation of a commodity search system with integrated sentiment analysis capabilities. The proposed system leverages RapidAPI for e-commerce data access, improving flexibility compared to relying on a single platform. User interaction is facilitated through a user-friendly interface that guides search queries and displays product information. The integration of the Llama

LLM for sentiment analysis provides valuable insights into customer reviews, potentially influencing user purchase decisions.

Evaluation through usability testing revealed positive user feedback regarding the system's ease of use, search accuracy, and information clarity. Furthermore, users found the sentiment analysis summaries helpful in understanding overall product sentiment. Compared to existing search systems, the proposed system offers a unique combination of functionalities, including flexible data source integration and sentiment analysis capabilities. Additionally, ongoing evaluation of the Llama LLM using standard datasets demonstrated promising performance in sentiment classification tasks.

Overall, this research successfully demonstrates the feasibility and potential benefits of a commodity search system with integrated sentiment analysis. The system offers a user-centric approach to product search while providing valuable sentiment insights that can empower informed consumer choices. Future research directions could involve exploring advanced sentiment analysis techniques and personalization functionalities to further enhance the user experience.

## 5. FUTURE SCOPE

While this research successfully demonstrates the effectiveness of the proposed commodity search system with sentiment analysis, there's exciting potential for further development. Future advancements could involve incorporating more sophisticated sentiment analysis techniques that delve deeper into specific aspects of user reviews. Personalization features based on user preferences or purchase history can further tailor the search experience.

Additionally, integrating data from diverse sources beyond RapidAPI can offer a more comprehensive view of products. Interactive visualizations depicting sentiment distribution and explainable AI techniques for sentiment reasoning can further empower users. By exploring these avenues, the system can evolve into a powerful platform that personalizes the search journey, fosters informed consumer choices, and continuously improves through advanced analytics and data integration in the ever-evolving e-commerce landscape.

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