



# International Journal of Innovative Research in Computer and Communication Engineering

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# Big Data Analytics in E-Commerce Platform

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**ABSTRACT:** The process of gathering, processing, and evaluating massive quantities of both organised and unstructured data produced by online buying activities is known as "big data analytics" in e-commerce systems. E-commerce Companies use social media interactions to collect data., product reviews, browser histories, transaction records, and customer transactions. Businesses may determine consumer preferences, forecast purchasing patterns, and enhance decision-making by utilising big data technologies. It supports focused marketing tactics, inventory control, fraud detection, and customised product suggestions. In general, big data analytics improves consumer satisfaction, boosts revenue, and boosts operational effectiveness in contemporary e-commerce platforms.

**KEYWORDS:** Big Data, E-commerce, Data Analytics, Customer Behaviour, Personalization, Recommendation Systems, Inventory Management, Fraud Detection, Digital Marketing, Business Intelligence.

## I. INTRODUCTION

These days, e-commerce platforms are much more common in recent years because of the rapid expansion of smartphone technology and internet usage. Online shopping is preferred by millions of consumers due to its convenience, wide selection of goods, and simple payment methods. Because of this, e-commerce websites produce enormous volumes of data every second from consumer searches, purchases, clicks, product ratings, reviews, and social media interactions. Big data refers to this enormous quantity of information. Such massive, intricate, and rapidly evolving datasets are beyond the capabilities of conventional database systems.

The process of gathering, storing, processing, and analysing substantial amounts of structured, semi-structured, and unstructured data in order to derive valuable insights is known as big data analytics. Big data in e-commerce platforms aids businesses in comprehending consumer preferences, purchasing behaviours, and market trends. Companies may improve their performance and make better decisions by analysing both historical and current data.

Another significant domain in which analytics using big data is crucial to e-commerce platforms is marketing. To develop tailored ads and marketing campaigns, companies examine consumer demographics, browsing patterns, and social media trends. This enhances customer retention and draws in more clients. Sentiment analysis is also utilised to comprehend consumer views via feedback and product reviews.

## II. SYSTEM MODEL AND ASSUMPTIONS

The analytics of big data system for an e-commerce platform considers a large network of users, sellers, and administrators interacting through an online marketplace. The platform produces enormous volumes of data from customers purchases, browsing history, product searches, reviews, payment transactions, and social media interactions. This data can be structured, semi-structured, or unstructured and is collected from multiple sources in real time.

The system assumes that data is stored in distributed storage platforms such as cloud databases and big data frameworks to handle large volumes of information efficiently. Technologies like Apache Hadoop, and Apache Hive are used for storing, processing, and analysing the data. The platform assumes continuous internet connectivity and secure transaction systems for seamless user-server communication.

Before analysis begins, Preprocessing procedures are applied to the gathered data such as data cleaning, filtering, transformation, and integration. The system assumes that customer behaviour patterns can be found utilising predictive analytics models and machine learning techniques. These models help in product recommendation, demand forecasting, fraud detection, and customer segmentation. The e-commerce platform also assumes that user data is updated



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continuously in real time to provide personalized recommendations and dynamic pricing strategies. Security and privacy measures are considered to safeguard private client data while it is being collected and analysed.

### III. EFFICIENT COMMUNICATION

In this Big Data analytics scheme, the e-commerce platform continuously collects large amounts of data from customers, sellers, and transaction systems. The collected data includes product searches, browsing history, purchase records, payment details, customer reviews. The system identifies relevant data sources and transfers the required information to data processing units for analysis.

Using data filtering and selection techniques, the platform chooses useful datasets that help in improving business performance while reducing unnecessary storage and processing costs. The primary goal is to ensure efficient data utilization with minimum delay in decision-making.

### IV. SECURITY

Due to the constant collection, processing, and storage of vast volumes of sensitive customer and corporate data, security is a crucial necessity in Big Data analytics for e-commerce systems. Personal information, payment information, browsing history, transaction records, and product reviews are all contained in this data. To preserve client confidence and the company's reputation, this information must be shielded from illegal access, cyberattacks, and data abuse.

Data security threats in e-commerce platforms can be divided into various categories:

1. Unauthorized Access: To steal personal data, including usernames, passwords, and credit/debit card information, hackers may try to obtain unauthorised access to customer databases, payment systems, or analytics platforms. To stop these kinds of attacks, robust authentication techniques and access control systems are employed.
2. Data Breaches: Large e-commerce businesses are attractive targets for online criminals due to they maintain enormous datasets. Financial information and private client records may be exposed by data breaches. Data transmission and storage are protected through the use of encryption techniques.
3. Fraud Detection Attacks: Fraudsters may create false accounts, modify payment systems, or conduct fraudulent transactions. Machine learning algorithms are used in big data analytics to identify anomalous transaction patterns and instantly stop fraud.

### V. RESULT AND DISCUSSION

In Fig. 1, The quantity of successful customer transactions over a given time frame is used to gauge sales performance. The graph shows that as client data is efficiently analysed for tailored recommendations and focused marketing tactics, sales progressively rise.

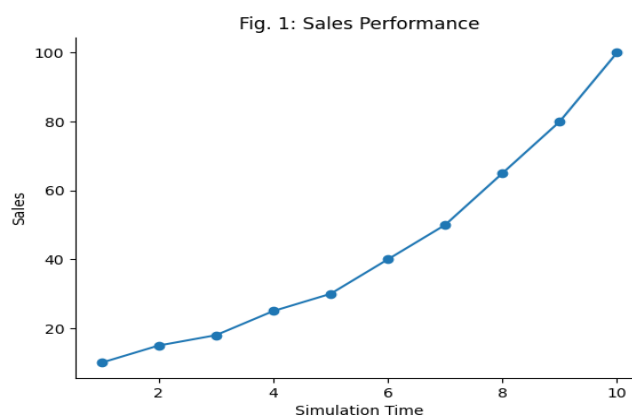


Fig. 1: Simulation time vs Sales Performance in E-commerce Platform



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In Fig. 2, It displays the time vs. customer satisfaction rate graph. Better product recommendations, quicker service, and an enhanced user experience through data-driven decision making all contribute to increased customer satisfaction. The graph shows that when analytics are implemented effectively, satisfaction ratings rise with time.



Fig. 2: Simulation time vs Customer Satisfaction Rate

In Fig. 3, The findings show that massive data analytics enhances e-commerce platform security, customer satisfaction, and sales growth. However, for improved performance, obstacles including data privacy concerns, storage expenses, and processing complexity must be handled skilfully.

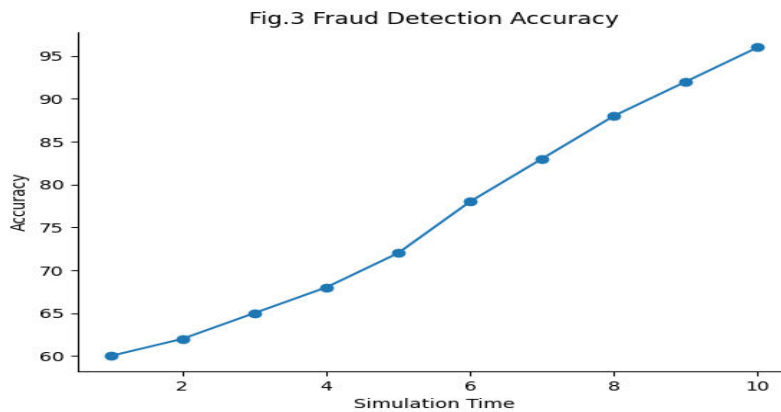


Fig. 3: Simulation time vs Fraud Detection Accuracy

### VI. CONCLUSION

An important factor in raising performance is big data analytics of e-commerce platforms by efficiently collecting, processing, and analysing large volumes of customer and transaction data. It helps businesses enhance product recommendations, inventory management, pricing strategies, and sales forecasting. It also improves customer experience through personalized services and targeted marketing. Security measures protect customer information and detect fraudulent activities. In the e-commerce sector, big data analytics generally boosts customer satisfaction, operational effectiveness, and business expansion.



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