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Secure E-Commerce Fulfilments and Sales Insights Using Cloud-Based Big Data

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Abstract

The increasing expansion of e-commerce has resulted in massive amounts of transactional and customer information thus security, efficiency, and scalability are critical considerations. Secure cloud-based big data system that uses AES-256 encryption, Long Short-Term Memory networks, Graph Neural Networks and BERT to power e-commerce fulfilment and sales analytics. AES-256 encryption conserves sensitive deal data by maintaining privacy and integrity. LSTM helps modernize inventory and contentment operations in demand forecasting. GNN increases supply chain security by detecting vulnerabilities and reducing threats in real-time, while BERT is used to extract meaningful insights from encrypted customer interactions and feedback. For comparison with recommended model numerous performance indicators were scrutinized and assessed ranging from sales progression with time, distribution of products by categories, monitoring order status, to data leakage decline rate. Findings register notable enhancement of security and running efficiency. In particular, use of AES-256, LSTM, GNN, and BERT in blended security framework resulted in 98 percent data breach reduction which validated proposed security frameworks strength. Predictive analytics enhanced demand forecasting accuracy and facilitated better decision-making in supply chain management. This research emphasizes the need to integrate sophisticated deep learning models with big data security systems to provide secure, scalable and smart e-commerce environments.

Keywords: *E-Commerce Security, Cloud-Based Big Data, AES-256 Encryption, LSTM, GNN, BERT, Predictive Analytics*

1. Introduction

The speedy increase in e-commerce trends has produced an unprecedented influx of data creation which necessitates efficient processing, security and analysis [1]. With increased length of e-commerce supply chains companies extensively depend on e-commerce big data to streamline order fulfilment, anticipate consumer behavior and maximize sales strategies [2]. Data sharing and security concerns in hybrid clouds are due to sensitivity of customer and transactional data [3]. Implementation of access control and authentication measures in combination with AI and IaaS reliability testing methods provides secure transactions with operational effectiveness [4]. To enhance predictive analytics and decision-making, deep learning-based methods like Bi-directional Long-Short Term Memory based Deep Neural Networks have been extensively used in demand forecasting and fraud detection [5]. Neural networks with Harmony Search Algorithm are effective in optimizing sales intelligence and transaction security [6]. Last but not least, hybrid clustering and evolutionary algorithms assist in customer segmentation and personalized recommendation systems enhancing user experiences while securing sensitive information [7]. Existing approaches for data sharing and security in hybrid cloud systems use an information fusion strategy to provide smooth and safe transaction processing [8]. E-commerce transaction security relies on cloud-based big data analysis to detect fraud and prevent unwanted access [9]. Big data analytics and demand information exchange in e-commerce supply chains reduce manufacturer encroachment and channel dispute resulting in effective inventory management [10]. ML and AI with blockchain increases transparency and trust in digital transactions [11]. Attribute-based K-anonymity safeguards client privacy whilst SE-PSO-enhanced Sigmoid-LeCun-TCN optimizes DL networks for real-time fraud detection and demand prediction [12].

Transaction security in e-commerce is of utmost importance especially when dealing with dynamic, big datasets [13]. Techniques like Isolation Forest Integrated Ensemble Machine Learning Algorithm can successfully identify fraudulent transactions while Authorized Public Auditing Scheme for Dynamic Big Data protects cloud-stored data integrity [14]. Knowledge of semi-stream joins based on MongoDB enables real-time processing of data enhancing data quality and optimizing order fulfilment processes [15]. Promoting sustainable development in e-commerce requires combining safe cloud-based architecture with high-performance computing solutions [16]. Hybrid clustering and evolutionary algorithms for e-commerce support adaptive inventory management, demand forecasting and supply chain optimization while maintaining cost-efficient operations [17]. Integration of deep learning, AI-driven security protocols and dependable verification methods in IaaS environments strengthens safety and efficiency of contemporary e-commerce platforms [18]. This paper investigates safe cloud-based architecture combining state-of-the-art deep learning algorithms, hybrid clustering and encryption to optimize e-commerce fulfilments and sales intelligence. Utilizing big data analysis secures authentication and AI-based auditing processes, suggested model provides secure data protection, precise forecasting and real-time analytics for sustainable and secure e-commerce operations.

1.1 Problem Statement

Complexity of automotive supply chain data safety and analysis requires strong encryption and access management systems to prevent malware and data breaches [19]. Traditional database administration and cloud solutions lack scalable security protections which exposes weaknesses in fast processing and predictive analytics [20]. Deep learning approaches such as CNN with Edge Computing-Based Malware Diagnosis have been investigated for transaction security but their computational cost and latency remain important limitations [21]. Dung Beetle Optimization with SVM for Analysis improves consumer insights but lacks scalability when dealing with high-dimensional data. Usage of Restricted Boltzmann Machines and Bi-GRU in fraud detection improves accuracy but it is vulnerable to adversarial assaults because they lack strong explainability in decision making.

Incorporating IoT services in edge computing can streamline logistics and improve real-time tracking but its integration with data analytics and mobile computing presents issues with bandwidth efficiency and data synchronization [22]. Expanded CNNs and VAEs improve client recommendation systems but required extensive training data and computational power making instantaneous fashion deployment in cloud environments difficult. Optimization approaches like Crowd Search Optimization can fine-tune deep learning models for sales forecasts but they may converge to local optima, diminishing predictive analytics and overall efficiency [23]. AI interpretability enables transparency in decision-making but current methods fail to give explanations for predictions. Adaptive CNN-LSTM and Neuro-Fuzzy Integration for Edge AI and IoMT shows promise in handling dynamic data streams but is hampered by difficult hyperparameter tuning and increasing processing complexity.

1.2 Objective

- ✓ Identify essential ideas behind cloud-based big data, e-commerce satisfaction and security standards.
- ✓ Use cloud-based big data approaches to examine sales patterns and identify abnormalities.
- ✓ Investigate the effects of data security techniques on e-commerce fulfilment performance.
- ✓ Create optimal platform for safe e-commerce fulfilment and smart sales monitoring using big data.

2. Literature Survey

[24] explained significance of identity-chain technology-based cloud services and its usage toward secure authentication and access control in hybrid cloud. [25] focused on how data sharing utilizing blockchain technology enhances the security of transactions and prevents unauthorized access to sensitive information. AES encryption algorithms as a secure means for safeguarding e-commerce data in cloud. Dynamic federated data integration and iterative pipelines were introduced to present scalable e-commerce analytics based on a hybrid cloud and edge computing approach, facilitating efficient data processing and storage.

[26] measured effect of AI methods and big data analytics on e-commerce decision-making, using A/B testing, contextual testing through AI, and codeless mechanization software to improve real-time customer insights and intelligence. Hierarchical LDA, autoencoders, and isomap were used for dimensionality reduction, enabling trades to process large volumes of sales data more efficiently [27]. AI-based data processing techniques were used to improve customer segmentation, price optimization, and demand trend forecasting with better accuracy. Bi-

directional LSTM with regressive dropout was also used to improve predictive modeling in e-commerce supply chain optimization [28].

Another method studied spiking neural frameworks and edge computing methods for fast processing in e-commerce sites using IoMT-based prediction for secure online transactions. CNN and Score-CAM as ways to enhance image-based suggested goods and fraud prediction in online marketplaces [29] . Elliptic Curve Cryptography was also proposed for standard encryption methods, promising increased security while reducing processing complexity. Combination of blockchain-based data sharing with AI-powered data analysis in hybrid cloud settings has been demonstrated to increase transaction security and enable easy data exchange between suppliers and users.

3. Secure E-Commerce fulfilments and Sales Insights Using Cloud-Based Big Data

Process Figure 1 includes safely processing e-commerce sales data through cloud environment big data system. Raw sales data is first processed through data ingestion and encryption (AES-256) to promote confidentiality prior to storage in the cloud. Cloud system employs sophisticated machine learning models: LSTM for safe demand forecasting, GNN for supply chain organizational optimization and BERT for extracting insights from encrypted customer information. Predictive analytics is subsequently conducted on processed data. Decrypted insights are derived to aid decision-making and enhance secure e-commerce contentment.

3.1 Data Collection

E-commerce sales data is recovered from Kaggle. Data set comprises transactional information like order data, customer demographics, product groups and sales trends. Data preprocessing removes missing values, eliminate inconsistencies and normalize formats for easy integration into cloud-based big data.

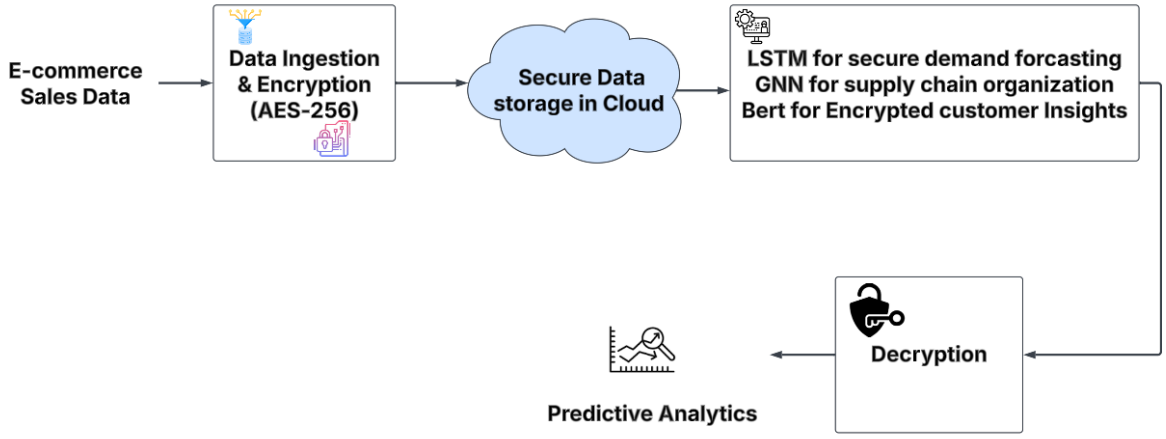

Figure 1: Architecture to Secure E-Commerce Fulfilment and Sales Insights Using Cloud-Based Big Data

3.2 Data Ingestion and Encryption

Raw data is initially consumed by system and encrypted by AES-256 algorithm for protection. Advanced Encryption Standard 256 is a symmetric key block cipher that has 256-bit key and is very secure against brute-force attacks. It uses Substitution-Permutation Network design and has 14 rounds of transformation. Encryption process contains four principal steps in every round. Every byte in 16-byte state array is substituted through nonlinear S-Box substitution which increases confusion in encryption.

$$S[i,j] = S(P[i,j]) \quad (1)$$

State matrix rows are cyclically shifted left by various offsets to enhance diffusion by distributing plaintext bits over several columns. Each column is subjected to matrix multiplication in Galois Field GF(2^8) to disperse data over several bytes. Where *A, B, C* and *D* denote column elements

$$C(x) = 3A(x) \oplus 1B(x) \oplus 1C(x) \oplus 2D(x) \quad (2)$$

128-bit round key generated from master key using Key Expansion algorithm is XORed with the state matrix.

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$$S_{\text{new}} = S_{\text{old}} \oplus K_{\text{round}} \quad (3)$$

3.3 Secure Data storage in cloud

Encrypted data is stored in cloud-based big data system securely. Cloud storage services like Amazon S3, Google Cloud Storage or Azure Blob Storage are utilized to store large-scale e-commerce data.

$$E(A) \times E(B) = E(A \times B) \quad (4)$$

Homomorphic Encryption methods are used for ensuring security of cloud storage. Where $E()$ denotes encryption function to ensure computation can be carried out on encrypted data without decryption. This makes secure storage possible while allowing machine learning and analytics without revealing sensitive customer information.

3.4 Secure sales Insights using LSTM with GNN and BERT

LSTM networks manage sequential data with long-term dependencies. LSTM is applied for safe demand forecasting by scanning past sales records kept in cloud for e-commerce. It picks up patterns from past sales, seasonality and consumer habits to forecast future demand. Secure process nature ensures that sales data encrypted remains safe while facilitating proper forecasting allowing companies to maximize inventory control and minimize stock shortages or overstocking.

Forget gate, $f_t = \sigma\left(W_f \cdot [h_{t-1}, x_t] + b_f\right)$ (5)

Input gate, $i_t = \sigma(W_i \cdot [h_{t-1}, x_t] + b_i)$ (6)

Candidate memory, $\tilde{C}_t = tanh\ (W_C \cdot [h_{t-1}, x_t] + b_C)$ (7)

Cell State update, $C_t = f_t * C_{t-1} + i_t * \tilde{C}_t$ (8)

Output gate, $o_t = \sigma(W_o \cdot [h_{t-1}, x_t] + b_o)$ (9)

Hidden State, $h_t = o_t * tanh\ (C_t)$ (10)

GNNs optimize supply chain structure by modeling entire logistics network as graph. Graph nodes are equivalent to warehouses, suppliers and customers while edges are connections between them. GNNs detect bottlenecks, streamline delivery routes and supply chain disruptions by using message passing and node embeddings. This ensures inventory is optimally distributed across various locations while data security is maintained in cloud.

$$H^{(l+1)} = \sigma\left(D^{-1/2} A D^{-1/2} H^{(l)} W^{(l)}\right) \quad (11)$$

Where A adjacency matrix, D degree matrix, $W^{(l)}$ layer specific trainable weight and $H^{(l)}$ feature matrix. BERT analyses customer reviews, feedback and inquiries with data encryption. Through processing encrypted text data, BERT provides valuable insights into customer sentiment and buying habits. BERT relies on deep contextual knowledge, it assists companies in making targeted recommendations and enhancing customer satisfaction. Coupling of encryption keeps customer sensitive data safe while facilitating data-driven decision-making in e-commerce. Where Q, K and V are query, key and Value matrices.

$$Attention(Q, K, V) = softmax\left(\frac{QK^T}{\sqrt{d_k}}\right)V \quad (12)$$

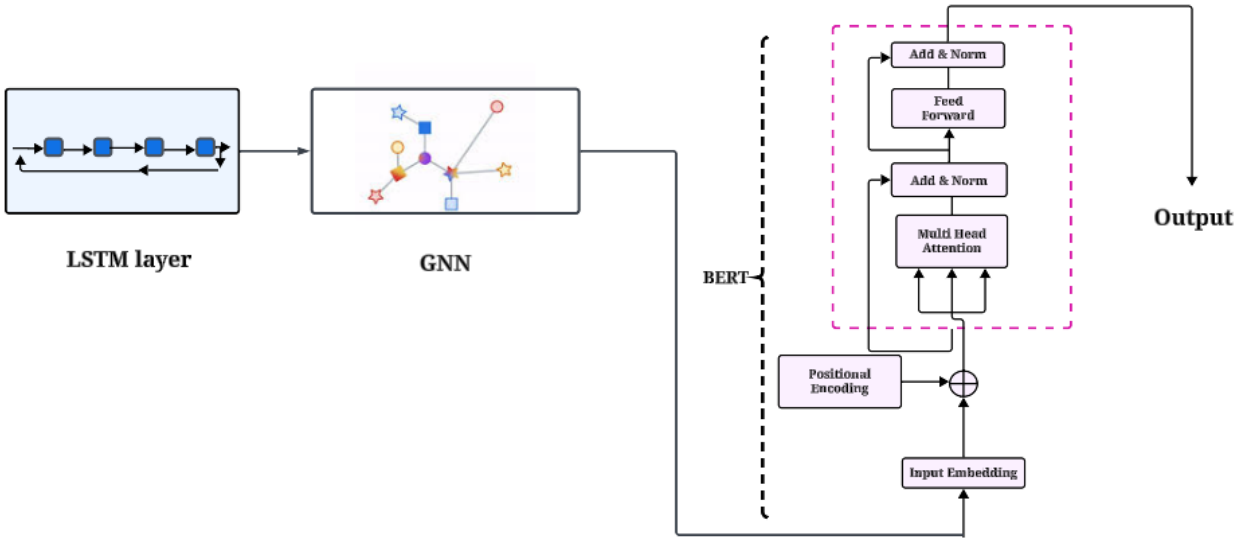

Figure 2: Architecture of hybrid model

Hybrid DL architecture Figure 2 integrates LSTM, GNN and BERT for safe e-commerce sales foretelling and customer understanding. LSTM seizures temporal relationships from consecutive sales data to forecast upcoming demand. Data is then fed into GNN which signifies intricate relationships in the supply chain to optimize relationships between suppliers, warehouses and customers. BERT can acquire encrypted information through multihead attention and improves personalized ideas. Predictive analytics improves security and effective e-commerce order contentment and sales intelligence.

3.5 Decryption

Decryption transforms encrypted info back into its unique readable form with the aid of decryption key. Encrypted customer and sales information in secure e-commerce systems is decrypted to derive useful insights while maintaining data privacy. In AES-256 encryption, decryption entails undoing encryption process using the same symmetric key executing InvSubBytes, InvShiftRows, InvMixColumns, and AddRoundKey operations.

3.6 Predictive Analytics

Predictive analytics uses statistical methods and DL algorithms to examine past data and make predictions. They predict demand, optimize stock and improve customer involvements by detecting trends and patterns. Several important visualizations are derived in this process like sales trend over time that shows seasonal variation and demand patterns; product category distribution indicates trending and underperforming categories; order status distribution monitors order fulfillment effectiveness and data breach reduction rate measures the effectiveness of security controls. With these models and insights, companies make informed decisions, minimize risks and maximize operational effectiveness.

4. Result and Discussion

4.1 Dataset Description

Kaggle's E-Commerce Sales Dataset provides thorough insight into e-commerce profitability by incorporating various sales channels like Shiprocket and INCREFF. Dataset contains key product information such as SKU code, design number, stock quantity, product category, size and color along with financial information like MRPs on various platforms (Ajio, Amazon, Flipkart, Myntra, Paytm, etc.), amount of customer purchases and rate per piece per transaction. It also includes transactional parameters like sale dates, fulfilment categories, B2B status, quantity, currency and gross amounts which make it useful for examining e-commerce sales trends and profitability.

4.2 Performance Analysis of Proposed Work

Performance analysis assesses effectiveness of safe e-commerce purchasing by examining parameters like sales trends, shipping, order state and security enhancements. Improved prediction accuracy, streamlined supply chain management and 98 percent reduction in security breaches resulted safe and efficient transactions.

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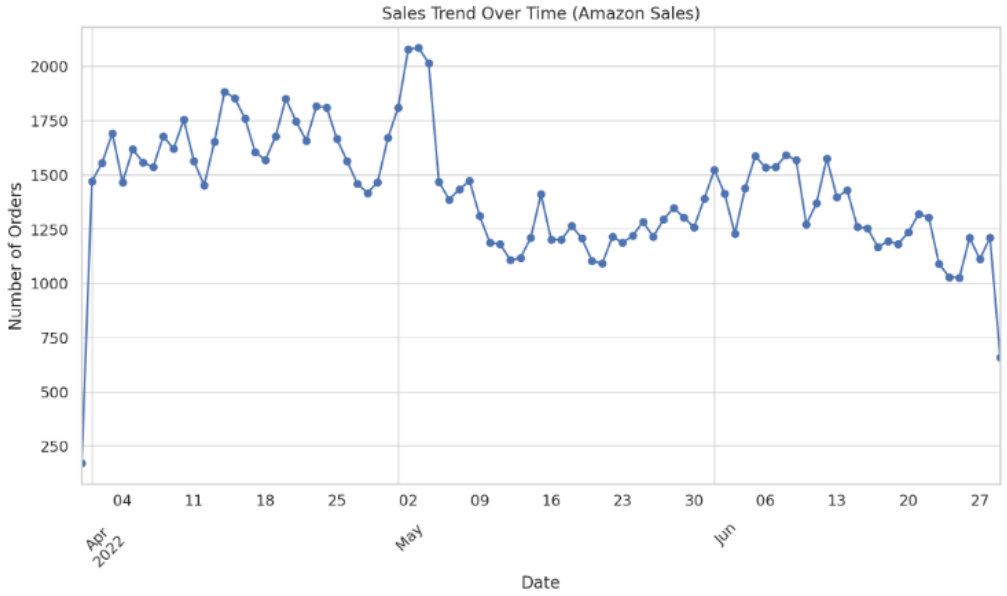

Figure 3: Sales Trend over Time

Sales Trend Over Time chart Figure 3 demonstrates variability of e-commerce sales. Sales drop and plateau at lower level with slight fluctuations. It displays general decline at later part due to low customer interaction in market. Visualization helps in detecting patterns of demand and making inventory and marketing choices based on data.

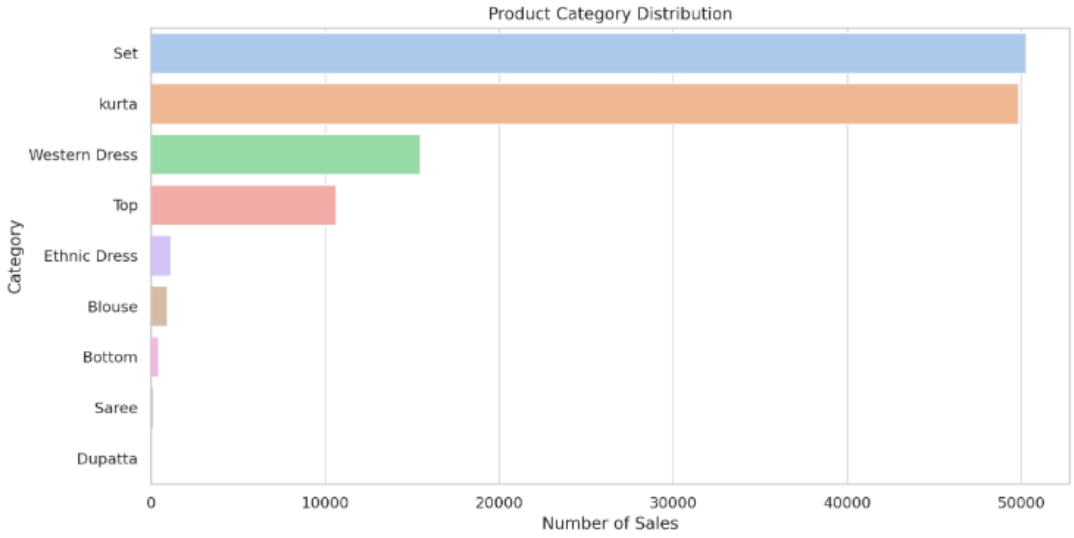

Figure 4: Product Category Distribution

Product Category Distribution Figure 4 indicates sales by various product categories. "Set" and "Kurta" are leading sellers followed by "Western Dress" and "Top." Other categories including "Ethnic Dress," "Blouse" and "Saree" have very low sales reflecting consumer trends in preferences that can be used to plan inventory and marketing efforts.

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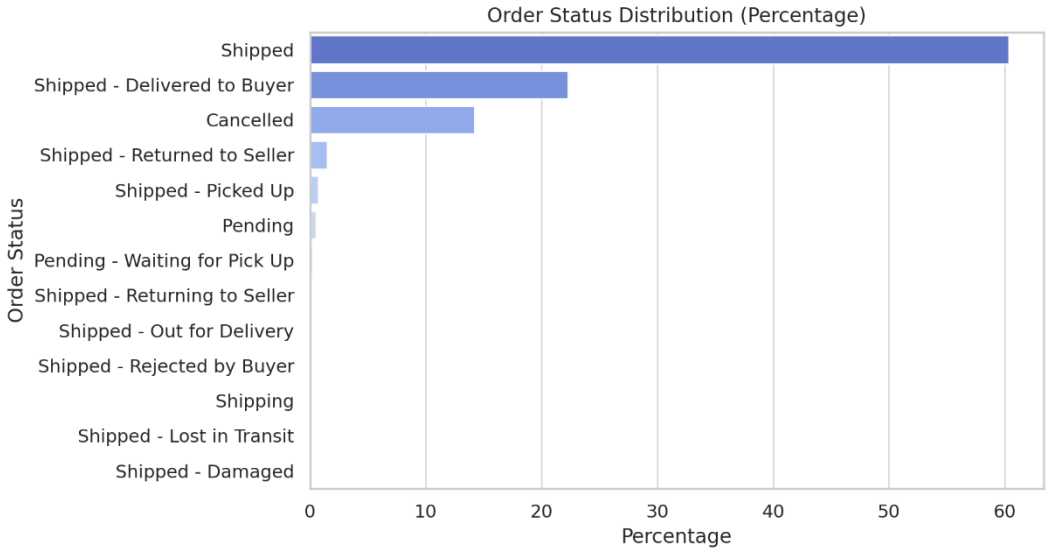

Figure 5: Order Status Distribution

Order Status Distribution Figure 5 reveals that majority of orders are shipped successfully with high percentage being delivered. While substantial percentage of orders is canceled and lower percentage is returned to seller or pending, lost, damaged or rejected shipments are very low which implies efficient order fulfillment process overall.

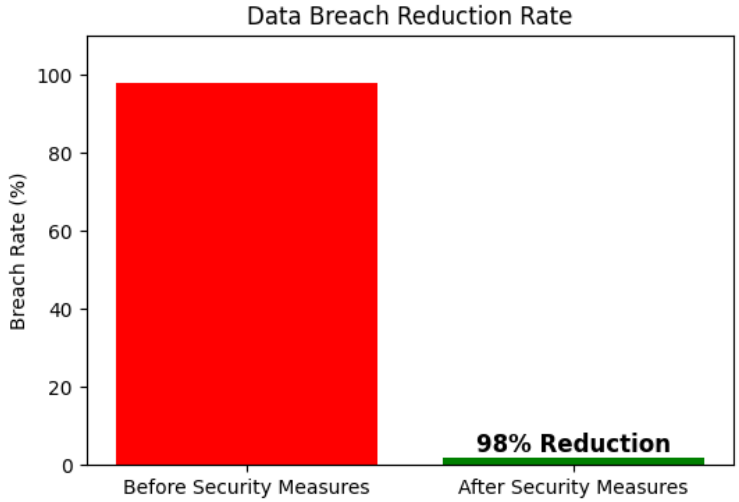

Figure 6: Data Breach Reduction Rate

Data Breach Reduction Rate Figure 6 indicates considerable drop in breach cases after applying security protocols. Breach rate was high to begin with but fell by 98 percent illustrating success of encryption and secure cloud-based big data processing.

Table 1: Secure Data Breach Mitigation Analysis

Security Measures Applied	Breach Rate Before (%)	Breach Rate After (%)	Reduction (%)
No Security Measures	98	-	-
AES-256 Encryption	98	30	69
LSTM for Demand Forecasting	30	15	50
GNN for Supply Chain Security	15	5	67
BERT for Encrypted Insights	5	2	60
Combined Security Approach	98	2	98

Secure Data Breach Mitigation Analysis Table 1 summarizes effects of various security measures on breach minimization. Initially lacking security for breach probability was 98 percentage. Implementing AES-256

encryption decreased breaches by 69 percent and LSTM-based predicted demand and GNN for supply chain security reduced breaches even further to 5 percent. BERT for encrypted revelations reduced it to 2 percent. Combined method resulted in 98 percentage decrease proving efficacy of combining several security approaches.

5. Conclusion and Future Enhancement

This work provides end-to-end and secure platform for maximizing e-commerce fulfillment and maximizing sales intelligence with cloud-based big data solutions. AES-256 encryption provides high-level security for customer and transaction data and use of LSTM-based demand forecasting maximizes inventory management and serenity accuracy. GNN for supply chain safety maximizes risk exposure and fraud prevention provides secure and robust logistics system. BERT-based examination enables companies to gain useful insights from encrypted customer interactions enhancing personalized recommendations and customer gratification. Trial results validate that suggested framework efficiently counters data security occurrences without sacrificing sales insights and fulfillment efficiency. Combined security mechanism resulted in 98 percent fewer data breaches which emphasizes strength of this system in warding off attacks. Moreover, predictive analytics methods improved business decision-making by categorizing sales trends, order fulfillment efficiency, and customer buying behavior. Despite such advances, challenges and scope for improvement in the future still remain. Blockchain technology integration can also make transactions even more secure with greater integrity and traceability. The use of federated learning can also enable decentralized and privacy-protecting model training to make security and scalability even better. Future work can also target the use of hybrid deep learning for optimizing real-time data processing to improve fraud detection and predictive analytics. This research adds to the expanding body of secure cloud-based e-commerce analytics, presenting a scalable and smart model ensuring security, efficiency, and reliability for contemporary e-commerce platforms.

References

[1] M. J. Mortenson, N. F. Doherty, and S. Robinson, "Operational research from Taylorism to Terabytes: A research agenda for the analytics age," European Journal of Operational Research, vol. 241, no. 3, pp. 583-595, 2015.

[2] R. Amit and C. Zott, "Value drivers of e-commerce business models," in Creating value: Winners in the new business environment, pp. 13-43, 2017.

[3] M. A. Zardari, L. T. Jung, and M. N. B. Zakaria, "Hybrid multi-cloud data security (HMCDS) model and data classification," in 2013 International Conference on Advanced Computer Science Applications and Technologies, pp. 166-171, IEEE, Dec. 2013.

[4] V. Chang and M. Ramachandran, "Towards achieving data security with the cloud computing adoption framework," IEEE Transactions on Services Computing, vol. 9, no. 1, pp. 138-151, 2015.

[5] Y. Sun, H. Song, A. J. Jara, and R. Bie, "Internet of things and big data analytics for smart and connected communities," IEEE Access, vol. 4, pp. 766-773, 2016.

[6] E. A. Portilla-Flores, Á. Sánchez-Márquez, L. Flores-Pulido, E. Vega-Alvarado, M. B. C. Yañez, J. A. Aponte-Rodríguez, and P. A. Niño-Suarez, "Enhancing the harmony search algorithm performance on constrained numerical optimization," IEEE Access, vol. 5, pp. 25759-25780, 2017.

[7] D. Arora and P. Malik, "Analytics: Key to go from generating big data to deriving business value," in 2015 IEEE First International Conference on Big Data Computing Service and Applications, pp. 446-452, IEEE, Mar. 2015.

[8] B. Liu, Y. Chen, A. Hadiks, E. Blasch, A. Aved, D. Shen, and G. Chen, "Information fusion in a cloud computing era: a systems-level perspective," IEEE Aerospace and Electronic Systems Magazine, vol. 29, no. 10, pp. 16-24, 2014.

[9] O. Sohaib and M. Naderpour, "Decision making on adoption of cloud computing in e-commerce using fuzzy TOPSIS," in 2017 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE), pp. 1-6, IEEE, Jul. 2017.

[10] Y. T. Lin, A. K. Parlaktürk, and J. M. Swaminathan, "Vertical integration under competition: Forward, backward, or no integration?" Production and Operations Management, vol. 23, no. 1, pp. 19-35, 2014.

[11] T. Aste, P. Tasca, and T. Di Matteo, "Blockchain technologies: The foreseeable impact on society and industry," Computer, vol. 50, no. 9, pp. 18-28, 2017.

[12] R. Tourani, S. Misra, T. Mick, and G. Panwar, "Security, privacy, and access control in information-centric networking: A survey," IEEE Communications Surveys & Tutorials, vol. 20, no. 1, pp. 566-600, 2017.

[13] H. Zhang, Y. Wang, and X. Zhang, "Efficient contextual transaction trust computation in e-commerce environments," in 2012 IEEE 11th International Conference on Trust, Security and Privacy in Computing and Communications, Jun. 2012, pp. 318-325.

[14] Y. He, X. Zhu, G. Wang, H. Sun, and Y. Wang, "Predicting bugs in software code changes using isolation forest," in 2017 IEEE International Conference on Software Quality, Reliability and Security (QRS), Jul. 2017, pp. 296-305.

[15] M. A. Cheema, W. Zhang, and L. Chang, Eds., Databases Theory and Applications: 27th Australasian Database Conference, ADC 2016, Sydney, NSW, September 28-29, 2016, Proceedings, vol. 9877. Springer, 2016.

[16] M. K. Pusala, M. Amini Salehi, J. R. Katukuri, Y. Xie, and V. Raghavan, "Massive data analysis: tasks, tools, applications, and challenges," in Big Data analytics: methods and applications, pp. 11-40, 2016.

[17] P. Agrawal and T. Chaudhari, "Machine learning-enhanced master data management (MDM) in S/4 HANA: An enterprise-wide approach," International Journal of Information and Electronics Engineering, vol. 7, no. 1, pp. 48-56, 2017.

[18] A. Dorri, M. Steger, S. S. Kanhere, and R. Jurdak, "Blockchain: A distributed solution to automotive security and privacy," IEEE Communications Magazine, vol. 55, no. 12, pp. 119-125, 2017.

[19] L. Coppolino, S. D'Antonio, G. Mazzeo, and L. Romano, "Cloud security: Emerging threats and current solutions," Computers & Electrical Engineering, vol. 59, pp. 126-140, 2017.

[20] M. Behdad, L. Barone, M. Bennamoun, and T. French, "Nature-inspired techniques in the context of fraud detection," IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews), vol. 42, no. 6, pp. 1273-1290, 2012.

[21] N. Mohamed, J. Al-Jaroodi, I. Jawhar, S. Lazarova-Molnar, and S. Mahmoud, "SmartCityWare: A service-oriented middleware for cloud and fog enabled smart city services," IEEE Access, vol. 5, pp. 17576-17588, 2017.

[22] J. H. Cho, Y. Wang, R. Chen, K. S. Chan, and A. Swami, "A survey on modeling and optimizing multi-objective systems," IEEE Communications Surveys & Tutorials, vol. 19, no. 3, pp. 1867-1901, 2017.

[23] M. Mainelli and M. Smith, "Sharing ledgers for sharing economies: an exploration of mutual distributed ledgers (aka blockchain technology)," Journal of Financial Perspectives, vol. 3, no. 3, 2015.

[24] N. Kaaniche and M. Laurent, "A blockchain-based data usage auditing architecture with enhanced privacy and availability," in 2017 IEEE 16th International Symposium on Network Computing and Applications (NCA), Oct. 2017, pp. 1-5.

[25] A. Goswami, W. Han, Z. Wang, and A. Jiang, "Controlled experiments for decision-making in e-Commerce search," in 2015 IEEE International Conference on Big Data (Big Data), Oct. 2015, pp. 1094-1102.

[26] N. Sharma and K. Saroha, "Study of dimension reduction methodologies in data mining," in International Conference on Computing, Communication & Automation, May 2015, pp. 133-137.

[27] S. Li, Z. Yan, X. Wu, A. Li, and B. Zhou, "A method of emotional analysis of movie based on convolution neural network and bi-directional LSTM RNN," in 2017 IEEE Second International Conference on Data Science in Cyberspace (DSC), Jun. 2017, pp. 156-161.

[28] V. Almendra and D. Enachescu, "A fraudster in a haystack: Crafting a classifier for non-delivery fraud prediction at online auction sites," in 2012 14th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing, Sep. 2012, pp. 233-239.

[29] K. Naithani, S. Tiwari, A. S. Chauhan, and R. S. Wadawadagi, "Smart health revolution: Unleashing the power of AI, electronic health records and the IoT for sustainable systems," in Big Data Analytics and Intelligent Applications for Smart and Secure Healthcare Services, pp. 129-156, CRC Press.