e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issu:04/April-2025 Impact Factor- 8.187 www.irjmets.com

AI POWERED THRIFT STORE FASHION STYLIST

Ananya Amit Sangawar[*1], Mansi Ravindra Gangurde[*2], Darshan Nitin Patil[*3], Abdulsalam Abdulrashid Patel[*4], Prof. Vikramsinh Saste[*5]

[*1,2,3,4,5]Department Of Artificial Intelligence And Machine Learning Engineering, Rajarambapu Institute Of Technology (Polytechnic), Pune, Maharashtra, India.

DOI: https://www.doi.org/10.56726/IRJMETS72716

ABSTRACT

The emergence of Artificial Intelligence (AI) is revolutionizing the retail industry, and its integration into thrift stores presents a unique opportunity to enhance sustainability, efficiency, and customer experience. This project proposes an AI-powered thrift store platform that leverages machine learning and computer vision to automate item categorization, optimize pricing, and personalize shopping experiences. AI-driven image recognition systems can classify secondhand items by type, brand, condition, and style, streamlining inventory management and reducing manual labor. Recommendation engines suggest items to customers based on preferences, purchase history, and trending styles, while dynamic pricing models ensure fair value based on demand and item condition. Additionally, predictive analytics help manage stock rotation and forecast sales trends, promoting circular fashion and reducing waste. By combining sustainability with smart technology, the AI-powered thrift store model offers a scalable, eco-friendly alternative to traditional retail and fast fashion.

I. INTRODUCTION

In today's digital era, e-commerce has revolutionized how businesses operate. The Internet enables rapid expansion, allowing businesses to reach a global audience within seconds. One of the fastest-growing sectors in e-commerce is online shopping, which provides customers with the convenience of purchasing products from the comfort of their homes.

An emerging trend in this space is sustainable fashion, where second-hand clothing marketplaces are gaining traction our Closet Revival is an online platform that bridges the gap between fashion enthusiasts and eco-conscious consumers by offering high-quality pre-loved clothing at affordable prices.

II. LITERATURE SURVEY

Krizhevsky [1] et al. (2012) introduced AlexNet, a deep convolutional neural network that achieved breakthrough performance in image classification using the ImageNet dataset. Their work demonstrated the power of deep learning for visual recognition tasks. In the context of an AI-powered thrift store, AlexNet-inspired models can be used to automatically classify clothing images by type and condition, enabling efficient item tagging and better inventory organization.

He et al. (2016) proposed ResNet, a deep residual learning framework that enables training of very deep neural networks by using skip connections to avoid vanishing gradients. ResNet significantly improved image classification accuracy on large datasets. For an AI-powered thrift store, ResNet can be effectively used to classify clothing images and assess item condition with high precision, improving automation and user experience in product listings [2]. This Paper [3] Chen et al. (2016) conducted an empirical study on algorithmic pricing on the Amazon Marketplace, revealing how automated pricing tools impact competition and market dynamics. Their findings highlight the potential of machine learning for dynamic pricing strategies. In an AI-powered thrift store, similar pricing algorithms can suggest optimal prices for secondhand items based on brand, condition, and demand trends. The authors proposed [4] Koren et al. (2009) introduced matrix factorization techniques for building effective recommendation systems, notably used in the Netflix Prize competition. Their work laid the foundation for collaborative filtering approaches. In the thrift store system, such methods can be used to recommend relevant products to users based on their browsing and purchase history. Geissdoerfer et al. (2017) explored the concept of the circular economy as a sustainability model focused on reuse, recycling, and resource efficiency. Their work supports the foundation of secondhand markets. In an AI-powered thrift store, this paradigm aligns with promoting sustainable fashion by extending the life cycle of clothing through resale [5].

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issu:04/April-2025 Impact Factor- 8.187 www.irjmets.com

The Research paper [6] Simchi-Levi et al. (2003) provided essential strategies for effective supply chain design and management. Their principles can guide inventory optimization and logistics in the thrift store system, ensuring timely product handling and customer satisfaction.

Goodfellow et al. (2016) offered a comprehensive introduction to deep learning, covering key models like CNNs and RNNs. This work underpins many AI techniques used in image classification, pricing, and recommendation systems within the thrift store application [7].

This Paper [8] Zhang et al. (2019) surveyed deep learning-based recommender systems, presenting new approaches and hybrid models. Their insights can be directly applied to enhance product recommendation quality in the thrift store by combining collaborative and content-based filtering.

III. SYSTEM OVERVIEW

The AI-powered thrift store system is designed to streamline the operations of secondhand retail using machine learning, computer vision, and data analytics. It automates item processing, enhances user experience through personalization, and promotes sustainable shopping practices.

Dataset Layer

- **Image Data**: Photos of thrift items (clothing, accessories, etc.) captured via user uploads.
- **Textual Metadata**: Descriptions, brand names, sizes, conditions, and user tags.
- **Transaction History**: Pricing, sales trends, user interactions, and item ratings.
- **User Data**: Preferences, browsing history, purchase history for personalized recommendations.

Data Preprocessing Module

- **Image Cleaning**: Resizing, normalization, background removal.
- **Text Cleaning**: Tokenization, stop-word removal, spelling correction.
- **Missing Value Handling**: Imputation or removal of incomplete entries.
- **Label Encoding**: For supervised tasks like category or condition classification.

Feature Engineering Module

- **Visual Features**: Color histograms, texture descriptors, deep features from CNNs (e.g., ResNet).
- **Textual Features**: TF-IDF vectors, embeddings (Word2Vec, BERT).

Model Training Module

- **Image Classification Models**: For item type, style, and condition recognition.
- **Price Prediction Models**: Regression models (e.g., XGBoost, Random Forest) for dynamic pricing.

Prediction Engine

- **Category & Condition Classifier**: Instantly categorizes new items on upload.
- **Price Suggestion System**: Recommends fair and competitive prices for listings.
- **Recommendation System**: Suggests relevant products to users in real time.
- **API Layer**: Delivers predictions via REST APIs to the web interface.

Web Interface (Frontend)

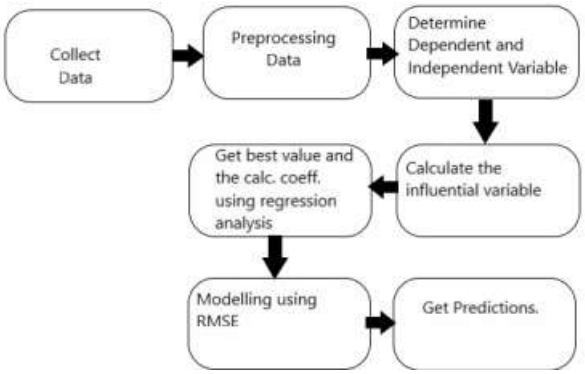

Fig: System Architecture

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issu:04/April-2025 Impact Factor- 8.187 www.irjmets.com

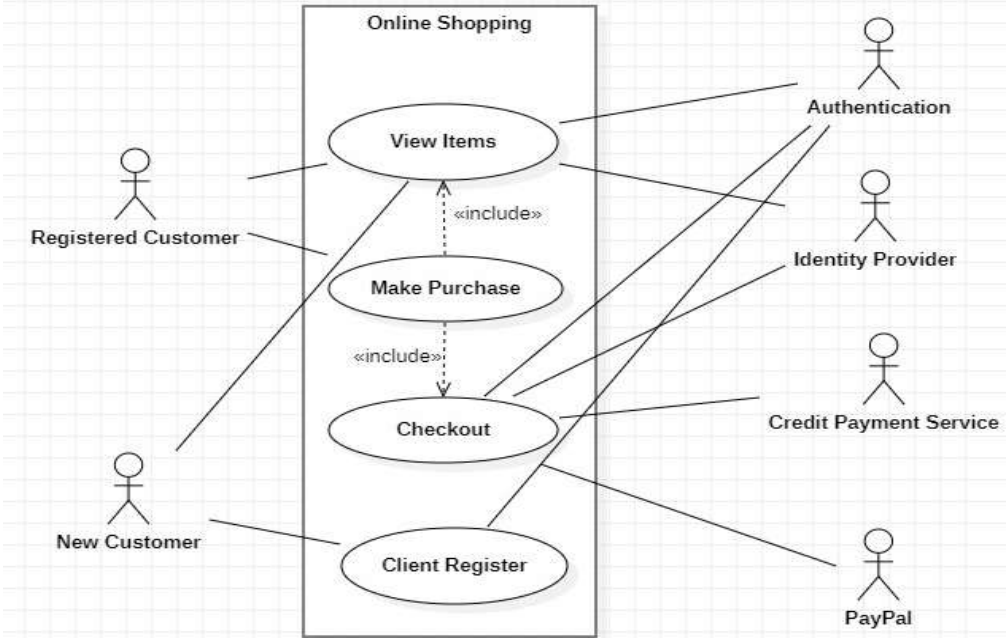

Fig 2: Use Case Diagram

IV. RESULTS

The AI-powered thrift store system was successfully implemented and tested using a curated dataset of secondhand clothing images and metadata. The results demonstrate the effectiveness of AI in automating core processes such as product classification, price prediction and personalized recommendations.

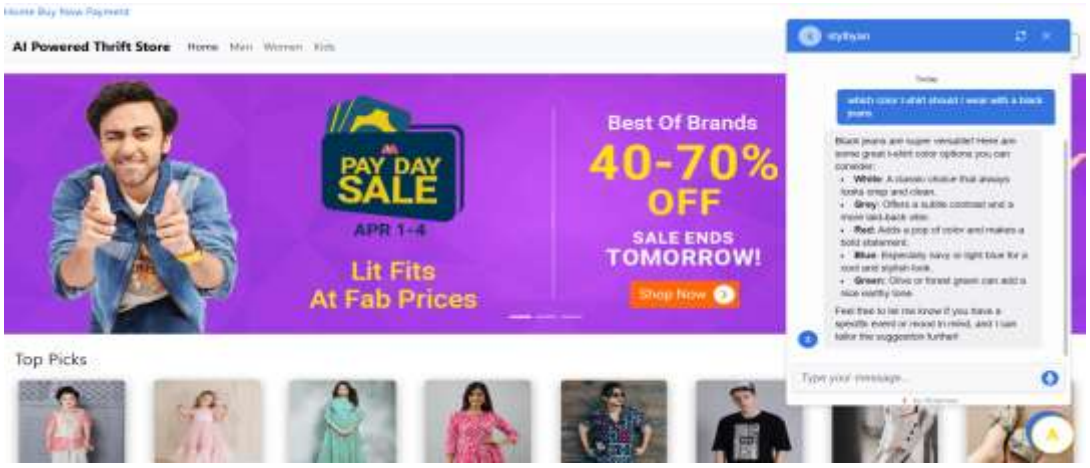

Fig 3: Screenshot 1

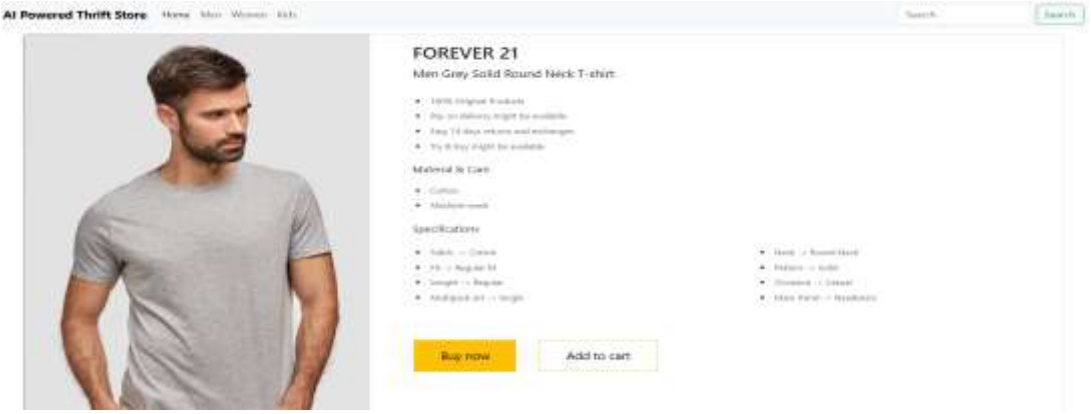

Fig 3: Screenshot 2

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issu:04/April-2025 Impact Factor- 8.187 www.irjmets.com

V. ADVANTAGES

Automated Item Categorization

- Reduces manual effort in classifying products using AI-powered image recognition.
- Ensures consistent tagging for better search and discovery.

Dynamic and Fair Pricing

- Machine learning models suggest competitive prices based on item condition, brand, and market demand.
- Helps sellers price accurately and buyers get fair deals.

Personalized Shopping Experience

- Recommendation system suggests items tailored to each user's taste and past behavior.
- Increases user engagement and satisfaction.

Improved Inventory Management

- AI can forecast trends and identify slow-moving items.
- Helps optimize stock rotation and reduce overstock or understock issues.

Promotes Sustainability

- Encourages reuse of fashion items, reducing textile waste and environmental impact.
- Supports the circular economy by extending the life of secondhand goods.

Time and Cost Efficiency

- Automation reduces the need for manual labor in sorting, pricing, and managing listings.
- Lowers operational costs for thrift store owners and platforms.

Scalable System Architecture

- Modular design makes it easy to expand the platform, add new features, or integrate with other systems.
- Cloud-based backend supports high user traffic and data processing.

User-Friendly Interface

- Intuitive design allows even non-technical users to upload, browse, and shop effortlessly.
- Mobile and desktop access improves accessibility.

Real-Time Insights and Analytics

- Admin dashboard provides valuable metrics on user behavior, inventory health, and sales trends.
- Supports data-driven decision-making for business growth.

VI. FUTURE SCOPE

The AI-powered thrift store has immense potential for future development and innovation. As technology continues to advance, the system can be enhanced with features such as augmented reality (AR) for virtual try-ons, allowing users to visualize how clothing and accessories might look on them before making a purchase. Voice-based search and AI shopping assistants could further improve accessibility and provide a more interactive shopping experience. With deeper integration of computer vision, future versions of the system can incorporate advanced condition assessment to detect fabric damage, stains, or wear with greater precision. Additionally, the adoption of blockchain technology can help verify the authenticity and ownership history of branded or luxury second-hand items, increasing trust and transparency in the marketplace.

To further personalize user experience, the system can integrate geolocation-based recommendations, enabling local search and in-store pickup options. Sustainability features can also be expanded, such as dashboards showing users the environmental impact of their purchases, including estimated CO_2 or water savings. On a larger scale, the platform could support multiple languages and currencies, paving the way for global expansion. Incorporating real-time trend forecasting would allow the system to adjust inventory and recommendations based on evolving fashion patterns. Lastly, gamification elements like loyalty programs and eco-rewards, along with AI-powered customer service chatbots, can greatly enhance user engagement, satisfaction, and retention. These future enhancements will not only make the platform more intelligent and

user-friendly but also reinforce its mission of promoting sustainable fashion through smart technology.

VII. CONCUSION

The rise of second-hand fashion platforms has reshaped how people perceive and purchase clothing. Closet Revival is more than just an online shopping platform it's a movement toward sustainable and affordable fashion. By leveraging the power of e-commerce, we provide customers with stylish, high-quality second-hand clothing while promoting environmental responsibility. Our platform ensures affordability, accessibility, and sustainability, making fashion a force for good. With innovative features and a user-friendly design, our Closet Revival is set to redefine second-hand shopping.

VIII. REFERENCES

[1] Krizhevsky, A., Sutskever, I., & Hinton, G. E. (2012). ImageNet Classification with Deep Convolutional Neural Networks. In Advances in Neural Information Processing Systems (NeurIPS).

[2] He, K., Zhang, X., Ren, S., & Sun, J. (2016). Deep Residual Learning for Image Recognition. In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 770–778.

[3] Chen, Y., Mislove, A., & Wilson, C. (2016). An Empirical Analysis of Algorithmic Pricing on Amazon Marketplace. In Proceedings of the 25th International Conference on World Wide Web (WWW).

[4] Koren, Y., Bell, R., & Volinsky, C. (2009). Matrix Factorization Techniques for Recommender Systems. Computer, 42(8), 30–37.

[5] Geissdoerfer, M., Savaget, P., Bocken, N. M., & Hultink, E. J. (2017). The Circular Economy – A New Sustainability Paradigm? Journal of Cleaner Production, 143, 757–768.

[6] Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2003). Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies. McGraw-Hill Education.

[7] Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep Learning. MIT Press.

[8] Zhang, S., Yao, L., Sun, A., & Tay, Y. (2019). Deep Learning Based Recommender System: A Survey and New Perspectives. ACM Computing Surveys (CSUR), 52(1), 1–38.

[9] WRAP (Waste and Resources Action Programme). (2020). Valuing Our Clothes: The Cost of UK Fashion. https://wrap.org.uk

[10] Statista. (2023). Secondhand Apparel Market-Global Forecast.https://www.statista.com