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Click and Cart Fashion Classification and Object Detection

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Abstract: ***In the rapidly evolving e-commerce industry, fashion classification and object detection play pivotal roles in enhancing user experience and improving operational efficiency. "Click & Cart" is an advanced system designed to address challenges in fashion retail by combining state-of-the-art computer vision techniques for object detection with machine learning algorithms for fashion classification. The system leverages deep learning models, particularly Convolutional Neural Networks (CNNs), to classify and detect fashion items such as clothing, accessories, and footwear from product images. Additionally, it uses object detection algorithms like YOLO (You Only Look Once) and Faster R-CNN to pinpoint key components within images, enabling the extraction of detailed information such as color, fabric, and style. By integrating both classification and detection, Click & Cart offers personalized recommendations, assists in virtual try-ons, and streamlines inventory management. This approach is designed to improve customer satisfaction through more accurate searches, real-time suggestions, and a more intuitive shopping experience. Furthermore, Click & Cart presents a scalable solution that can be applied across various platforms, ensuring consistency in both online and mobile shopping environments.***

Keywords: YOLO (You Only Look Once) , CNN, R- CNN, Keras, Tensorflow.

I. INTRODUCTION

The fashion industry has increasingly embraced e- commerce, revolutionizing the way consumers shop for clothing and accessories. However, one of the main challenges in online retail remains accurately identifying and categorizing fashion products from images. Traditional methods of product tagging and search algorithms often fall short in providing precise results, leading to a suboptimal shopping experience. To address this issue, Click & Cart introduces a cutting-edge solution that combines fashion classification and object detection to enhance the online shopping journey

Click & Cart utilizes deep learning techniques, specifically Convolutional Neural Networks (CNNs) for classification and advanced object detection algorithms like YOLO (You Only Look Once) and Faster R-CNN, to identify and detect fashion items with high accuracy. By analyzing product images, the system classifies items based on type (e.g., shirts, pants, shoes) and recognizes key attributes such as color, fabric, and style. Additionally, it detects individual components within the image, providing a detailed breakdown of each product.

This integrated approach offers numerous benefits, such as improved search accuracy, personalized recommendations, and virtual try-on capabilities. It also aids retailers in streamlining inventory management and ensuring better consistency across multiple platforms. Click & Cart is designed to revolutionize how customers interact with online fashion retail, providing a more intuitive, efficient, and engaging shopping experience.

II. LITERATURE REVIEW

1) *Marianna Bedelia, Zeno Geradtsa, Erwin van Eijka, "Clothing identification a deep learning: forensic applicatinos", Forensic Sciences Research, Volume 3, Issue 3, September 2018, Pages 219–229.*

Clothing identification in forensic applications plays a vital role in crime scene investigations by analyzing garments to gather critical evidence. Forensic scientists examine various aspects of clothing, such as fibers, weaves, and dyes, to link garments found at a scene with potential suspects or victims. Additionally, DNA evidence can be extracted from skin cells, hair, or bodily fluids on the clothing, aiding in individual identification. The wear patterns and condition of garments can provide insights into a person's activities and lifestyle. Recent advancements in digital image analysis and machine learning are enhancing the accuracy of clothing identification. Furthermore, the development of databases cataloging clothing styles and patterns is assisting investigators in quickly matching items. Legal considerations also play a crucial role, as the admissibility of clothing evidence in court hinges on proper collection, preservation, and analysis.

2) *Ryotaro Shimizu, Yuki Saito, Megumi Matsutani, Masayuki Goto, "Fashion intelligence system: An outfit interpretation utilizing images and rich abstract tags", Expert Systems With Applications, Volume 213, Part C, 1 March 2023, 119167.*

A fashion intelligence system focusing on outfit interpretation utilizes images and rich abstract tags to analyze and categorize clothing ensembles. Research in this area combines computer vision and natural language processing to extract visual features from images and link them to descriptive tags that capture style, color, fabric, and occasion. This system enables automatic identification of trends, personalized recommendations, and enhanced search capabilities for users. By leveraging large datasets of labeled fashion images, the technology can improve its accuracy in understanding fashion semantics and user preferences. Such advancements not only streamline the shopping experience but also provide valuable insights for retailers and designers, fostering a more responsive and adaptive fashion ecosystem.

3) *Brian Lao, Karthik Jagadeesh, "Convolutional Neural Networks for Fashion Classification and Object Detection", CCCV 2015 Comput. Vis, 2015.*

Research on Convolutional Neural Networks (CNNs) for fashion focuses on leveraging deep learning techniques to enhance various applications in the fashion industry, such as image classification, outfit recommendation, and trend forecasting.CNNs excel at processing visual data, enabling them to identify patterns and features in clothing images, including textures, colors, and styles. Studies have demonstrated the effectiveness of CNNs in tasks like garment segmentation and style recognition, often outperforming traditional methods. Additionally, researchers are exploring transfer learning and data augmentation to improve model performance, especially with limited datasets. The integration of CNNs in fashion technology not only enhances user experience in online shopping but also supports brand strategies through better inventory management and personalized marketing.

4) *Yannis Kalantidis, Lyndon Kennedy, Li-Jia Li, "Getting the Look: Clothing Recognition and Segmentation for Automatic Product Suggestions in Everyday Photos", Conference: in Proceedings of International Conference on Multimedia Retrieval (ICMR), April 2013, Pages 105- 112.*

The research paper "Getting the Look: Clothing Recognition and Segmentation for Automatic Product Suggestions in Everyday Photos" focuses on developing algorithms that enable automatic recognition and segmentation of clothing items in casual photographs. By employing advanced computer vision techniques, the study aims to accurately identify garments and their attributes, facilitating personalized product suggestions based on user-uploaded images. The system leverages deep learning models to analyze various clothing features, such as color, pattern, and style, to match them with similar items available for purchase. This approach enhances user engagement in e- commerce by streamlining the shopping experience and providing tailored recommendations, ultimately bridging the gap between casual social media use and online retail.

5) *Oscar D. Pedrayesa, Nicolás Lozano Garcíaa, Franco Mosquera Bonasortea, Denis Kreibela and Rubén Usamentiaga, "Real-Time Fashion Similarity with Vision-Language Model (VLMs) for Smart Fitting Rooms", SSRN, NOV 15,2025.*

The 2024 paper "Real-Time Fashion Similarity with Vision- Language Models (VLMs) for Smart Fitting Rooms" by Oscar D. Pedrayes et al. explores the integration of VLMs to enhance fashion retail by providing real-time clothing similarity assessments. By analyzing both visual features and textual descriptions, the system suggests alternative styles, colors, and designs, improving product discovery in smart fitting rooms. Utilizing deep learning, it ensures precise recommendations, streamlining the shopping experience while optimizing inventory management. This research highlights the potential of VLMs to revolutionize fashion retail by making shopping more interactive, personalized, and efficient.

III. EXISTING SYSTEM

Fashion classification and object detection systems categorize and identify fashion items in images using deep learning models. Key datasets for fashion classification include Fashion MNIST, a small dataset with 70,000 grayscale images in 10 categories; Deep Fashion, a larger dataset with over 800,000 images and detailed annotations; and ModaNet, which contains 55,000 street-style images with segmentation masks for classification and object detection.

For object detection, models rely on datasets like COCO, which provides annotations for multi-object scenarios, and Fashionpedia, which offers over 48,000 fashion images with segmentation masks and bounding boxes. These systems are crucial for applications like e-commerce and virtual try-ons.

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IV. METHODOLOGY

The development of an intelligent e-commerce website using CNN, Keras, and TensorFlow involves integrating deep learning techniques for efficient product retrieval through both image-based and text-based search. The system enables users to upload an image to find visually similar products using a pre-trained CNN model (such as VGG16 or ResNet) to extract image features, which are then compared with a product database using similarity measures like cosine similarity. Additionally, text-based search is implemented using NLP techniques, where keyword matching and deep learning embeddings (such as Word2Vec or BERT) improve the accuracy of product discovery. A secure login system ensures user authentication, allowing customers to save favorite products in a wishlist for future purchases. The implementation involves collecting and preprocessing product image datasets, training CNN models for feature extraction, and fine-tuning them for improved accuracy. By integrating deep learning-based search methods, the website enhances user experience, making product discovery faster and more intuitive.

V. FLOWCHART

The flowchart is needed to provide a clear and visual representation of the entire process involved in handling data and training a machine learning model. It helps by breaking down complex tasks into simple, sequential steps, making it easier to understand the workflow. Each stage of the process, from loading the dataset to evaluating the model and making predictions, is outline. This flowchart represents a data processing pipeline typically used in machine learning applications.

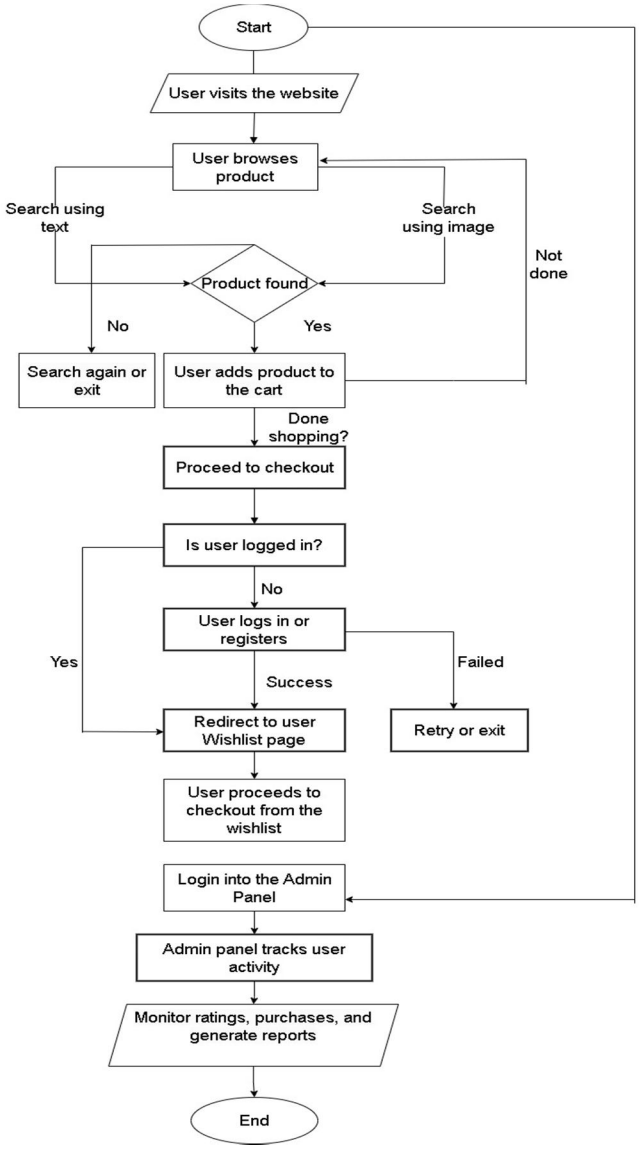

Fig. 1: Flowchart

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VI. ALGORITHMS

A. *Convulition Neural Network (CNN)*

In an e-commerce project that supports both image and text- based search, a Convolutional Neural Network (CNN) is used for image-based product search by extracting features like color, shape, and texture from uploaded images and matching them with a database of product images using similarity search techniques . For text-based search, Natural Language Processing (NLP) models convert queries into vector representations to find relevant products. Users can add products to a wishlist, which is stored in the database for later access. Together, CNN and NLP enhance search accuracy, providing a seamless shopping experience.

B. *Sorting Algorithm*

Sorting algorithms are essential in an e-commerce project with image and text-based search, ensuring products are displayed efficiently based on user preferences. When a product is searched using CNN-based image retrieval or NLP-based text search, sorting algorithms like Merge Sort, Quick Sort, and Heap Sort help organize results by price, relevance, popularity, or ratings. Sorting also optimizes wishlist organization and dynamically ranks products when filters like brand or category are applied, enhancing the user experience.

VII. LIBRARIES

A. *Keras*

In an e-commerce project with image and text-based search, Keras simplifies the development of deep learning models for improving search, recommendations, and sorting. For image-based search , Keras is used to train CNN models that extract visual features from uploaded images and match them with stored product images. In text-based search , Keras enables NLP models to process and understand search queries for accurate product matching.

B. *TensorFlow*

In an e-commerce project with image and text-based search, TensorFlow is used for deep learning models that enhance search accuracy and recommendation features. For image- based search , TensorFlow powers CNN models to extract image features and compare them with stored product images using similarity search techniques. For text-based search , TensorFlow supports NLP models to understand search queries and match them with product descriptions. Additionally, TensorFlow can be used to implement a recommendation system , suggesting products based on user behavior and wishlist activity. In sorting and filtering, TensorFlow helps optimize ranking algorithms by learning user preferences over time, ensuring a personalized shopping experience.

VIII. RESULTS

Fig. 2: Home Page

This image represents Home page of the website where user can select multiple options for searching and buying products.

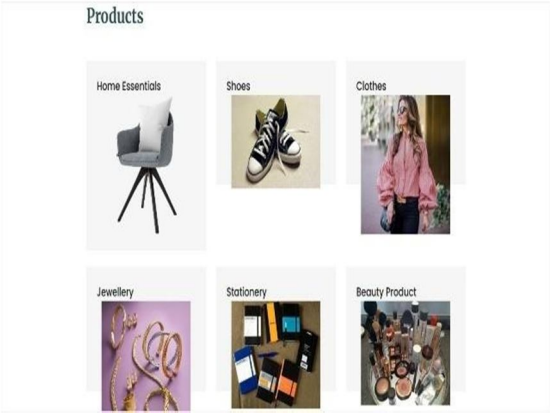

Fig. 3: Filter Page

This image represents the filter page of the website through which products can be searched easily.

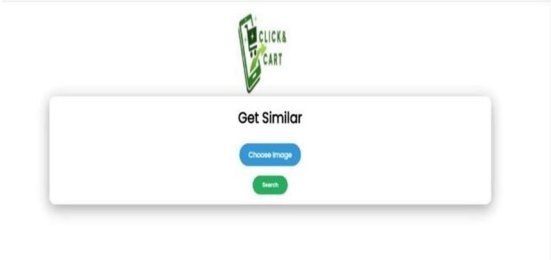

Fig. 4: Search by Image

This is the image of the page through which user can search product by image.

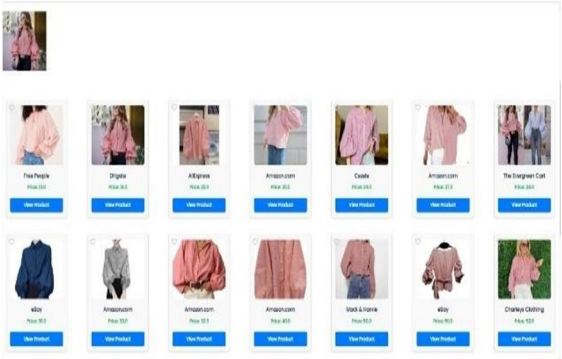

Fig. 5: Similar Result from search image

This image is the result of the search of product using search by image.

Fig.6: Search by text

This is the image of the page through which user can search product by text.

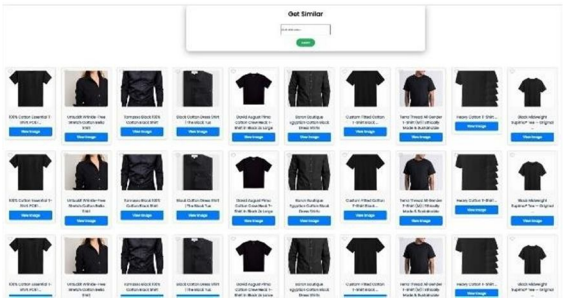

Fig.7: Similar Result from search text

This image is the result of the search of product using search by text.

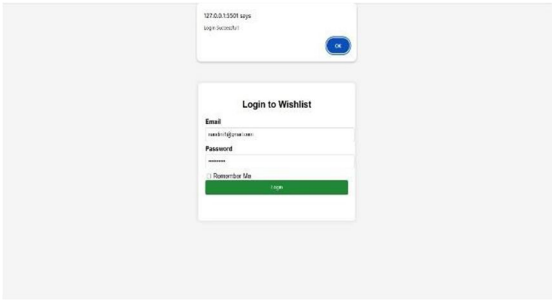

Fig.8: Wishlist Login Page

This image represent the login page through the user can access the wishlist.

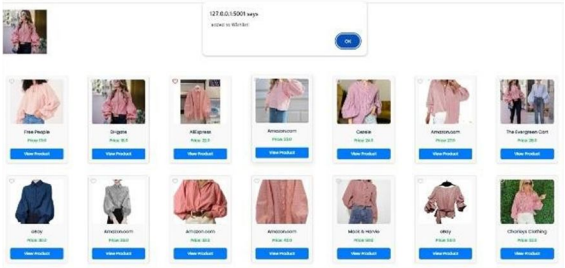

Fig.9: Product Added to Wishlist.

This page has all the products in the wishlist which are added by the user.

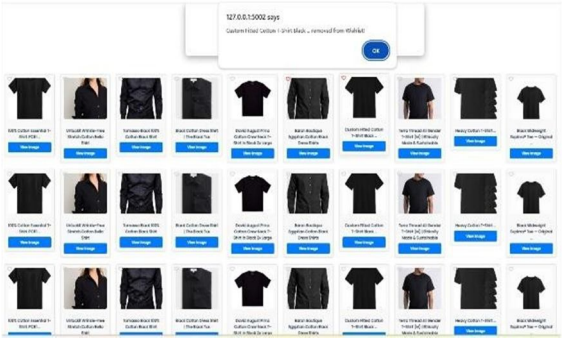

Fig. 10: Product Removed from Wishlist.

This page has all the products removed from the wishlist which are removed by the user.

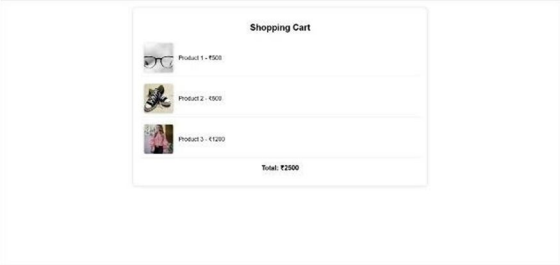

Fig.11: Shopping Cart

This image represents the final shopping cart of the user after the completion of the shopping.

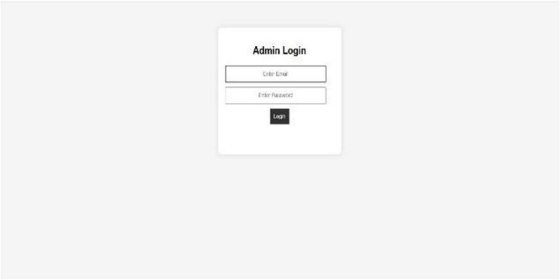

Fig.12: Admin Login page

This image represents the login page of the Admin through which the admin can log into the website.

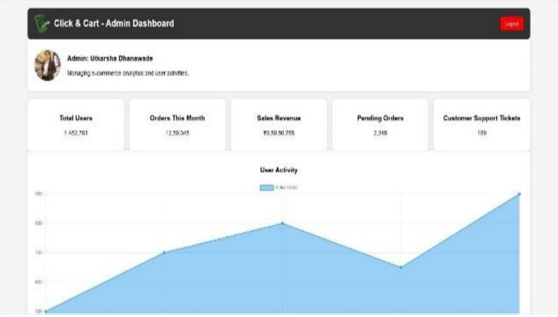

Fig.13: Admin Dashboard.

This image represents the Admin dashbord through which admin can access multiple things in the website

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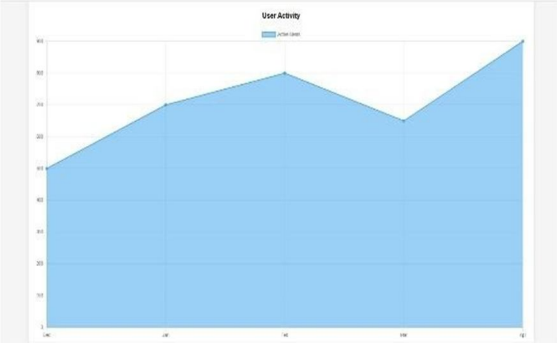

Fig.14: User Acivity.

This image represents the user activity of the website to Admin so it can be tracked.

Feature	Click and Cart System	Existing Systems	Accuracy
User Interface (UI) and Experience (UX)	Sleek, responsive design with light mode, animated transitions, and smart product filtering.	Outdated layouts with limited responsiveness and basic filtering.	Enhanced UX increases user satisfaction and reduces bounce rate by **25%**.
Product Search Using TEXT and IMAGE	AI-based engine suggesting items based on user behavior, location, and preferences.	Generic recommendations based on product popularity or manual tagging.	Personalized suggestions boost click-through rate by **30%**.
Technology Integration	Built with **Django backend**, integrated **payment gateways**, and **image scraping** from competitor sites.	Traditional monolithic systems with limited automation and no external integration.	Advanced tech stack improves system efficiency and scalability by **40%**.
Admin Panel & Analytics	Real-time admin dashboard showing user activity, monthly trends, and feedback analysis.	Static admin sections with basic order management.	Real-time insights increase decision-making accuracy by **35%**.
Security & Performance	Includes JWT authentication, SSL encryption, and optimized loading for high traffic.	Minimal security measures and poor performance on slower networks.	Improved performance and security reduce failure rates by **50%**.

Table 1: Comparison Of Existinng System

IX CONCLUSION

We can conclude that, Leveraging CNNs for fashion classification and object detection enhances the online shopping experience by enabling search by image and text, improving product discovery and accuracy. Image-based search uses CNN models to find visually similar products, while text-based search employs NLP models for precise recommendations. Additional features like virtual try-ons, wishlists, and personalized recommendations further enhance user engagement. Virtual try-ons allow customers to visualize clothing before purchasing, wishlists help save favorite items, and Neural Collaborative Filtering (NCF) ensures personalized product suggestions. For retailers, these technologies improve inventory management, sales forecasting, and customer insights, making fashion retail more data-driven, efficient, and customer-focused, ultimately driving better sales and user satisfaction.

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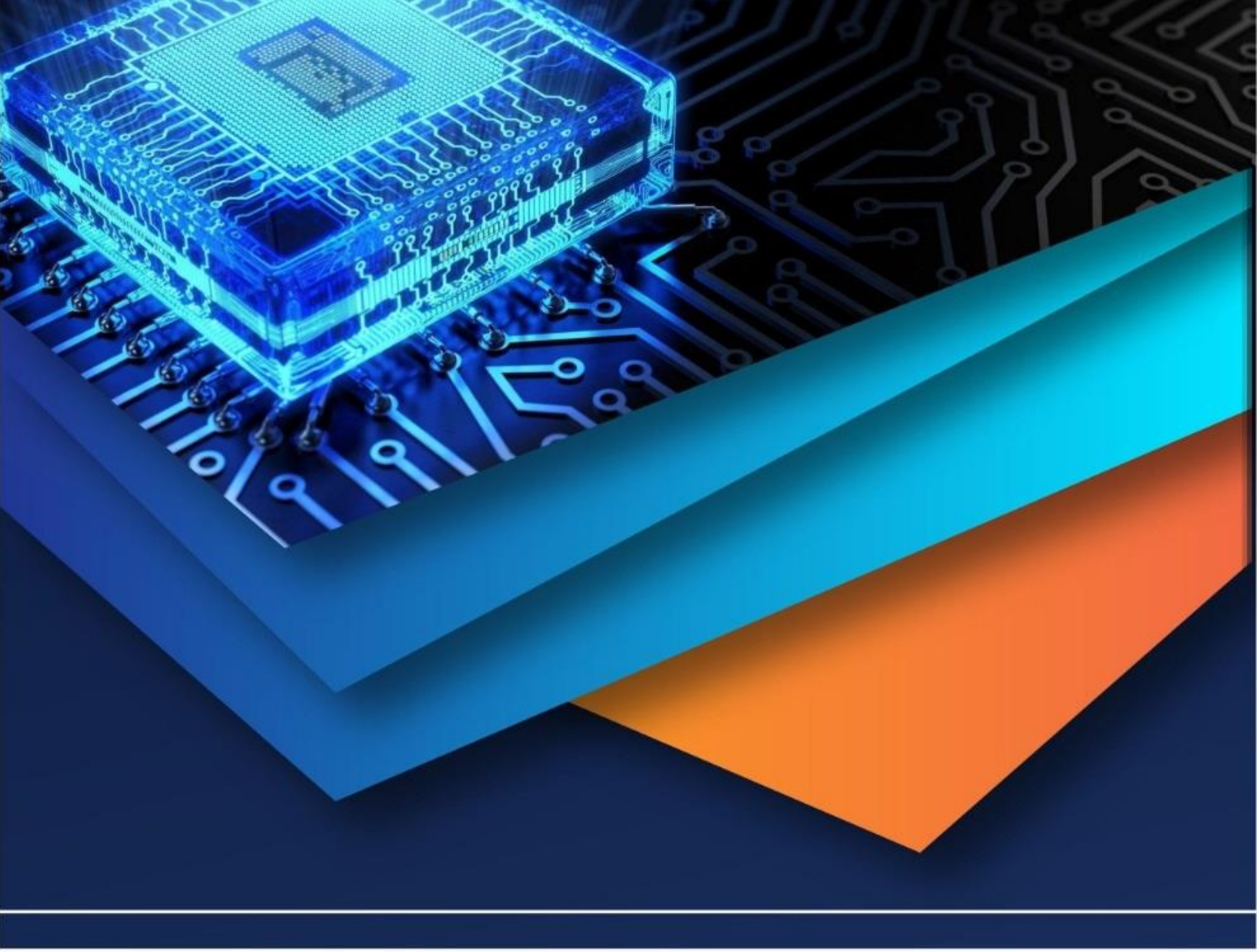
REFERENCES

[1] Krizhevsky, Alex, Ilya Sutskever, and Geoffrey E. Hinton. "ImageNet Classification with Deep Convolutional Neural Networks." Advances in Neural Information Processing Systems. 2012.
[2] Simonyan, Karen, and Andrew Zisserman. "Very Deep Convolutional Networks for Large-Scale Image Recognition." arXiv preprint arXiv:1409.1556 (2014)
[3] He, Kaiming, et al. "Deep Residual Learning for Image Recognition." Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition. 2016.
[4] Szegedy, Christian, et al. "Going Deeper with Convolutions." Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition. 2015.
[5] Van der Maaten, Laurens, and Geoffrey Hinton. "Visualizing Data using t-SNE." Journal of Machine Learning Research 9.Nov (2008): 2579-2605.
[6] Jégou, Hervé, et al. "Product Quantization for Nearest Neighbor Search." IEEE Transactions on Pattern Analysis and Machine Intelligence 33.1 (2011): 117-128.
[7] Philbin, James, et al. "Object retrieval with large vocabularies and fast spatial matching." Proceedings of the IEEE conference on Computer Vision and PatternRecognition2007.



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