A Review of Used Cases of AI & IoT in Fashion & Technology

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ABSTRACT

The Fourth Industrial Revolution is a period marked by increased automation, data exchange, and connectivity. This digital transformation has significantly impacted the fashion industry, making it possible for businesses to utilize data that was not accessible or affordable in the past. Companies can now collect large amounts of data on customer shopping behaviours, preferences, trends, and demographics. This data can be used to forecast and anticipate customer needs more accurately, leading to better decision-making and high customer satisfaction. Additionally, new technologies have allowed manufacturers to automate traditional processes, speeding up production times and greatly increasing efficiency. This paper examines how digital technologies are having a profound impact on the fashion industry. By leveraging data, automation, and connectedness, companies in the fashion industry are able to increase their efficiency and better understand customer needs. They can use data-driven insight to personalize customer experiences and make more informed decisions to better serve their customers. Additionally, they can take advantage of automation to streamline process and reduce costs. This paper looks at how these digital technologies are transforming the fashion industry and how businesses can benefit from them.

Keywords: AI, Industrial Revolution 4.0, IoT, Fashion & Technology, Digital Transformation

INTRODUCTION

When we think of technology, we usually don't think of the traditional tools and equipment used in the fashion industry such as scissors, needles, and stone-cutting tools [1]. Instead, what usually comes to mind are more modern inventions such as computers, smartphones, autonomous vehicles, robots, Artificial Intelligence, IOT, and the aerospace industry. This underscores the fact that technology has drastically advanced in recent years and "technology" has become synonymous with "high-tech" in the current conversation. Technology has been a part of human activities since the early days of human history, including dress-making [2]. From weaving on a loom, to developing mechanical looms in the Industrial Revolution, to automated machinery in the modern day, technology has always been deeply rooted in the design and production of clothing. Technology has enabled us to create clothing more efficiently and with better quality, and it continues to play a critical role in the advancement of the fashion industry [3].

In the late 17th and early 18th centuries, the fashion industry saw a significant increase in the number of innovations and patents. These included new ways of weaving fabric, creating elaborate embroidery, and producing silhouettes and shapes [4]. Additionally, new inventions such as the sewing machine and the screw press greatly enhanced the speed and efficiency of garment production. This influx of innovation made it possible for clothes to be produced faster, cheaper, and with greater precision, allowing for much greater customization in design [5]. Thanks to the introduction of machines in the production process, the fashion industry was able to expand from a small manufacturing system to that of a large, industrialized sector [6]. Machines allowed for more efficient production, making it possible for companies to produce higher volumes of clothing at lower costs. This led to a more competitive market and greater diversity of designs and styles. In addition, many manual labour processes, such as cutting and sewing, were automated, reducing labour costs and freeing up resources for more creative expression [7].

Digital transformation involves utilizing digital technology to modernize and improve existing business processes, increasing efficiency and productivity. This may involve upgrading outdated systems and software, as well as converting physical documents or information into digital format [8]. Data digitization makes it easier to store, access, manipulate, analyze, and share data. Digitalization is the process of using digital technologies, such as computing, to modernize existing business processes and operations to increase efficiency and productivity. This can involve upgrading outdated technology, introducing new software and hardware, improving digital services, and relying on automated processes [9,10].

Digitization is the process of converting data into digital format. This includes converting physical documents or information into digital format (e. g. turning a book into a PDF file). Data digitization makes it easier to store and

access data, as well as making it easier to manipulate, analyze, and share [11,12]. This process has revolutionized how information is tracked, stored, and used.

Digitization is the process of converting data into digital format. This includes encoding information or processes into binary bits of 0s and 1s, which is a language that computers can interpret and make use of [13]. Through digitization, information can be more easily stored and accessed, as well as manipulated, analyzed, and shared. It has revolutionized how data is tracked and used. Digitalization is the process of using digital technologies, data, and interconnections to revolutionize existing business activities or to create new ones [14]. This includes introducing new software and hardware, improving digital services, and relying on automated processes. By digitizing and digitalizing data, businesses are able to increase their efficiency and productivity [15,16]. Digitization and the development of Information and Communication Technologies (ICT) have transformed how businesses operate, creating an ecosystem of digital technologies that can be leveraged to increase efficiency and productivity. Some digital technologies are already in place and others are still in development, but the potential for how businesses can make use of these technologies is immense [17]. Technologies are interdependent, meaning that individual components rely on each other in order to work as intended. By connecting different components and technologies together, the ecosystem as a whole becomes stronger and more functional. The potential for how it can be used is increased and businesses can tap into that potential to improve their operations [18].

Technologies
IoT (Internet of Things)
The Internet of Things (IoT) is an extended network of connected objects that "talk" to each other. This means that physical objects can be connected to the internet in order to exchange data and interact with the environment around them. This opens the door to a wide range of new possibilities, such as better efficiency and automation, and can help create a more connected and intelligent world [19]. The Internet of Things (IoT) can be used in the fashion industry to streamline operations and increase efficiency. For example, connected sensors can be used to monitor inventory and prevent overstocking/understocking of goods. Additionally, smart containers can be used to track shipments in real time. This can also provide visibility into supply chain processes. Lastly, with enhanced data collection, IoT can help fashion brands develop products that better reflect consumer demand. Connected sensors are devices that are connected to the Internet of Things (IoT). These sensors can be used to monitor inventory in real time, allowing businesses to better manage stock levels and prevent overstocking or understocking of goods. Connected sensors can provide visibility into sales trends and alert businesses if there is low stock or an excess of inventory that is not being sold. By providing this real-time data, connected sensors can help businesses better manage their inventory and ensure that stock levels remain optimal [19].

AI (Artificial Intelligence)
AI can be used in the fashion industry for various tasks such as predicting trends, creating virtual models, and personalizing products to shoppers. AI technology can be used to track consumer habits, preferences and trends, and use this data to inform decisions about new product designs. AI can also help fashion designers create virtual versions of outfits to show off how their pieces look on a variety of models with different body shapes. AI has also been used to create virtual personal shoppers that can provide personalized recommendations for shoppers. AI-based systems are software programs designed to autonomously interact with the virtual world as well as provide useful insights. These systems can augment or provide alternative solutions to problems such as predicting trends and personalizing products for shoppers. AI-based systems can use data gathered from consumers, market trends, environment, and social media to make predictions about future fashion trends and help designers create more desirable pieces. AI-based systems can also provide targeted advertisements and alerts, helping retailers reach new customers and informing them of new products and promotions. AI can be embedded into hardware devices such as wearables, helping to automate certain tasks associated with the fashion industry. For example, AI-enabled wearables can track body measurements and monitor a user's movements in order to tailor clothing pieces for the individual. Wearables can also be used to analyze the colors and fabrics used in a product and provide personal recommendations for what the user should buy. AI-enabled wearables can also provide additional services such as tracking lifestyle changes and alerting users when certain products go on sale [20,21].

Cloud Computing
Cloud computing can be used in the fashion industry to improve processes such as customer service, data collection, marketing, and product design. Cloud computing can be used to provide customers with virtual personal shoppers or AI-based recommendations. It can also collect customer data to inform decisions about new product designs and trends. Cloud computing can also be used for marketing purposes, such as targeting customers with relevant advertisements and promotions. Finally, cloud computing can be used for product design, as AI-based systems can be used to generate 3D models of clothing pieces to give fashion designers a better idea of how their pieces will look on different body types. Cloud-based AI systems can quickly scale up and down to meet market demand. This allows fashion companies

to easily expand or reduce their computing resources to meet changing customer needs. Cloud computing also reduces the need for large investments in hardware, saving businesses money on upfront costs. Finally, cloud-based AI systems offer improved performance, meaning they can process more data faster than traditional systems. This allows fashion companies to better analyze consumer data and quickly adapt to changes in the marketplace [22,23].

Blockchain Technology

Blockchain technology has been becoming increasingly popular in the fashion industry as it offers a secure and transparent way to track products and their origins. It helps to create authenticity and traceability of products, build stronger relationships between and among different businesses in the fashion industry, and improve transparency of information such as pricing and sales data. Consumers can feel excited and more confident in buying products as they can easily access information on the product's source. Additionally, by utilizing blockchain technology, brand owners can access various data that can help them create and implement marketing strategies that can drive consumer loyalty, retention, and engagement. Blockchain is a distributed ledger technology that allows applications to securely and transparently authenticate ownership of digital assets. It works by having multiple stakeholders in a network keep a synchronized, encrypted list (the "blockchain") of all transactions and asset ownership. This allows the network to keep track of ownership and ensures that no one can make fraudulent modifications to the ledger. Blockchain technology can be used by the fashion industry to protect intellectual property rights by allowing copyright owners to securely register and track their ownership of an asset, such as a design or logo. This can help prevent counterfeiting and protect the rights of creators. Blockchain can also be used to securely process transactions between transactions parties, as well as securely store customer data such as shipping addresses and payment information [24].

Big Data Analytics

Big data analytics is a key tool for businesses in fashion. By utilizing big data, fashion companies can gain insights from data such as customer preferences, market trends, and purchasing patterns. They can leverage these insights to develop more effective and innovative retail strategies, such as personalized product recommendations, tailored customer promotions and discounts, and more effective customer segmentation. Furthermore, big data analytics can also be used to gain a better understanding of customers' buying behavior and preferences, so fashion businesses can better target their marketing campaigns for maximum customer engagement. Big data analytics is the process of collecting and analyzing large amounts of digital data in order to uncover patterns, trends, and behaviors. Techniques like data mining, pattern recognition, machine learning and predictive modeling are used to analyze large datasets to generate insights and make better decisions. Big data analytics can be used for a variety of purposes, from marketing and customer profiling to data mining and predictive analysis. Specialized software can help businesses analyze their data more quickly and efficiently, and provide them with actionable insights that can help them make better strategic decisions [25].

Instore User Experience

Digital technologies are being used to enhance the customer experience in stores, such as with digitally enabled fitting rooms, augmented reality (AR) capabilities, and interactive customer ordering systems. For example, some stores are using digital technology to allow customers to virtually try on clothing items using AR displays. Stores are also using digital ordering systems for customers to find products, review customer reviews, and purchase products without the assistance of sales staff. Furthermore, digital technology can also be used to create a seamless customer experience, such as in-store pay options and loyalty programs that can be accessed and used through digital channels.

Smart mirrors are being used by many luxury fashion brands in combination with their physical stores to provide an enhanced customer experience. Smart mirrors allow customers to virtually try on clothes with different sizes and colors as well as explore product options by providing detailed information and styling tips. Additionally, smart mirrors also offer a personalized shopping experience where customers can create wish lists, customize clothing combinations, and share their looks with their friends. This technology helps to create a more engaging and interactive shopping experience for consumers, and luxury fashion brands are utilizing this technology to offer a unique and innovative way of browsing and selecting their products [26].

Figure 1. Smart Mirror [2]

A smart mirror is a two-way mirror with an electronic display behind it, typically consisting of a touch screen, camera, microphone, and speakers. This type of mirror is used to create a more personalized and interactive shopping experience. Customers can use the smart mirror to virtually try on clothes, view product details, access customer reviews, and even share their looks with their friends. Smart mirrors can also be used to collect analytics data to help retailers understand customer preferences and better target their marketing campaigns.

Smart mirrors allow customers to share images or videos with people outside of the store, bringing home the images and videos and buying the items without having to wait in line at the cash register. This gives customers a much smoother and more efficient way to shop, allowing them to instantly purchase items without the need to wait in line. This technology also offers a unique and innovative way for customers to share their shopping experiences with friends, allowing them to spread the word about the store and encourage more customers to visit. Smart mirrors can help to create a more engaging and interactive shopping experience for customers, driving customer loyalty and increasing sales for retailers. Farfetch's Store of the Future is an AI-powered initiative that is focused on providing customers with better offline experiences. This technology enables personalized services and product recommendations, delivers real-time stock information and seamless checkout experiences, and makes use of various sensors and cameras to track customer movement throughout the store. Additionally, the AI technology can even suggest the best path a customer should take through the store in order to pick up their desired items and make their shopping experience as efficient as possible. As AI advances, Farfetch's Store of the Future is likely to become increasingly more personalized in order to provide customers with an even better shopping experience [27].

CONCLUSION

With the help of AI, fashion companies can now provide more personalized customer experiences both online and in-store. AI-powered algorithms allow companies to quickly analyze online user data and search behavior to provide customers with product recommendations tailored to their specific interests. AI can also be used to enable quicker and easier checkout processes, to faster process orders, and to autonomously detect and prevent fraud. Additionally, AI can also be used to help optimize in-store experiences with features such as facial recognition, personalized product recommendations, and voice-activated shopping assistants. Through the use of AI, fashion companies can now not only improve the convenience of their customers' shopping experiences but also make it more enjoyable. In conclusion, AI has become an integral part of the fashion industry, enabling companies to provide better, more personalized customer experiences both online and in-store. AI-powered algorithms can be used to analyze customer data and suggest product recommendations, as well as help optimize checkout processes and in-store experiences. Through the use of AI, fashion companies now have the tools and capabilities to greatly improve their customers' shopping experiences.

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