



Analysis of AI Applications in Beauty and Fashion Industry

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Abstract. As an emerging interest in beauty and fashion, it is clear that many of the brands have been considering adopting Artificial Intelligence to promote their brands by utilizing different technologies. Consumers are provided with more options to interact with brands, products, and services as being a member in the online and offline community. This paper aims to study the Artificial Intelligence (AI) applications and its challenges in the beauty and fashion industry. From virtual try-on to generative AI, to Non-Fungible Token (NFT) collections, brands execute different technologies to engage with their clients. Clearly, it is a trend that more and more brands will take into consideration to promote their brands in the future. However, even the AI applications has been utilized but it is not fully matured in other aspects, such as data privacy, regulations and ethical concerns. Therefore, more actions are needed to implement AI-powered technology in real practice.

Keywords: Artificial Intelligence, Brand Strategy, Generative AI, Non-Fungible Tokens, Technology

1. INTRODUCTION

It is considered rapid growth in the beauty and fashion design industry as so many technologies have been developed to help the consumers fulfill their needs and wants quickly. The tech industry is going through Web 3.0. Artificial Intelligence (AI) developed so quickly that many brands adopted it to market their brands- increase brand awareness, convert into buying power, interact and serve with consumers. As AI is advanced by experts over decades, major innovations are developed to better perform tasks and simulate actions like humankind such as machine learning and data analytics.

This paper aims to study the immersive experience created by AI-powered technology in the beauty and fashion industry and its potential challenges and suggestions to tackle the issues. It is critical to have technologies in the business. Brands want to enhance their commerce ability and sustain their brands with high-quality techniques. Consumers want to be a part of the brand community, have identity cognition, and have a feeling of belonging. So the author analyzes how brands implement this, the needs of consumers, and transform their consumers into a digitalized world by analyzing cases

from virtual try-on technology, virtual fitting rooms, and AI fashion design, to NFT Collections.

2. ARTIFICIAL INTELLIGENCE IN BRAND STRATEGY

The emergence of AI was coined in 1956 by computer scientists John McCarthy and his colleagues who worked on a workshop of human studying artificial intelligence [1]. Since then, the study around AI has come to the notice of experts and scholars, as well as corporations. Later on, as Big Data emerged in the field, AI became known as the ability of machines to perceive data and experience, make assumptions and analyses, and develop solutions to problems that originally needed to be solved by humans. Over decades, to summarize the milestone in AI history, humans have deep dive into its potential and power to be tested and functioned in practice (See Table 1).

Table 1. Milestone in AI history.

Year	Milestone
1950	Turing test was a way to test a machine’s intelligence
1956	AI was coined for Dartmouth Artificial Intelligence Conference
1965	AI-based chatbot ELIZA was created
1997	IBMs Deep Blue beated chess world champion Gary Kasparov
2005	Stanford vehicle drives autonomously winning the DARPA challenge
2009	Google built self-driving car
2011	IBMs Watson beated Jeopardy champions
2014	Chatbot Eugene Goostman won a turing test
2014	Amazon introduced Alexa- intelligent virtual voice assistant
2015	Amazon Echo was created
2016-2017	Google’s AlphaGo defeated Go’s champion Lee Sedol and Ke Jie
2021	OpenAI released the first generative model- DALL-E
2022	Microsoft invested \$1 billion in OpenAI to develop AI technologies
2023	ChatGPT 4 was launched

AI in technology came into vast fields to make work faster and more efficient, e.g. automated car driving and checker-playing. Besides all the research and work on developing AI technology, it comes true that utilizing AI could also enhance efficiency and reduce the cost of human labor in the workplace. The AI-based solution has become a top strategy for many corporations while doing a wide range of business, such as brand marketing. Many applications of AI systems have been applied both online and offline in the beauty and fashion industry which can assist the firms to connect with their customers and serve their wants and needs on an unprecedented scale. Specifically, there is virtual try-on technology applied by brands and retailers to provide visualization of apparel before purchasing goods and this could also be utilized along with Augmented Reality technology. For example, Farfetch has invested in virtual try-on technology to bridge the gap between online shopping and cloth-fitting in realism [2]. There is a huge potential to use AI in business as it can collect and turn vast amounts of information into actionable strategies, providing efficient service, building trust relationships, and reducing exchanges and returns [3].

When analyzing brands' strategies to utilize AI tools, there could be the following: 1) Create more and better designs. 2) Increase the sales efficiently. 3) Build personalized relationships with customers. 4) Reduce waste, human labor, and mundane business procedures. No matter which of the goals a brand or retailer wants to achieve, it is acknowledged that AI tools can be designed to help the brands function at maximum. With the support of new technology, a marketing strategy can also be transformed depending on the focus of the target. From traditional marketing to digital marketing, strategies that brands might use have changed from print media to websites, and from broadcast media to social media. It is a trend that marketing strategies changed from brand-centric to user-centric. Instead of a mass marketing method, consumers would rather get involved via approaches they can interact with the brands. As generative AI tools have been applied to product and service development, there is no doubt that a shift of focus from brands to consumers takes place. Focusing on the customers themselves rather than the one-direction brand-to-consumer method would benefit customers to explore their wants and needs through customized experiences. If any brands want to grab an opportunity to build its awareness or enhance its profits, AI-related contents can be taken into consideration to tighten their bonds with customers.

3. CASE STUDY: AI APPLICATIONS

As AI-powered technology presents new opportunities in the beauty and fashion industry, implementations in real-life practice become popular among brands to serve their target consumers. Hence, it is essential to discuss cases in the beauty and fashion sector to see how brands can promote their products and services through approaches.

3.1. Virtual Try-on

One of the implementations of AI-based technology is the feature of virtual try-on across different brands and retailers. This paper aims to talk about virtual try-on in the beauty and fashion industry.

Beauty retailers and brands try to promote their products by drawing customers' attention to the new AI and AR technology. For example, Sephora- a beauty retailer across many nations- allows a virtual try-on to help customers find the right lipstick colors. Perfect Corp. is another good example of transforming the beauty industry by providing services integrated with AI and AR technology to businesses and consumers. In helping with businesses, Perfect Corp. has enabled AI and AR technology to do virtual analysis or try-on including face diagnostic, hair, makeup, nail, and men's grooming services. In helping consumers, Perfect Corp. set up photo and video editing tools and AI avatars for consumers to download in the APP Store and Google Play. Another AI & AR skin analysis tool under the same company offers users real-time feedback on their skin diagnosis. Cameras would take pictures of users, predict users' age, and score their skin conditions at first. Specifically, the tool would analyze customers' wrinkles, texture, redspots, dark circles, etc., and give suggestions based on the results to improve skin care.

In addition to the virtual try-on in the beauty sector, AI-created technology along with AR can also allow users to virtually try on fashion apparel online. Fashion accessories such as eyewear, jewelry, and watches can be tried via some brands' virtual try-on services. As mentioned above in the beauty sector, Perfect Corp.'s AgileHand Tracking Technology, won "Product of the Year" in the Sales and Marketing Technology Awards, aka Sammy Awards - empowers virtual try-on shopping experience for users' hands or wrists [4]. It is also common to see brands unveil their clothing and sneakers by virtual try-on techniques. To try on as their own models, Christian Dior has its AR filters available on Snapchat for consumers to partake in the virtual try-on for their four versions of sneakers and allow them to purchase via the brand's profile on Snapchat. Sometimes, there could be another type of virtual try-on by visualizing garments on AI-generated models whom the consumers can find most look like in weight, height, and skin color, to themselves to display the clothing. However, the limitation for any virtual try-on in fashion exists because of the lack of real touch. It's hard to determine the fabric and comfort of the apparel materials as the virtual try-on experience can only visualize the look so consumers might have difficulties experiencing the feeling of wearing.

3.2. Generative AI

Not only have virtual try-on comes to promoters' notice, but AI-powered generator-integrated with machine learning have been applied by the beauty and fashion fields. Deloitte announced its expansion in strategic alliance with NVIDIA to build generative AI solutions for enterprises to reinvent their business, and the term generative AI is coined as AI-powered machines create contents to "reduce costs, increase productivity, accelerate innovation, and identify new revenue streams and growth areas" [5]. Mostly,

these AI generators would transform instructions into various mediums such as messages, images, and videos. Artists can utilize generative AI programs to generate art and images, and so do the fashion designs. Major AI art generators, such as MidJourney, and DALL-E 2 have been popularized among fashion designers who wish to express their creative insights and show new possibilities of fashion art. It could be of interest to see visually compelling content and stand out for business as designers can connect with customers from a new approach.

Besides the generation of new contents, AI can also predict the trend and recommend actions based on machine learning. For example, Depop- a thrifting mobile retail platform- is working on its retail service by training machines to have tastes and get to know users' likes and dislikes of products [6]. Depop utilizes a collaborative filtering model to offer customization and personalization including matching users with similar tastes and displaying products to others who have the similar interests [6]. The machine learning-based classifier model can automatically categorize shoes into precise subcategories as it learns the tastes, and then display the shoes to users with similar tastes so that the buyers can easily contact the sellers. who want to find looking for sneakers Another AI recommendation takes place in big data analytics, as AI tools such as Prewave can monitor the supply chains of production and maintain sustainability revealing potential violations [7]. ChatGPT, the open-coded AI-powered language model launched by OpenAI, can also be capable of generating contents and engaging with users based on context and past conversations. Both brands and consumers may utilize its dialogue format to better learn about the beauty and fashion works based on the data collection and AI training. There could be more possibilities dealing with ChatGPT to formulate conversations around human-AI centric in the future for the beauty and fashion business. Therefore, as AI recommendations are heavily developed and trained by human force and models to provide responses, it is expected to see more AI- generators coming out to perform tasks in the near future.

3.3. Crypto & NFT Collection

In Web 3, there could be other topics that fall into this network besides AI-based technology, and NFT collection could be one of the many. Even though users' interest in Non-Fungible Tokens- a unique asset logged on the blockchain, mostly part of the Ethereum blockchain- has slowed down since 2021, many of the fashion brands still consider investing and launching NFT collections as they want to build a community around their users. In such a case, users can buy a digital NFT Collection and hold these unique tokens in their wallet- all have been logged on the blockchain as one-of-a-kind virtual art creations. Luxury fashion brand Gucci is a leading company investing in the Web 3 market as it allows customers to purchase products with crypto coins and teams up with YugaLabs- the parent company behind NFT collections such as Bored Ape Yacht Club, and CryptoPunk- for a multi-year partnership [8]. In October 2023, sports brand NIKE announced its physical product- a pair of the Air Force 1 sneaker coming out from. Swoosh- a platform to collect NIKE's virtual products [9]. This platform is designed by NIKE to educate their users in absorbing Web 3, collecting digital goods,

and consequently co-building the online community. So rather than only doing collectible items, NIKE envisions its community engagement in a virtual and new channel that can strengthen the ties with customers, and it takes time to see how it goes. As the themes on the crypto market and NFT collection have been discussed and taken into consideration across brands, there is a possibility for more and more firms to initiate the same action to attract customers and tighten the users' centric community rather than the traditional payment methods and art piece. So even if NFT projects and crypto currencies might be slow to carry out, it is the brand's responsibility to rethink the utilization of digital assets and its impacts on shaping their users' needs and wants.

4. CHALLENGES OF AI-POWERED TECHNOLOGY

After the examination of AI-integrated technologies, it is crucial for brands and customers to understand the challenges of AI tools in brand marketing, and it might consist of data privacy risks with limited laws and regulations. During the process of AI tools implications to improve the customers' buying experience, data can be collected as biometric information such as height, weight, and skin color, to customize products for customers. It is considered a risk to customers who are involved in virtual try-on technology as their biometric information might be disclosed improperly. Therefore, retailers need to consider how to safely collect, use, and store the data to avoid data privacy violations.

Meanwhile, as the rise of AI systems quickly draws people's attention, the laws and regulations are relatively unconstructed and not updated. The European Union is the leading region that constructs the General Data Protection Regulation (GDPR) faster than the United States, however, it still has no fully constructed AI-related regulations [10]. As for AI-generated tools in marketing, the copyright issue should be considered when brands choose to do so. Shein, the online fast fashion retailer, was sued for allegedly using AI-based algorithms to collect art and put it into production which other artists came out with in summer 2023 [10]. According to the U.S. Copyright Office, materials created only by AI tools can not be copyrighted because of a lack of human authorship, thus it might belong to the public domain. Plus, there has been no change under the Copyright 1976 since then. So, it becomes difficult that no rules specify the data regulations or copyright situation where AI-generated contents may fall into a gray zone.

In addition to the lack of data privacy and AI regulations, the ethical issue of AI-generated materials needs to be paid attention to. Consumers' tastes can be influenced by AI-integrated technology rather than real humans. For example, consumers' attitudes towards the design of apparels based on big data and AI-generated contents might be different as someone might say 'It is not different from other AI designs' or 'The design looks pretty dull rather than having an aura'. Therefore, the willingness to be shaped by AI systems on tastes and preferences is unknown among the customers.

5. SUGGESTION

It is critical to acknowledge this paper aims to discuss AI-powered technology and its brand implementation in business, while challenges await brands to tackle such as data privacy, law regulations, and ethical concerns. However, there is room for brands and retailers to improve their trust relationship as long as they show consumers transparency and responsibility. ‘Eighty-one percent of customers expect faster service as technology advances’, written in Salesforce’s sixth edition of State of the Connected Customer report [11] (See Table 2). In other words, it is a brand’s call to step up and give back to their customers the fact that companies need more from them to do customer service and personalization. The technological breakthroughs lead the customers to raise the standards of expectation of the brands and thus brands should make use of such opportunities to motivate customers to stay with their brands.

Table 2. Percentage of customers asking faster service and better personalization in different situations.

Customers’ Situation	Customers who expect faster service	Customers who expect better personalization
When technology advances	81%	73%
When they provide more Data	75%	74%
When they spend more	65%	64%

Speaking of the lack of laws and regulations in the AI regime, there is a low possibility of revising the Copyright 1976 in the United States, but it could mean that when humans use AI-integrated technology to design or function their works in beauty and fashion, they should pay special attention to its authorship. There is also room for discussion about the AI ethical issue. Even though the design of goods can be extracted from big data and AI analysis, consumers still have the right to accept or refuse the production of goods in beauty and fashion. Human assistance still plays an important role in helping customers to find the right thing they need and companies should provide a connected customer experience as much as they can to represent their brands and bridge the trust gap. In the meantime, customers should remain cautious and value their sentiments as generative AI is embraced by brands at a large scale. Overall, digital integrations with AI technology need to be put in a strategic and clear framework and make sure the transformation would not distort a brand’s history and culture [12].

6. CONCLUSION

As AI is gradually integrated into market practice which can help brands achieve their potential to create designs, increase sales, build influences and relationships, and reduce workloads at a large scale, it is vital to know a journey to an AI-based orientation still has a long way to go. To look back and examine firms across the beauty and fashion industry, there is an effort to combine AI-powered technology and their marketing strategy to promote the brand. Every marketer should be wary of the power of AI but cannot fully leave AI technology to decide everything. Human force is still needed to intertwine with the development and implementation of AI skills in the market. To conclude the study of how AI works in the beauty and fashion industry, further actions are awaiting brands and tech firms to take on improving the AI-powered approaches, laws, and regulations that need to be constructed and passed for better and smarter use of AI tools. What it can tell is that consumers and brands show positive attitudes toward AI applications and its future.

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