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Fashion and A.I.: Determining How the Creative Process for Independent Designers is Shifting in 2023

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ABSTRACT

The merging of AI in the fashion industry has resulted in various concerns but also benefits that have led multiple people to question whether the usage of AI in the fashion industry should be restrained or embraced. Additionally, the significance of this investigation has to do with not only how recent this integration is but also addressing the benefits and non-benefits to better understand the complexity of this innovation in the creative industry. Nevertheless, fashion experts have already stated in interviews or other sources that one should see AI as a tool and not a threat to the creative process of fashion design. It can give designers a whole new way of processing and thinking of unique and innovative fashion pieces with just the assistance of AI. Ultimately, legal concerns like copyrights, data privacy, and consumer data have raised various questions among people in the industry due to the significant consequences that can result from utilizing AI in one's design. Regarding all that was stated, the future can only tell how the integration of AI in the fashion industry will positively or negatively affect the fashion world.

Introduction

In a time when technological advancements are increasing daily, the fashion industry has now crossed paths between the original tradition of fashion designing and a new era of fashion and AI. The merging of artificial intelligence (AI) and fashion was once considered a futuristic concept, but now, it has become one of the most powerful tools for the evolution of fashion. Although multiple fashion experts are concerned about this new way of working in the fashion industry, many have realized that many benefits can come from integrating AI into the fashion industry. Various examples of the benefits can be intelligent inventory management, predicting fashion trends, assisting in the business fundamentals of a brand's transactions, and more. While the integration of AI in fashion is still in its early stages, it has already shown great promise in revolutionizing the industry. Using AI, designers can create more sustainable and efficient fashion products while meeting customers' demands. As technology advances, it will be interesting to see how AI will continue to shape the future of fashion. Even with great technology and numerous improvements in AI, there can be many opposing sides to utilizing AI in the fashion industry due to its endless possibilities and unknown information about how it works thoroughly in multiple areas of the industry. Furthermore, some fashion companies already have legal issues with using AI to make clothing pieces; this causes numerous experts to wonder what legal rights one could have or not have when using AI to design such clothes. With the in-depth analysis, ethical sources, case studies, and expert thoughts on the topic, this investigation seeks to showcase a complete understanding of the current state at which AI is in with its automation in the fashion industry and the possible events that might take place in the later years due to this automation.

Problem Statement

The genesis of the conflict resulted from integrating AI into the fashion industry, which was sparked in 2020. Consequently, this integration has impacted the fashion industry's work dynamic immensely by shaping it into many new titles in the industry itself and providing much efficiency in apparel production consumption. Adding to the previous sentence, the pros of this integration are that it has made multiple fashion predictions, provided virtual assistance for better customer experience, created computer-generated virtual models, and much more. For example, the image processing system of AI being integrated into the fashion industry allows various fashion organizations like Tommy Hilfiger to analyze specific images of clothing models and instantly create new fashion designs/pieces. The problem with this example is the possible unoriginality that may arise from the system's creations or cause it to have biased opinions regarding merging these pieces of clothing. Not to mention another big concern from many fashion professionals would be the invasion of privacy that AI can lead to if it is not handled accordingly by human control.

Purpose

The purpose of this investigation lies in the low level of awareness on this topic, which has resulted in various concerns from multiple people due to the possible automation of technology, which in this case is AI-related. In this rapidly evolving industry, the integration of AI in the fashion industry has immensely separated the way of the industry's workforce and what is to come because of it. As a result of this integration, the acceptance and integration of AI in their workforce throughout recent years will bring many benefits and backlashes.

Justification

The importance of this investigation is truly because of how recent this topic is and how it can change at any time because Al is being improved every day as we speak. Consequently, because of the rapid improvements made to Al, it will be a part of or integrated entirely into every existing industry. Furthermore, fashion professionals have observed and concluded that Al has most definitely enhanced many areas in various fashion companies with AI's system of efficiency and sustainability. However, one must carefully work through this process and realize that even if this integration leads to immense work improvements, it can also limit and complicate the entire purpose of being more efficient and sustainable. One of the biggest concerns from the fashion industry's integration with Al would be the aspect of unoriginality from fashion pieces or biased opinions on specific creations. In addition, the automation of Al in the creative industry demonstrates a high chance of job displacement for many people.

Moreover, another conflict from this integration is that very few people are discussing this topic since it is a more modern problem. Although there has been some backlash about integrating Al into the fashion industry, it is fascinating to see all the possibilities regarding the benefits offered to all these fashion companies. Lastly, Al will grow substantially through many years of improvements and possibly solve existing conflicts within the fashion industry's system.

Research Questions

1. Is Al a great tool for fashion designers to make more innovations in the design processes?
2. What legal protections should be established for the integration of Al in the fashion industry?
3. In what ways can Al transform the consumer's buying experience from both online and in-store?

Research Objectives

1. To address the people the positive impacts that come a long by merging Al into the process of designing.
2. To breakdown the concerns of the data privacy, copyrights, intellectual property law, and bias.
3. To examine the potential Al can reach when it comes to making better consumer experiences.

Theoretical Framework

Various people greatly misunderstand that AI will not affect creative industries like the fashion world when that is false (Liz Guber, 2023). When categorizing, there is a subgroup of AI that is classified as generative artificial intelligence, which has been able to produce content ranging from text to music to images and more; this has led many fashion companies or corporations to enter a whole new world of designing methods with this generative artificial intelligence subgroup (Nathan Reiff, 2023). To distinguish, one should also demonstrate that only some things about AI have been beneficial and that AI has multiple consequences. For example, there is legal protection from AI in a person's workforce and for consumers (Marcus et al., 2023). The utilization of AI as a tool for designers has brought multiple methods to designing; the great use of predicting fashion trends gives significant leverage to designers by being able to meet their customer's demands and be able to be ahead of the curve in competition with other fashion designers as well (Wolff, 2023). The vast amount of utilization of AI by various fashion companies has led to a much bigger competition for all of them, and fashion designers will have a much harder time being able to stand out from the competition by producing even more creative and innovative pieces of clothing to consumers (Atkinson, 2023).

Definition of Terminologies

Generative artificial intelligence is known as a subgroup of Al that has grown in popularity in the fashion industry due to its endless possibilities. It focuses on producing creative content like text-to-music or text-to-images based on the specific prompts it receives. (Reiff, 2023). In addition, sustainable fashion is when the pieces of clothing are made by considering the environmental issues that the fashion industry affects. (Atkinson, 2023). Lastly, algorithms play a massive role in Al's systems due to their performance when merged with the fashion industry. Al analyzes online data and predicts future fashion trends because of the various patterns found in fashion trends (Atkinson, 2023).

Review of Literature

The Global Implications of Fast Fashion and how to Reduce the Fashion Industry's Effects

The investigation exposes the global consequences of fast fashion and offers activities individuals can do to decrease the fashion industry's impact. Fast fashion is the concept of inexpensive, stylish apparel created on a big scale, frequently represented in social media and celebrity cultures. Between 2000 and 2014, the fashion sector doubled its clothes manufacturing. They have one of the most giant carbon footprints, accounting for 8 to 10% of global carbon emissions. Waste is increasing because landfills contain 85 percent of the world's apparel. Companies regularly destroy unneeded clothing: Burberry wasted about $37 million in items in 2017. Furthermore, just 12% of the clothing we buy is recycled; compared to other waste goods, such as glass and paper, which have been recycled at 27% and 66%, respectively, clothing needs to catch up. A pair of jeans and

a T-shirt requires approximately 5,000 gallons of water. The amount of water the apparel industry uses is expected to increase by more than 50% by 2050.

Furthermore, this business discharges 20% of the world's wastewater, which contains dyes, chemicals, and toxins, into the natural environment. Again, synthetic fibers used in the fashion industry account for 35% of microplastics found in water. These countries usually lack strong and thorough labor rules, allowing fashion businesses to exploit poor people's labor. The fashion business continues to abuse and mistreat men, women, and children in developing countries worldwide. Many fashion firms continue to destroy the environment and exploit the labor of poor working people to meet the enormous demand for new trends from social media and celebrities. One may reduce the amount of clothing in landfills by keeping what one buys for as long as possible or donating it to thrift stores and homeless shelters. To save our planet and humanity, the most effective strategy is to be a wise spender who knows when and what to buy. In addition, fabrics that are very sustainable and effective for creating an eco-friendly fashion industry would be organic cotton and bamboo linen. Regarding this, fast fashion is an ever-growing problem in this world, and the following source goes into detail by stating that:

The investigation demonstrates the global implications of fast fashion and suggests actions that individuals must take to reduce the fashion industry's impact. Fast fashion refers to the idea of cheap, trendy clothing produced on a large scale, often reflected in social media a2nd celebrity cultures. The fashion industry doubled its clothing production from 2000 to 2014. They are one of the most giant carbon footprints, accounting for eight to ten percent of all carbon emissions worldwide. Since 85 percent of the world's clothing is in landfills, the waste rises. Companies frequently destroy unwanted clothing: In 2017, Burberry trashed almost $37 million in merchandise. In addition, just 12 percent of the clothing we buy is recycled; compared to other waste products, including glass and paper, that have been recycled at 27 percent and 66 percent, clothes undoubtedly need to catch up. About 5,000 gallons of water are required to create a single pair of jeans and a t-shirt. The water the fashion industry uses is anticipated to grow by more than 50% by 2050. Furthermore, this industry generates 20% of the world's wastewater, which contains dyes, chemicals, and poisons, back into the natural world. (Bai et al., 2023)

The presented information is paramount for advancing this investigation due to spreading awareness to others about fast fashion and its effects and the actions one must take to have a cleaner and healthier environment. It is essential to state this situation because only a few people talk about this topic widely enough. Having a plan of action for all humans to follow in our everyday lives can help us better grasp the importance of this situation, just as how important it is to recycle. This source also exposes the amount of water used in the fashion industry and how much that can affect the basics of human living. Also, this source clarifies that no company talks upfront about the situation because it does not look good on them. Still, they keep exploiting people and causing more damage to the Earth because consumers demand “new fashion.” This information helps the advancement of the investigation because of the exact numbers/percentages utilized, making this situation more severe and convincing for the readers/audience. In addition, it covers not only one topic, like the contaminated environment, but also the mistreated and exploited labor workers working in deplorable conditions for these giant fashion corporations.

Social Media and its Role in the Integration of AI in the Fashion Industry

There are various factors to consider when integrating AI into the fashion industry; more can be accomplished without social media. Social media plays a significant role in combining AI and the fashion industry. AI is rapidly evolving, and social media plays a substantial part in fashion marketing, among other things. Global AI integration in the fashion industry was anticipated to grow from $0.47 billion in 2021 to $0.65 billion in 2022, with a CAGR (compound annual growth rate) of 42.1%, reaching $2.66 billion by 2026. In 2021, North America will likely lead the market, with Asia Pacific expected to be the fastest-growing region. This growth is primarily

due to social media's growing importance in the fashion business, as it acts as a vital platform for fashion expertise, viewpoints, and brand endorsements by fashion influencers. The marketing influencer market increased from $9.7 billion in 2020 to $13.8 billion in 2021 as a result of factors such as the increasing popularity of short video formats on platforms such as TikTok, Facebook, and YouTube, which increased social media usage during the pandemic while also improving data collection for targeted ads. The growing importance of social media in the fashion industry is a critical aspect of AI integration. Machine learning also shapes this industry, which allows machines to mimic human behavior, make suggestions, and acquire insights from massive databases. For example, Tommy Hilfiger used machine learning to evaluate fashion pictures and trends. Finally, Syte, an Israeli software business, purchased Slyce in September 2021 to extend its North American footprint and improve its visual search technology for 60 shops. Regarding all that was mentioned, the following source exemplifies further information on the subject by stating that:

For instance, according to influencer marketing hub, a social media resource for influencers, the marketing influencer market grew from $ 9.7 billion in 2020 to $ 13.8 billion in 2021. The increasing popularity of short video formats on platforms like TikTok, Facebook, and YouTube, as well as the impact of the global pandemic on consumers, which catalyzed social media consumption, and the optimization of data collection, which marketers used for social media ads, are all contributing to this growth. Such growing influence of social media is driving the growth of the market. Machine learning are shaping the AI in fashion market. Machine learning is a part of artificial intelligence which defines the capabilities of the machine to copy human behavior. A machine can understand visualize and perform an action that helps in providing better information and suggestions to customers according to their behavior. For instance, in April 2021, Tommy Hilfiger, a renowned designer fashion brand applied machine-learning tools for product images of 15,000, and 600,000 publicly available runway images, and almost 100,000 fabric patterns sites. (Wood, 2022)

The importance of this source concerning this investigation is that it demonstrates very well how fast the world is changing and how AI will only be more robust and knowledgeable in fashion. The integration of AI is very significant, and it has changed the lives of many people and companies like Tommy Hilfiger. The source provides many numbers essential for us to realize how big AI is making the world shift each year economically. This source also offers good knowledge for future fashion people because everyone will have to accept, learn, and adapt to AI integration in the fashion industry now and later. Moreover, the geographic location of all the regions/places expanding on the integration of AI in the fashion industry makes us understand that only some things are about fashion in the US because there are many more. This source helps advance the investigation by providing real-world examples, making it more trustworthy/accurate. Finally, this source also gives citizens an idea of what is waiting for us to be prepared for it, physically and mentally.

The Brands Integrating AI, the Benefits, and the Challenges they Face Upon it

Well-known brands have taken a piece of this integration of AI with their products; this investigation demonstrates the types of pros and cons that these companies face. This investigation suggests that AI is unquestionably incorporated into the fashion industry and will emphasize which brands are involved, the benefits, and the future challenges. First, what exactly is AI? Beyond Talent says, "AI refers to programs and algorithms that perform tasks by simulating human intelligence." AI systems mimic human intelligence, allowing machines to complete tasks faster and with fewer errors. Machine learning, natural language processing, and data analysis generate options and predictions. Such AI systems evolve as they gain experience from previously processed data. AI is already rapidly transforming the fashion industry's business. Some examples are fashion design, patternmaking and production, marketing and sales, retail experience, sustainability, manufacturing, and modeling.

Additionally, when it comes to individual brands, a few have already benefited from AI. Five brands have already combined with AI: Adidas, Levi Strauss, Balmain, and Zegna. In terms of benefits, AI has excelled

in efficiency, personalization, sustainability, and prediction. These factors appear favorable, but some difficulties may arise when working with AI. Unoriginality, bias, privacy, job displacement, and cost are a few examples from the source. This source demonstrates how a successful product can be successful while including damaging things. Regardless, a study made by Beyond Talent was able to indicate that:

Efficiency: The most evident and profound advantages are speed and efficiency. AI can reduce time-consuming and dangerous labour, like the kind involved in cutting and sewing. It also helps with highly complicated tasks, such as supply chain management. These AI solutions have been shown to significantly reduce the time and effort required to create new products and improve accuracy and quality. Personalization: Incorporating AI in fashion improves product personalization and customization, which benefits both customers and companies. Consumer needs are met more effectively, and sales and satisfaction increase. Sustainability: Perhaps the most important benefit is increased sustainability. AI algorithms that optimize inventory, predict demand and streamline supply chain operations result in less waste. This outcome happens because less raw material is used, fewer items are produced and the environmental impact of manufacturing and transport is minimized. Prediction: AI algorithms are useful in helping retailers analyze data and predict trends so that they can make more informed decisions. (Pantanella, 2023)

The information presented in this source validates a better understanding of AI on the business side of the fashion industry. The in-depth illustration of everything stated in this source helps clarify why things are said to be true about AI in fashion. In addition, it adds to the point of drastic technological growth and how AI can not only reshape many industries but also restructure them completely. Also, the fact that this source is said to have been published this year helps a lot in having new and fresh information for the investigation. Moreover, the structure of the ideas mentioned and organized in the source are well thought out in terms of which topics one should discuss. Lastly, having more specific examples of the brands integrated with “AI Fashion” helps the investigation further richen the information being processed.

Clarifying the Misunderstanding of the Creative Industries Being Immune to the Automation of Technology

The creative industry thought that AI could not replace specific jobs in their field, but this investigation will demonstrate how different that is from what is true as time passes. The goal of this research is to demonstrate that there is a widespread misconception that the creative sectors are resistant to technological automation when, in fact, this is not the case. Bovell, a Canadian model, futurist, and founder of the tech education company "Waye," predicted in a viral Vogue article in 2020 that AI would come for fashion models' backs, saying that the fashion industry, like everyone else, must prepare for the changing workforce. AI can affect more than just models in the fashion business; it can also affect photographers, agents, makeup artists, set helpers, and caterers. Contrary to popular belief, AI is increasingly affecting the creative industries. Millions of people were duped in a week by a highly accurate deepfake image of Pope Francis clothed in a supersized, fashion-forward, pearly white puffer jacket.

Nonetheless, AI advances are raising concerns, with studies estimating that generative AI might affect 300 million employees globally. One advantage of incorporating AI would be sustainability, as picture shoots can be incredibly wasteful.

However, AI eliminates the need to fly in talent, ship crates of clothing, and construct temporary sets to shoot most of one's inventory. Using AI avatars instead of human models in the fashion business, on the other hand, raises ethical problems about representation and pay. Some corporations utilize artificial intelligence to diversify their casting, but they are under criticism for potentially bypassing genuine diversity efforts. There are concerns about who benefits from AI portrayals of minority groups and whether tech elites help more than the populations depicted. Experts encourage fashion companies to proceed cautiously when incorporating AI into their operations. Finally, the best advice for the fashion industry, and any industry at this moment, is to be

ready for whatever the future may bring. A study conducted by the founder of the tech education company Waye was able to demonstrate that:

"Without knowing it, you've probably bought clothing modelled by an AI-generated image already," said Sinead Bovell. A Canadian model, futurist and founder of the tech education company Waye, Bovell first sounded the alarm that AI was coming for models' jobs back in 2020, writing in a viral Vogue article, "it's safe to say that we will have to prepare for a changing workforce just like everyone else." It was when Bovell came across research papers on this topic published by German e-commerce retailer Zalando, a company she had modelled for many times, that she realized, "This is for real." Now her predictions are coming to fruition. AI can be used for everything from online shopping product photography to high-concept productions like fashion magazine cover shoots. "There's technology out there to create humanlike beings in a variety of poses and expressions, and there are so many use cases for this in modelling," said Bovell, who regularly tracks data, patents and technology trends across different industries. Of course, any fashion set includes more than just models. AI has the potential to affect whole swaths of the industry, from photographers and agents to makeup artists, set assistants and caterers. (Guber, 2023)

The usefulness of this source within this investigation is that it provides information on AI's significant and rapidly rising influence on the fashion industry; this needs to be addressed in discussions regarding the effect of AI on various companies. According to the source, AI would influence not just fashion models but also photographers, agents, makeup artists, set workers, and caterers. This broader viewpoint is crucial because it underlines the spectrum of AI's disruptive repercussions, prompting businesses to start planning for workforce changes beyond modeling. This source also discusses the significance of deep fake technologies and how readily such creations may deceive. Furthermore, ethical issues presented by AI avatars rather than people have a significant impact on the topic of fashion models and how they should feel about it. This source also informs readers that this is not a small-scale issue; it has already become a global debate/conflict in the creative industries.

Doubts About the Integration of AI and How it can Affect the Fashion Industry in Many Areas

There are a lot of uncertainties when it comes to this integration because of its countless possibilities, this investigation will demonstrate how AI can affect certain fields in ways that one could not have ever imagined. This investigation aims to calm any fears or concerns about the inclusion of AI and how it may affect the fashion industry in several ways. Since AI can now automate up to 30% of activities and 60% of occupations across all sectors, it is a big problem. This illustrates that AI is now an important issue and that everyone in every industry should think about their job. AI has already proved that it can fully interact with its clients regarding selling clothes. Customers, for example, may use the bot to get specialized ideas, product care instructions, customer service, and even make purchases. This lets people know that human assistance will be much replaced regarding one’s purchasing options. Furthermore, AI-based stylists are something that many firms are looking into because they can be helpful not just in terms of not having to pay a stylist but also in consideration of the effectiveness of image processing, which AI can understand. The following source explains this further by stating:

To mimic the experience of talking with an in-store sales associate, companies like Levi Strauss & Co. have partnered with Al companies like mode.ai. In late 2017, Levi's and mode.ai released a conversational commerce bot that helps consumers discover their perfect jeans. Figure 2-2 shows a screenshot of the conversational shopping interface by mode.ai that appears on Levi's Facebook Messenger and web site. This particular example uses a mixed UI relying not only on the user's improvised inputs, but allowing the user to select common options by clicking preexisting buttons. Al agents learn as a consumer interacts with them, making suggestions for products and actions based on products they've liked. At times, these agents even adapt the GUI based on click-rate. For example, UI components like buttons may be revealed, like the ones shown in Figure

2-2. As users interact with the bot, data is collected about engagement with each UI component. These components can be adjusted in real time, depending on their success with customers. For brands, the proposition of hosting bots that interact with other bots makes revenue sharing easier. (Luce, 2018)

The application of the focal point of this source concerning this investigation is that it demonstrates a descriptive explanation of the components gathered to inform one about the many areas AI can cover. In addition, this source is significant because it focuses specifically on AI and fashion throughout the book. Also, the author of this book is very trustworthy regarding all the information mentioned in the book. The reason is that the author is a Rhode Island School of Design graduate. If that was not enough, she had worked on robotic exoskeletons and soft goods for the military at the Wyss Institute at Harvard University and Otherlab in San Francisco. With all this in mind, she even worked for Vogue and currently works as a Product Manager at Google. Lastly, this source can further advance the investigation because of its evidence that AI was not just born last year. Instead, all of this information in this book was published in 2018, making it clear that AI has been affecting the fashion industry since before.

How the Fashion Industry Uses Generative AI

This investigation aims to clarify that generative artificial intelligence (AI) is a subgroup of AI that creates content ranging from text to music to images and more. Generative AI has led many fashion companies or corporations to enter a whole new world of methods for designing with generative artificial intelligence. Due to this, generative AI has caught the attention of many people interested in AI due to high-profile tools like the well-known OpenAI's ChatGPT. All these systems have in common their fundamental model for deep analysis of various amounts of data collected to use that information and "produce" new content based on the particular prompt given to the system. As this is no exception, fashion and technology have been closely linked for centuries. In recent years of fashion, digital clothing has been available in markets like the metaverse or as non-fungible tokens (NFTs) as prime examples. Some experts predict that generative AI could be the most powerful tool yet to transform the fashion industry entirely. Instead of neglecting the use of AI, many industries are already employing AI as partners in creation. Many enterprising designers find this partnership refreshing by using AI as a soundboard of ideas. It can create creative options by basing its data on past products, themes, inspirational images, and more. Another method designers are looking into is giving the generative AI system an image of their sketch and letting the system finish their sketch into a complete product, giving them ideas on executing the final product. In addition, another benefit of the generative AI tool is being able to customize products for individual customers on a much larger scale; this has allowed firms like Germany's Styleriser to work with customers and be able to offer them recommendations of specific clothing colors and styles based on the customer's images given to the firm. As a result, this can increase the buyer's confidence in their purchase, resulting in much fewer chances of customers returning clothing to the company. Lastly, the AI system can analyze millions of photographs better to recognize subtle design elements unique to illegal reproductions. In the end, endless possibilities of AI and fashion have only begun to appear. The following source can further elucidate on generative AI by stating that:

From the customer side, AI may play a role in shaping interaction with fashion companies and their products even when the consumer isn't aware. Text-generating AI systems are capable of generating and modifying product descriptions and other ad copy in order to specifically target an individual customer. Similarly, buyers should anticipate that their experience of digital shopping should be increasingly governed by AI tools that add or remove steps from the consumer journey in a bid to maximize sales potential. But perhaps one of the most exciting innovations to the customer experience that AI can provide is the ability to try on products virtually and make personal style recommendations. Google announced in June 2023 that it had developed a generative AI tool to aid in virtual clothing fittings. The tool shows customers what particular pieces or outfits might look like based on dozens of models with a variety of body types. From the business perspective, helping

the customer to find colors, designs, and sizes that best suit him or her with the use of AI could mean a massive dent to expensive returns, which currently cost retailers up to 38% of an item's original cost. (Reiff, 2023)

The salient and summarized information within this source provides clarification that not all AI systems are or work the same. In this case, one of the subgroups of AI is called the generative AI tool, which has revolutionized the fashion industry for the better. This creation of the generative AI tool has caught the attention of many fashion designers from various companies because of the effortless way of producing products much more seamlessly and quickly. This generative AI tool has also opened other doors for multiple uses, like being able to customize a company's customers on a much larger scale. They can also recommend clothing color options and styles to them based on images sent by the customer to the company. In addition, the data collected from this source has helped further advance the investigation by clarifying the different subgroups of AI systems and how they work. Lastly, this source details how AI can produce images for the fashion industry, like AI-generated images of models for fashion companies.

The Uncharted Legal Frontier of AI in Fashion

This investigation showcased that only some things about AI have been a benefit, and one should address the consequences of utilizing AI. For example, there is legal protection from AI in a person's workforce and for consumers. It is no exception that AI has improved sensationally in many different areas of various industries worldwide. The amount of improvement AI has done to many workforces within the time it started to gain popularity is impressive. However, artificial intelligence (AI) is still new to everyone, and there are many sides to it that can be bad for fashion companies that only a few people are looking into, like the legal protections of and from AI. First, this means that there are existing legal implications and risks associated with what is known as copyright and data privacy. In addition, the platforms used for AI have terms and conditions that may govern ownership of the product and compensate in the case of a third-party claim; this means that fashion brands should analyze these risks when it comes to the case of utilizing AI in the creative process of one's product. The creative process can get complicated with the ownership rights and copyright of such items due to how much a human contributes to their product.

Nevertheless, the creative process integrated with AI can be protected if there is enough human involvement in the product. For example, the source states, "In March 2023, the Copyright Office clarified that there may be instances in which "a work containing AI-generated material will contain sufficient human authorship to support a copyright claim. For example, a human may select or arrange AI-generated material sufficiently creatively so that "the resulting work as a whole constitutes an original work of authorship." Even though the Copyright Office has issued guidance, the Copyright Act has not been modified since 1976. It cannot account for any technological updates over nearly 50 years. In the summer of 2023, the well-known fast fashion brand Shein was sued for allegedly utilizing an AI-based algorithm to find art and other content on the internet to produce, distribute, and sell the exact copies of other artists' creative works.

As a consequence of using AI as a tool in the creative process, its output may be considered a public domain due to the lack of human contribution to the work. It is not easy to determine when legal frameworks will catch up with the advancements of technology since it can take years for regulators and lawmakers to make changes or guidance with the updates of technology. Now, delving into data privacy and AI risks, fashion brands using AI to process consumer data raises one's privacy concerns, making brands obligated to abide by the General Data Protection Regulation (GDPR) if they wish to continue doing business in the industry. Some laws have strict requirements for using a consumer's data that obligate them to include informed consent and a valid reason to use the customer's data. Additionally, some laws guarantee consumers the right to request their data to be removed or corrected, such as the information sent about their height, weight, face, skin color, and more. Lastly, the following source will better demonstrate the complexity of AI's legal protections by stating:

However, the purely creative aspects (such as the patterns or decorative elements) may be protected if there is sufficient human involvement. Authorship has been consistently construed to be limited to humans and the U.S. Copyright Office has advised that materials generated solely by AI cannot receive copyright protection because they do not meet the human authorship requirement. In March 2023, the Copyright Office clarified that there may be instances in which "a work containing AI-generated material will contain sufficient human authorship to support a copyright claim. For example, a human may select or arrange AI-generated material in a sufficiently creative way that "the resulting work as a whole constitutes an original work of authorship. While the Copyright Office has issued guidance, the Copyright Act itself has not been updated since 1976 and does not account for any updates in technology that have occurred over nearly 50 years. Earlier this summer, fast-fashion clothing brand Shein, was sued for allegedly using an AI-based algorithm to find art and other creative content online in order to produce, distribute, and sell exact copies of artists' creative works. (Marcus et al., 2023)

Pertaining the information in this source and its importance within this investigation would be delving more into the adverse effects of utilizing AI as a tool instead of the overall benefits many people hear from AI. In addition, thanks to the source demonstrating the legal protections from and of AI within the fashion industry, it helps showcase how badly it can affect multiple fashion brands. Furthermore, having insight into the legal protections from AI with laws that protect customers from these fashion brands will exemplify why one as a consumer must also be concerned about AI and be cautious of its utilization. This source's information helps advance the investigation because of its detailed data on what parts of the world have been involved with the usage of AI in their creative process. Moreover, stating the specific names of the systems responsible for the legal protections from AI helps further understand who is to blame or requests a change in their laws, not to mention the excellent explanations and examples of how AI can complicate a brand's overall way of doing business. Lastly, the source being very recent confirms to one as an investigator how good and updated the information presented by this source truly is.

How AI is Transforming the Fashion Industry

This investigation aims to provide information on how AI is not only for the use of a chatbot but also to improve one's fashion business and how that is happening in the year 2023. To begin with, utilizing AI as a tool in the creative process of producing a piece of clothing can analyze the data on the product's overall performance. They help designers identify areas that require improvement and recommend changes to the design or process of manufacturing the piece. These changes can make one's clothing more durable, more comfortable, and more aesthetically pleasing for one's eye. Furthermore, intelligent inventory management AI is also utilized to optimize inventory management in the fashion retail industry. When analyzing the data on the sales of trends, customer preferences, and other factors, the AI algorithms can tell retailers what better decisions to make to know which products to stock and the amount of necessary inventory to keep on deck. With this assistance, retailers will improve probability, reduce waste, and ensure they always have their customers' desired products. In addition, AI has already been used to make fashion pieces and creatively organize and present fashion shows. For example, Moncler Genius, a Milan-based luxury fashion brand, recently launched its Fall 2023 collection with an AI-powered campaign. Moncler utilized an AI system that generated images that uniquely and innovatively demonstrated the collection. This AI usage resulted in extraordinary images that resembled the collection in an innovative and sustainable sense. Also, with the help of AI-generated images, the designers were much more efficient in producing rather than making traditional photoshoots, which can lead to wasting a lot of designer's time and effort on the project.

Another example of AI's help in fashion shows is that last year, in 2023, New York City hosted its first-ever AI Fashion Week. Maison Meta organized it; it is the world's first AI generative agency, partnered with online retailer Revolve Group. This event was held from April 20 to 21 at Soho's Spring Palace, which has

hosted past New York Fashion Week shows. AIFW (AI Fashion Week) is set to be annually presented as an event to showcase the latest innovations in the merging of AI and fashion.

Along with Malik Afegbua's Elders fashion show is a recent fashion show in Lagos, Nigeria, made by the designer Malik Afegbua, who utilized AI to produce a unique and innovative runway experience titled "The Elders Series." This runway show was about elderly models (AI generated) wearing traditional African clothing but with a twist with modern design as well. This show celebrated African culture and heritage while exemplifying AI's massive potential in the fashion industry. Lastly, go into an online retailer of AI-generated collections made by designers and brands called Dress X. The purpose of this retailer is for users that want to buy a digital item and upload an image of themselves wearing the clothes to their size. Then, Dress X will send the customer a custom image of themselves wearing the digital item they bought, giving customers the right to share the digital piece on social media as often as they want. The goal of Dress X is to make digital fashion accessible, affordable, and sustainable for anyone while also encouraging creativity and diversity in the fashion industry by granting access to 3D designers and traditional brands of fashion opportunities. In the end, AI has confirmed to everyone that it has changed how fashion businesses operate in their workforce. As the years pass, AI and fashion will become more intertwined with the upcoming technological improvements made for AI systems to become even more efficient. The following source can illustrate further by stating:

In 2023, New York City hosted its first-ever AI Fashion Week, organized by Maison Meta, the world's first AI generative agency, in partnership with online retailer Revolve Group. The event was held on April 20 and 21 at Soho's Spring Place, a location that has hosted past New York Fashion Week shows. AIFW is an annual event that showcases the latest innovations in AI and fashion. The event features a series of runway shows that highlight the use of AI in fashion design, production, and marketing. In a recent fashion show in Lagos, Nigeria, designer Malik Afegbua used AI to create a unique and innovative runway experience, titled "The Elders Series." The show featured elderly models wearing traditional African clothing but with a modern twist. The AI technology was used to create digital art projected onto the clothing, creating a dynamic and interactive runway experience. The digital art was created by analyzing data on African art and culture, and then generating designs that reflected these influences. The result was a stunning fashion show that celebrated African culture and heritage, while also showcasing the potential of AI in fashion design. (Rachel, 2023)

The information presented in this source validates the fact that it covers the benefits of AI in the fashion industry, showcasing topics like AI's assistance in making fashion shows, intelligent inventory use, online retailers for digital pieces of clothes, and more. Furthermore, the importance of this source also has to do with how unique and different every benefit mentioned is. In addition, this source explained perfectly all the benefits of using AI with clear examples and ideas. Also, with the recent source from the last year of 2023, the information collected can be beneficial for finding new information on AI in the fashion industry. For example, using images is pleasing to one as an investigator and to identify the examples of each topic covered by the source. Lastly, instead of just providing one unique example of the merging of AI in the fashion industry, the source showcases more examples like the ones mentioned before.

The AI-Driven Fashion Revolution

The article seeks to exemplify the great use of AI in predicting fashion trends and demonstrate that utilizing AI in fashion is all about balance and not losing human creativity. To begin with, the fusion of AI and the fashion industry has had an immensely positive impact on them due to the endless possibilities and potential that AI holds up to its name. First, one of the many great uses of AI in fashion would be predicting fashion trends. It works by having AI algorithms analyze vast amounts of data, such as images and social media content, making it able to identify the patterns of these images and create forecast popular styles; this can be useful because designers can leverage these predictions and produce designs relevant to upcoming trends, allowing them to create pieces that their target audience will enjoy immensely.

An example is Heuritech, the leading AI-powered trend forecasting platform that showcases its significant application in the fashion industry. Their technology can analyze millions of images from multiple resources like social networks, focusing on colors of images, texture, patterns, and silhouettes. Not only is Heuritech's platform capable of predicting fashion trends, but it also keeps track of trends' evolution over time, giving designers a deeper understanding of the creation of trends and their potential impact on the fashion market. Now, many people wonder if AI is a threat to the creative process of the fashion industry; no, it is not a threat if one does not let it. The merge of AI in fashion has been debated since its creation. However, various fashion industry experts believe that AI is a great tool to complement and improve human creativity rather than replace it. In the end, it is all about balancing out human creativity and AI technology at the same time. This balance ensures that human effort and expression remain at the center of artistic creations while allowing AI to analyze vast amounts of data to produce new and unique ideas. Ultimately, the source that follows can demonstrate further data by stating that:

AI algorithms are capable of analysing vast amounts of data, such as images and social media content, to identify emerging patterns and forecast popular styles. Designers can leverage these insights to create designs that align with upcoming trends and resonate with their target audience. Heuritech, a leading AI-powered trend forecasting platform, demonstrates the practical application of AI in the fashion industry. Their technology collects and analyses millions of images from social networks, focusing on aspects such as colour, texture, pattern and silhouette. This comprehensive analysis helps identify micro and macro trends and enables designers to make data-driven decisions when creating their collections. Heuritech's platform not only forecasts the popularity of certain styles, but also tracks their evolution over time, allowing for a deeper understanding of trends and their potential impact on the market. By using Heuritech's insights, designers can create collections that cater to the upcoming trends and resonate with their target audience, keeping them one step ahead in the competitive fashion landscape. (Wolff, 2023)

Regarding all that was stated, the significance of this source has to do with the excellent way of explaining how AI systems work to predict fashion trends. In addition, the source showcases how and for whom this use of AI is of benefit. Providing examples of AI-powered platforms, like Heuritech, lets researchers know this is an authentic source with valuable data on how fashion predictions are possible. Also, using visual images in this source of generated AI images for fashion pieces gives researchers a good idea of the potential of AI systems in the fashion industry by observing in detail the fantastic textures, colors, and more. Furthermore, this source, being from FG Magazine, demonstrates that their interpretation and data on AI in the fashion industry must be valid. Additionally, by stating clear evidence on AI in the fashion industry, this source has valuable information that has helped further advance the investigation. Lastly, having well-rounded arguments and showing different sides of the benefits and non-benefits of AI is truly helpful for ongoing research on the topic.

The Future of AI in the Fashion Industry

Have demonstrated how AI's revolution in the fashion industry will cause various companies to have greater competition due to the great use of AI in the creative production of clothing. AI is the future of many industries, and one must embrace it now. Unsurprisingly, AI will eventually change how workforces will operate in the upcoming years. In addition, many fashion companies are realizing the great competition that will lead AI to the fashion industry's creative process of releasing amazing and unique pieces and, first, showcasing the great use of AI in the fashion industry with the Fabricant's digital fashion collections. The "Fabricant" is a digital fashion resource where it creates clothes that only exist in the digital world. They make this happen by utilizing 3D design tools and AI systems to produce outstanding and life-like fashion collections that can be "worn" in the virtual environment of digital spaces.

Furthermore, another example of AI's great use in fashion design is in Adidas' Speedfactory. It uses AI and robotics to create customizable shoes for consumers to buy online. Their fantastic technology allows for

quicker production deadlines and more personalized products, giving consumers input into the design of their shoes. In addition, Stitch Fix's AI-driven personal styling service is also of great use to the world of fashion design. Stitch Fix utilizes AI and machine learning algorithms to help personalize customer's outfits. Their technology analyzes the consumer's data, including past purchases and style preferences, making it able to recommend clothing items that the customer will most likely love.

Another example would be Tommy Hilfiger's AI-driven design process as well; they utilize AI to analyze fashion trends and consumer data to produce innovative and trendy designs. With the help of technology, the brand can stay ahead of fashion trends and meet the consumers' demands quickly. Lastly, SEDDI's Textura AI-powered textile digitization platform enables the digitization of physical textiles to be utilized in the digital product creation and development for apparel. It can produce digital textiles' physical and optical elements by using AI algorithms trained with highly authentic data from thousands of fabrics to ensure the accuracy of simulating fabrics in the digital environment. Likewise, the presented source can clarify that: future of fashion is intertwined with these emerging technologies. The fashion industry is at the cusp of a significant transformation. Virtual reality and augmented reality are also making their way into the fashion space, with social media platforms offering new ways for customers to experience fashion. These technologies are not only changing the way we shop but also the way we interact with fashion brands on social media. Artificial intelligence is not just a tool but is becoming a significant driver of design innovation in the fashion industry. From AI-informed design to smart manufacturing processes and online shopping, AI is transforming the way fashion is created and consumed. The role of artificial intelligence in fashion design is significant, with AI-powered tools enabling designers to create unique and innovative designs that would not be possible with traditional methods. The fashion world is embracing AI, with luxury brands like Ralph Lauren and Louis Vuitton incorporating AI into their design processes. The evolution of technology in the fashion industry has been nothing short of remarkable. (Atkinson, 2023)

This source holds significance due to its adaptive explanation of how AI systems will make fashion companies more competitive than ever before. This source also effectively highlighted the beneficiaries of this AI application in designing fashion pieces. Including examples such as Adidas' Speedfactory for customizing one's shoes or Stitch Fix's styling service platform adds much credibility to the source, offering researchers valuable insights into the mechanisms behind fashion design. Incorporating AI-generated images for fashion pieces enhances comprehension by allowing researchers to visually appreciate these pieces' intricate details, textures, and colors. Being sourced from Seddi Textura, it lends much credibility to the interpretation and data on AI in the fashion industry. Moreover, the source contributes to advancing research by presenting clear evidence of AI's role in the creative process of producing digital pieces. The comprehensive arguments presented, showcasing both the advantages and predictions of AI, are particularly beneficial for ongoing research on this topic.

Methods

During the investigation, a computer with an internet connection and a browser (Safari) was used to find the required sources. Despite the unstable internet connection, the Google search engine was instrumental in pinpointing the necessary sources to answer the research question. Although the sources were not peer-reviewed, they were reviewed and approved for validity by the investigation mentor; these factors created optimal conditions for completing the project.

A documentary analysis design was utilized with a descriptive content-analysis methodology to complete the investigation. Each of the ten sources found was necessary to specify its purpose and target population, and a well-synthesized summary was constructed for each source. The limitations, results, and recommendations were also stated for each source. Despite the occasional instability of the internet connection, it was sufficient to conduct all required components of the investigation.

Results

The utilized search engines (Ebsco Host and Google) proved to be the most useful for the following sources of this investigation. The fifth source within the Literature Review was not recent, as it was published in 2018. It demonstrated the doubts and the effects of merging AI in the fashion industry's different working areas and confirmed that AI is less recent than various people think. The first, second, third, fourth, sixth, seventh, eighth, ninth, and tenth sources were very recent, as they were published in the same year of 2023; the first source showcased information by stating the global implications of fast fashion and suggesting to others how their actions have to be taken into consideration when it comes to reducing the fashion industry's impact on the environment. The second source outlined the general integration of AI in the fashion industry; this source reveals the great significance of external factors like social media due to its effectiveness in increasing the popularity of AI in the fashion industry and its considerable role in the fashion marketing area. Additionally, the third source was able to elucidate what the future of the fashion industry will look like due to its integration with AI by mentioning examples of brands utilizing AI and the benefits and challenges that they face.

Furthermore, the fourth source established misunderstandings among people working in any creative industry (fashion models, makeup artists, photographers) that they are immune to the automation of technology (AI) when that is false. The sixth source exemplified how the fashion industry utilized generative AI and validated that generative artificial intelligence (AI) is a subgroup of AI that produces content that ranges from text to music to images and more. The seventh source described how only some things about AI have been a benefit, and one should address the consequences of utilizing AI. An example is the legal protection from AI in a person's workforce and for consumers. The eight sources indicated that AI is known as a chatbot and another way of providing methods for one's business in the fashion industry and how that is happening in 2023. The ninth source provided how the prediction of fashion trends with the help of AI gives a massive advantage to any fashion designer in the world and also illustrates by fashion experts that AI is a beneficial source for creative ideas in order to produce more unique fashion pieces while also not losing all creativity in the process. The tenth source stated how the revolution of AI's integration in the fashion industry would give multiple fashion companies much higher competition due to AI's great use in clothing manufacturing.

During the early development of this investigation, the main question was:

1. Is AI a great tool for fashion designers to make more innovations in the design processes?
    a. The section labeled "How AI is transforming the fashion industry" directly provided the necessary data to answer that question. The source states that AI is a fantastic tool beyond being a chatbot, including improvements in the creative process and inventory management. An example of the great benefits of AI would be the system of AI's ability to assist designers in analyzing their product's performance data, identifying areas for improvement, and even recommending changes for the clothing's durability, comfort, and aesthetic. Ultimately, AI's intelligent inventory management allows for stock decisions based on the sale trends and the customer's preferences, reducing waste and enhancing the probability.

As more evidence was gathered, one more question was generated to define further the variables of this investigation.

2. What legal protections should be established for the integration of AI in the fashion industry?
    a. The section labeled “The Uncharted Legal Frontier of AI In Fashion” directly provided the necessary data to answer that question. The source illustrates that even though the merging of AI in the fashion industry has had multiple benefits, it has also raised significant legal and ethical concerns about the usage of AI in this creative industry. Specifically, the legal protections of copyright and data privacy are crucial elements that need to be addressed when utilizing AI; this has already caused companies like Shein to have some legal problems due to

the unethical usage of AI in their process of manufacturing clothing; this has led to the cause of unoriginality in the creative process of producing clothing, potentially worrying many fashion designers' work due to the robbery of original work from an artist. Additionally, the slow pace of the legal framework for regulating AI has become a significant challenge for the fashion industry and any other creative industry. Furthermore, AI's usage of processing consumer data has raised multiple privacy concerns, making the need to create regulations like GDPR (General Data Protection Regulation). Lastly, this is a sign of the necessity of laws being required for valid reasons for using consumer data, with revisions for data removal or corrections.

Such a situation led to the creation of the final question:

3. In what ways can AI transform the consumer's buying experience from both online and in-store?
    a. The section labeled "The Future of AI In the Fashion Industry" directly provided the necessary data to answer that question. The source proves that AI is an excellent tool for improving the customer's online and in-store experience. An example of how it works would be AI and robotics that can create customizable shoes for consumers to buy online; Adidas created this idea, which became known as Adidas's Speedfactory. In addition, when it comes to improving the in-store experience for customers, it would be made possible with the idea of virtual fitting rooms with a big digital screen that scans a person's entire body. Scanning an individual's entire body can let them try on clothes from the store without even going into a fitting room to see how it looks on a customer.

Discussion & Conclusion

The presented sources elucidated the global implications of fast fashion; they discussed how to reduce its effects and social media's role in integrating AI into the fashion industry. Moreover, this investigation delineated the brands integrating AI, their benefits, and their challenges. For example, brands that have integrated AI into the fashion industry are Zara, Tommy Hilfiger, Gucci, Adidas, Levi Strauss, and many more. Additionally, evidence was provided to clarify the misunderstandings of the creative industries' immunity to technology automation. Even with this, further data supported the investigation by stating the doubts about the integration of AI and how it can affect the fashion industry in many areas.

Further data states that generative AI is one of the best tools for the fashion industry and leads to many legal concerns for various people. Moreover, evidence was provided that the legal protections of AI need to be established better to avoid legal issues on the creative validity of one's creative work when making fashion pieces. Many fashion designers need more confidence about ever using the assistance of AI systems to benefit their creative process. Likewise, intelligent inventory management was only made possible because of AI, making fashion brands' businesses operate much quicker and more efficiently. It allows fashion brands to keep track of the styling preferences of customers and sales trends in order to meet the audience's demand much faster than other fashion companies.

On top of that, Heuritech is a leading AI-powered trend forecasting platform that showcases its significant application in the fashion industry, giving fashion designers a significant advantage over other competitors due to their awareness of upcoming fashion trends and letting them meet customer demands beforehand. Lastly, another source presented how beneficial AI has been for the customer's experience in the online store. It was executed by what is known as "Adidas' Speedfactory," which is made up of AI and robotics that produce customizable shoes for customers to purchase online. Their extraordinary technology allows for quicker production deadlines and more personalized products, resulting in more consumer input to the creative design of their shoes. Remarkably, the following source from "Renaissance Rachel" was outstanding due to its long, credible,

well-organized data, images, and diversity of information on how AI is transforming the fashion industry. The process overall revealed some limitations, which might be resolved by more investigation. Recommendations for the upcoming continuing research and data analysis include securing additional years of data and requesting more study resources.

Additionally, one should analyze qualitative phenomena through logical field studies, interviews with fashion designers, and surveys. Generally, the sources presented a vignette on integrating AI and the fashion industry. Ultimately, this investigation aims to answer how AI will change the fashion industry workforce for years. Sources converged to provide an answer: many positions in the fashion industry will be automated, and most likely, people will have to adapt to or embrace this drastic adjustment to survive.

Limitations

For the investigation to come to fruition, the scope of the research question had to be more encompassing to find more information on the subject, which permitted the optimal conditions to answer the research question. If the original research question had not been changed, the essay would not have been written as well, given that the research question would have been challenging to complete. Additional internal threats had to be mitigated to preserve the investigation's internal validity, such as changing various sources that did not meet the quality threshold to elucidate the problem surrounding the conducted research correctly. Moreover, multiple external threats had to be addressed to preserve the external validity of the inquiry, such as the instability of the institution's Internet connection, a limited database, and having a slow computer on occasion.

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References

Al in Fashion Global Market Report 2022: Growing Influence of Social Media on the Fashion Industry Fueling Sector. (2022). M2Press WIRE.

Ai in the fashion industry. Beyond Talent Recruitment. (n.d.) https://beyondtalentrecruitment.com/blog/ai-in-fashion

Atkinson, M. (2023, December 13). The future of Al in the fashion industry. SEDDI Textura. https://textura.ai/future-of-ai-in-fashion-industry/

BAI, I. (2023). FAST FASHION: the global implications of our clothes. Teen Ink, 37(7), 16-17.

Faro, S. M. X. K. B. X. E. (2023, September 26). The uncharted legal frontier of Al in fashion. The Interline. https://www.theinterline.com/2023/09/07/the-uncharted-legal-frontier-ofai-in-fashion/

Liz Guber Special to the Star. (2023, March 30). Al is coming for fashion models' jobs. Toronto Star (Canada).

Luce, L. (2018). Artificial Intelligence for Fashion: How Al is Revolutionizing the Fashion

Industry. In Google Books. Apress.
https://books.google.com.pr/books?hl=es&Ir=&id=ZRFDWAAQBAJ&oi-fnd&pg=PR5&dq=ai+
and+fashion&ots-rKxsY6IVg4&sig=CmAyb9Q s P 0EWE6Y4LX¡CBDY&redir esc-y#v-onepage&q&f-false

Rachel, R. (2023, November 3). How Al is transforming the fashion industry. Renaissance Rachel.
https://renaissancerachel.com/ai-and-fashion/

Reiff, N. (2023, October 19). How the Fashion Industry Uses Generative Al. Decrypt.
https://decrypt.co/resources/how-the-fashion-industry-uses-generative-ai-2

Wolff, A. (2023, March 28). Fashion Meets AI: A New Era of Design & Creativity. FG MAGAZINE.
https://thefashionglobe.com/ai-and-creativity