

Work in Progress: AI Digital Transformation: AI Tools for Fashion Design

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Abstract— In today's society, there is a recognition of how artificial intelligence is rapidly influencing the fashion industry. The fashion industry is undergoing a digital transformation, where generative artificial intelligence tools can be used to improve the multiple phases of the fashion design process. However, this trend calls for a change in the pedagogical practice of fashion design, adequately training future fashion designers. This article aims to present a summary of AI generative tools that help the fashion design process, highlighting the permanent need to adapt teaching practices in fashion design to train future designers for the urgent needs of the industry.

Keywords—innovation, artificial intelligence, education, fashion design, industry

I. INTRODUCTION

Today, there is an undeniable need to formalise artificial intelligence as a concrete reality, objectively recognising its potential impact as a prominent asset in various industrial sectors. The fashion industry, far from being an exception, is also being profoundly influenced by technology, thus offering new opportunities and challenges in all its aspects.

Aside from this, it is a fact that the fashion industry is undergoing a digital transformation, accelerated by the development of artificial intelligence [1]. This continuous development means significant changes at all levels of the value chain, from design to the consumer experience [1].

Currently, from a creative point of view, fashion design and artificial intelligence are developing a strong and evolving relationship, because artificial intelligence can gradually be used through tools, with the ultimate aim of improving various aspects of the fashion design process [2].

A study by Zhang & Liu [3], shows that there is growing interest in the fashion industry in adopting a design process assisted by artificial intelligence tools to fulfil market demands. With this growing trend, fashion design teaching will also have to adjust, strategically integrating artificial intelligence tools into the teaching practices associated with the design process.

In this sense, through a synthesised presentation of some artificial intelligence tools that help with the different stages of the fashion design process, the main aim of this article is to make the fashion design education system aware of the importance of adapting quickly to this new reality. Despite the existing technology, the fashion industry will always be looking for skilled designers to respond promptly to needs.

II. AI THEORETICAL APPROACH

Artificial intelligence is an innovative technology that enables the development of a system capable of simulating human cognitive abilities in tasks related to solving complex problems [4].

By combining an advanced algorithm with machine learning techniques, artificial intelligence can replicate analysis and decision-making processes, thus offering efficient solutions in a variety of contexts [4].

Among the various branches of artificial intelligence, generative artificial intelligence stands out as the most suitable for the fashion industry, since it allows human creativity to be combined with computational capacity in the creation of new products [5].

This technology is transforming the way we design the designs of the future [6].

In the fashion industry, an area where adaptability and innovation are synonymous with success, the unlimited power of generative artificial intelligence tools makes it possible to revolutionise many aspects of the fashion design process, thus responding to the dynamics and demands of a constantly evolving market [7].

III. AI IN THE FASHION DESIGN PROCESS

As one of the main sources of the world's global economy, the fashion industry relies heavily on design, which stands out as a driving force behind innovation, thus keeping the sector competitive [8]. The ability to develop original designs not only guarantees differentiation on the part of brands but also ensures that the sector remains competitive in a constantly evolving landscape.

Corroborating this, it is a fact that design plays a crucial role in adapting to new trends and consumer demands, contributing greatly to the sustained growth of the fashion industry. A study by Zhang, Bai & Ma [9], confirms that consumers are increasingly willing to pay for fashion products designed using artificial intelligence.

Today, with the digital transformation in progress and response to growing consumer demand, it will be necessary for both education and the fashion industry itself to adapt, merging generative artificial intelligence tools with the different phases of the fashion design process.

From a practical point of view, fashion design consists of developing clothes and accessories that combine functionality, style and cultural influences [10]. Although each fashion designer has their preferences, methodologies and design practices, the design process can be broken down into six different basic pillars, as can be seen in Fig. 1. below [11]; [12].

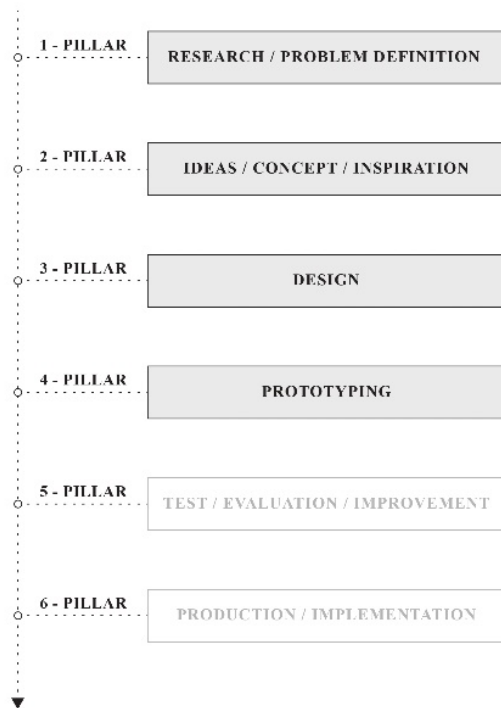


Fig. 1. Basic pillars representing the fashion design process.

These pillars serve as a guiding structure that helps organise the various stages of the fashion design process, allowing for a more cohesive and efficient approach.

Based on the above, generative artificial intelligence tools have the power to revolutionise every fundamental pillar of the fashion design process, from problem identification to the creation of the final product. However, in order to direct this research, only the first four pillars were taken into account..

In the first pillar, relating to research and problem definition, generative artificial intelligence tools can be used to synthesise and centralise data on emerging trends and patterns of consumer behaviour. This allows designers to quickly identify challenges and opportunities, facilitating more strategic decision-making [2].

About the ideas, concept and inspiration pillar, generative artificial intelligence tools facilitate creative exploration, allowing visual moodboards to be created using simple inputs and a unique combination of shapes, textures and colours. In addition, these tools also allow designers to align their inspiration proposals with what is in demand in the market, promoting a more focused and strategic approach to developing new concepts [13].

In terms of the design pillar, generative artificial intelligence tools can be exploited to create new patterns, materials and parts based on a few inspirational inputs. In addition, the tools make it possible to automatically vary the

different designs, covering different sizes, colours, patterns and shapes, optimising efficiency when exploring alternatives [3].

Finally, in the prototyping pillar, generative artificial intelligence tools make it possible to create 3D prototypes, eliminating the need to create physical samples. In addition, the tools make it possible to simulate the behaviour of various raw materials under specific conditions, such as movement, flexibility and reaction to light [14].

IV. AI TOOLS FOR FASHION DESIGN

Based on the four pillars mentioned above that make up the fashion design process, Fig. 2. illustrates which generative artificial intelligence tools can currently be incorporated into each of these pillars. These tools not only enrich the process but also boost efficiency and innovation, allowing fashion designers to explore a panoply of approaches and solutions when developing their products.

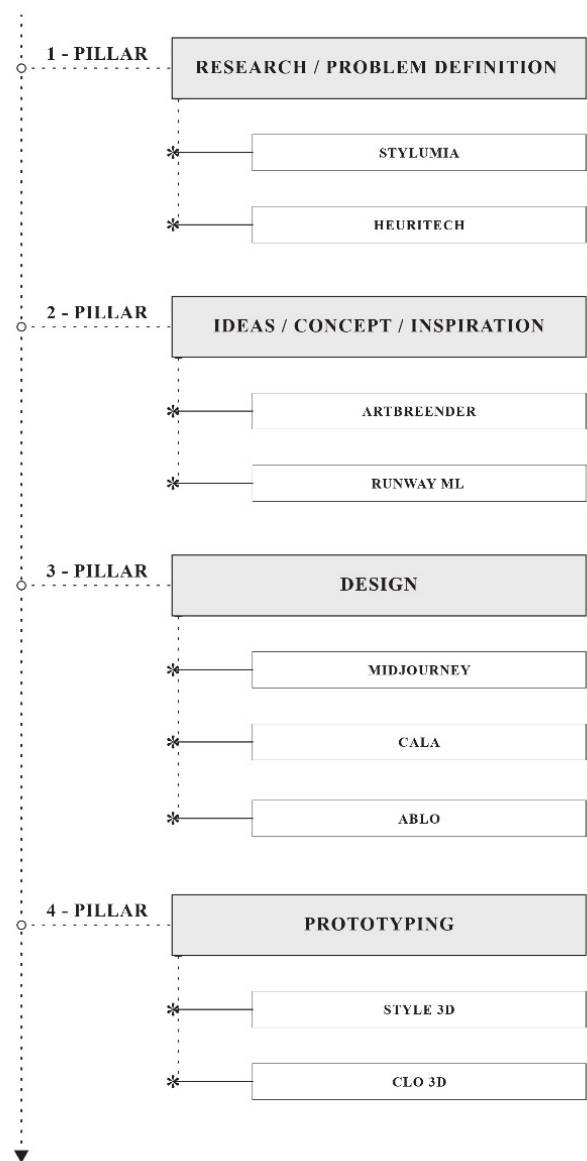


Fig. 2. AI generative tools for each fashion design process.

Regarding the research and problem definition pillar, two generative artificial intelligence tools stand out: Stylumia and Heuritech, already used by brands such as H&M, Prada, Dior, New Balance, and Paco Rabanne. Both tools are advanced instruments for analysing consumer preferences and perceptions, thus identifying emerging trends and needs. These tools also offer valuable insights that help fashion designers align their products based on consumer expectations.

In the ideas, concept and inspiration pillar, the generative artificial intelligence tools to be used are Artbreeder and Runway ML. Both are tools that allow designers to create and combine images within a given concept or inspiration, facilitating creative exploration and innovation in the development of new visual concept panels. As part of the design pillar, three generative artificial intelligence tools play crucial roles in the process.

As part of the design pillar, three generative artificial intelligence tools play crucial roles. Midjourney emerges as the most suitable tool for the development of artistic patterns and materials, already used by brands such as Paatiff, Tommy Hilfiger and Matilde Mariano's, the tool provides a wide range of creative options. When it comes to creating fashion pieces, the Cala and Ablo tools allow for a more design-centred approach through illustration and are already used by brands such as Balmain, Pangaia and Smiley.

Finally, in the prototyping pillar, the generative artificial intelligence tools that stand out are Style 3D and Clo 3D, already used by brands such as Adidas, United Colors of Benetton, Boss and Levis. Both tools make it possible to create 3D prototypes, providing a visual and detailed representation of products before they are produced. In addition, these tools make it possible to simulate the behaviour of various raw materials, allowing designers to assess the appearance, functionality and interaction of materials in different contexts.

V. CONCLUSION

After this research, it is possible to conclude that there is a huge range of generative artificial intelligence tools being used in the various phases of the fashion design process. From problem identification to the creation of the final product, the tools help automate and speed up all stages of the process while expanding creative potential [7].

The diversity of these tools contributes significantly to the evolution of fashion design, enabling greater adaptability to the demands of an ever-changing market.

We are undoubtedly emerging into a new reality, where the growing interest on the part of the fashion industry in implementing a more precise design process aided by artificial intelligence tools makes it urgent to change the panorama of fashion design teaching, which must be able to incorporate these new digital dynamics [3].

It's essential to train future designers for this new technological reality and to think about new teaching dynamics, through a reformulation based on digital practice, because we're moving in leaps and bounds towards a fashion industry 4.0 where technology will be the basis of sustainability. Artificial intelligence is currently being widely used, for example at AI Fashion Week, which brings together numerous brands that use these tools, such as Paatiff [15], Ope [16], and Matilde Mariano's [17], among others. All this helps

to prove the need for methodological development in fashion design teaching based on the use of artificial intelligence.

Therefore, the aim of this research was to synthesise some artificial intelligence tools to help with the different phases of the fashion design process, already serving as a basis for the pedagogical practice of the design process, thus helping future fashion designers in this new reality.

In conclusion, despite everything, it is essential to recognise that the role of the fashion designer will not be replaced by artificial intelligence tools, but rather complemented by them. The tools act as a fusion, enhancing creativity, but they do not replace the artistic vision and understanding of context that are intrinsic properties of human work. Therefore, the incorporation of tools should be seen as an opportunity to expand the creative capacity of fashion designers and not replace them.

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