

Research Article

Using Artificial Intelligence Techniques to Innovation 3D Designs for Occasion Clothes Inspired by the Fatimid Era

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Abstract

Intelligence has been used in various fields worldwide, and many studies have emerged related to artificial intelligence and its effective and essential role in the field of ready-made clothing in all its various stages, This research aims in general to study and analyze one of the most important applications of artificial intelligence, which is (Leonardo.AI), and to benefit from it in the field of designing occasion clothes inspired by the Fatimid era. The importance of the research lies in presenting an analytical study of one of the most important applications of artificial intelligence (Leonardo.AI) - enriching the local market with designs for occasion clothes inspired by the Fatimid era using one of the most important applications of artificial intelligence - enriching the field of fashion design and the digital library with a study linking it to one of the most important applications of artificial intelligence (Leonardo. AI). The result of this research: There are no statistically significant differences between the averages of the opinions of the arbitrators on the designs in employing the elements and foundations of the proposed design for occasion clothes inspired by the Fatimid era using the artificial intelligence application, and between the averages of the opinions of the arbitrators on the designs In the aesthetic aspect of the proposed design of occasion clothes inspired by the Fatimid era using the artificial intelligence application, between the average opinions of the arbitrators on the designs in the functional aspect of the proposed designs for occasion clothes inspired by the Fatimid era using the artificial intelligence application, and between the average opinions of consumers on the designs in the proposed designs for occasion clothes inspired by the Fatimid era using the artificial intelligence application.

Keywords

Artificial Intelligence, Fatimid Era, Occasion Clothes

1. Introduction

The world has witnessed many industrial revolutions for hundreds of years, and the twentieth century witnessed a technological information revolution in electronics and computers, which were used in many vital fields worldwide, contributing to a breakthrough in all fields and industries, including the ready-made clothing industry, as it developed rapidly using all the innovations of the era from modern ar-

tistic methods and advanced technology. One of the most important stages that contemporary technologies have touched upon is the stage of preparing and implementing models, as it represents one of the foundations and pillars of this important industry [1, 2, 16, 26].

Artificial intelligence has become the most important product of the Fourth Industrial Revolution, and it has uses in

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various fields, including industry, economy, science, technology, medical care, education, and services. It is expected to open the door to endless innovation and lead to more industrial revolutions, which will result in fundamental changes in human life, because with the rapid and tremendous development of technology that the world is witnessing, artificial intelligence will be the engine of progress, growth, and prosperity in the coming years [14].

Some countries have developed and advanced scientific and local professional capabilities in the field of artificial intelligence through various mechanisms, and innovated an artificial intelligence culture at all levels of society to promote the development of artificial intelligence, as they have worked to facilitate the spread of the use of tools that rely on these technologies and innovation digital citizens capable of dealing with them [17].

The concept of artificial intelligence (AI) was first defined by John McCarthy as the ability of computers to mimic human functions such as learning and problem solving. AI is characterized by its ability to make computer programs mimic human behavior and mental abilities. The greatest evidence of the thinking skills and abilities of artificial intelligence appears as a result of the fact that true artificial intelligence is a system that can learn on its own [20-29].

Artificial intelligence has become part of the way we do business in all different industries, even the fashion industry, as fashion looks forward and looks to new technologies that can be implemented by artificial intelligence programs that are characterized by the speed with which fashion moves and the extreme precision [25, 27, 28].

Artificial intelligence aims to understand the nature of human intelligence by creating computer programs capable of simulating intelligent human behavior. It means the ability of a computer program to solve a problem or make a decision in a situation, as the program itself finds the method that should be followed to solve the problem or reach the decision by referring to many different inferential processes that the program was fed. This is considered an important turning point that goes beyond what is known as "information technology" in which the inferential process is carried out by humans and the most important reasons for using the computer are limited to its high speed [6-23].

Artificial intelligence technology has entered the fashion industry as it did in many other fields, including the development of special systems to help consumers choose their clothes professionally. Not only that, but researchers have developed systems based on artificial intelligence that help people choose their clothes based on their personal characteristics by entering the person picture of the outfit, where artificial intelligence algorithms give him a recommended model [5, 21, 24].

Artificial intelligence has been used in many fields worldwide. Many studies have emerged related to artificial intelligence and its effective and essential role in the field of ready-made clothing in all its various stages, starting from the

design process to the manufacturing stage and until the final appearance of the clothing product. However, there is a scarcity of previous studies and research related to the applications of artificial intelligence and its use in fashion design [8].

The following is a presentation of some studies that dealt with the field of artificial intelligence in the field of clothing, including the study of Mohamed Muhyi al-Din Mahmoud [13], which aimed to know the possibility of using artificial intelligence technology and its contribution to raising the design capacity of the industrial designer, which helps in creating modern products. The results concluded that the use of artificial intelligence works to reduce the time and cost of completing models.

Ahmed Al-Sheikh's study [4] also aimed to reach the possibility of innovating designs suitable for designing women's clothing fabrics that are consistent with other factors in clothing, the design, technological, environmental and social aspects, as women's clothing is one of the most important requirements and necessities for every personality. The research presented 7 designs suitable for use as women's clothing inspired by actual fabric designs, but they were processed using artificial intelligence systems, which is one of the most important modern design methods and sources used to enrich women's clothing fabric designs.

The study of Iman Abdel Salam et al. [3] also aimed to identify the applications of artificial intelligence and its various algorithms and study those applied in the fashion design stage, prediction and inspiration, in the various types of results, and to identify the relationship between the use of artificial intelligence and the specialization of the designer within the factory, the effect of his years of experience and to know the extent of the relationship between the effect of the size of the factory (large - medium - workshop) and the type of production (local - export - export and local) as well as the specialization of the designer for his use of these applications. The study concluded that factories use the AutoCAD program and the design method based on the customer's request by (28.6%) in the design stage, and for those with years of experience (5 - 2 years), they were the largest in relying on modern technological applications, while in the prediction stage, the percentage reached (28.6%) through analyzing sales and profit trends, and the analysis of fashion trends reached (50%), and the percentage for the type of local production and export to use AutoCAD was (26.7%), followed by local factories by (25%).

The study of Mohamed Hajjaj [7] also aimed to use one of the most important applications of artificial intelligence (Midjourney) with the aim of creating designs suitable for printing on clothes inspired by some symbols of the Pharaonic civilization to emphasize the Egyptian identity and add artistic and aesthetic value to the targeted clothing design, the "T-shirt". The researcher innovated (52) innovative printing designs that were innovated entirely within the artificial intelligence application through textual processing of some descriptive phrases for the desired design. The results showed

that the designs succeeded in raising the aesthetic and artistic value of the clothing design.

The study of Rania Ali et al. [10-12] aimed to study the effectiveness of the guided self-learning strategy based on artificial intelligence applications to develop the skills of fashion design inspired by fractals and spatial visualization among home economics students. The results showed the effectiveness of guided self-learning based on artificial intelligence applications on students of the first experimental group and the second experimental group in favor of the second experimental group in developing both cognitive achievement and spatial visualization, and the final product evaluation card for women's fashion designs inspired by fractals (as a whole) and in each of its dimensions.

It can be noted from the above-mentioned studies that there is a scarcity in previous studies that deal with studying the applications of artificial intelligence in fashion design, and hence the idea of research came to support the educational process in creating designs for occasional clothing inspired by the Fatimid era using one of the artificial intelligence applications (Leonardo.AI) by entering 10 hand-drawn designs modified with Photoshop for occasional clothing inspired by the Fatimid era to help them provide an infinite number of wonderful innovative proposed designs in the fastest time and with high technology.

Research Problem

Given the scarcity of academic studies and scientific research that dealt with the applications of artificial intelligence in fashion design, the research problem can be defined in this question: What is the possibility of using artificial intelligence techniques to innovation three-dimensional designs for occasion clothes inspired by the Fatimid era, and the following questions branch out from it:

- 1) What is the possibility of benefiting from one of the artificial intelligence applications (Leonardo.AI) in creating designs for occasional clothes inspired by the Fatimid era?
- 2) What is the degree of acceptance of Arbitrators for designs for occasional clothes inspired by the Fatimid era?
- 3) What is the degree of acceptance of consumers for designs for occasional clothes inspired by the Fatimid era?
- 4) What is the possibility of implementing a selection of the proposed designs that received the highest acceptance rate from Arbitrators and consumers?

1.1. Research Objectives

This research aims in general to study and analyze one of the most important applications of artificial intelligence, which is (Leonardo.AI), and to benefit from it in the field of designing occasion clothes inspired by the Fatimid era. The following set of sub-objectives emerge from it:

- 1) Study and analyze one of the most important applications of artificial intelligence, which is (Leonardo.AI).
- 2) Innovation several wonderful innovative proposed de-

signs using one of the most important applications of artificial intelligence, which is (Leonardo.AI) in the fastest time and with high technology, by entering some designs drawn manually and modified with Photoshop.

- 3) Measure the extent of acceptance or rejection of the proposed designs by Arbitrators and consumers.

1.2. Research Importance

- 1) Providing an analytical study of one of the most important applications of artificial intelligence (Leonardo.AI).
- 2) Enriching the local market with designs for occasion clothes inspired by the Fatimid era using one of the most important applications of artificial intelligence.
- 3) Enriching the field of fashion design and the digital library with a study linking it to one of the most important applications of artificial intelligence (Leonardo.AI).

1.3. Research Methodology

The descriptive and analytical approach through a description and analysis of one of the artificial intelligence programs (Leonardo.AI) as well as the experimental applied approach represented in invent a number of proposed designs for occasion clothes inspired by the Fatimid era using one of the most important applications of artificial intelligence, which is (Leonardo.AI), by entering some hand-drawn designs modified by Photoshop, and implementing the best designs.

1.4. Research Hypothesis

- 1) There are no statistically significant differences between the averages of the judges' opinions on the designs in employing the elements and foundations of the proposed design for clothes inspired by the Fatimid era using the artificial intelligence application.
- 2) There are no statistically significant differences between the averages of the judges' opinions in the aesthetic aspect of the proposed design for clothes inspired by the Fatimid era using the artificial intelligence application.
- 3) There are no statistically significant differences between the averages of the judges' opinions in the functional aspect of the proposed designs for clothes inspired by the Fatimid era using the artificial intelligence application.
- 4) There are no statistically significant differences between the averages of the consumers' opinions in the proposed designs for clothes inspired by the Fatimid era using the artificial intelligence application.

1.5. Research Terms

1.5.1. Artificial Intelligence

Artificial Intelligence is a branch of computer science and

one of the most important elements of the technology industry in the current era. It is a term consisting of two words (intelligence and artificial) and means intelligence: the ability to understand and perceive new concepts, while artificial: is related to things that resulted from certain elements, unlike natural things that appeared as a result of human intervention. The term artificial intelligence includes programs and systems that simulate the intellectual aspects of humans [11, 18, 19].

Artificial intelligence is a system that includes programs and smart devices that aim to build machines that perform complex human tasks, by designing them in a way that simulates the human mind in the way it learns, thinks, makes decisions and solves problems, and then employs the results of this study to develop smart systems and programs [15-22].

1.5.2. Fatimid Era

In the tenth to twelfth centuries, an area including present-day Algeria, Tunisia, Sicily, Egypt, and Syria came under the rule of the Fatimid dynasty (909–1171) [9-30].

1.6. Research Borders

Objective Borders: Study and analysis of one of the most important applications of artificial intelligence, which is (Leonardo.AI), and benefit from it in entering 10 hand-drawn designs modified with Photoshop for clothes inspired by the Fatimid era to innovation 40 proposed designs for clothes inspired by the Fatimid era. (30) designs were selected from them by Arbitrators in terms of achieving the functional aspect of the design.

1.7. Research Procedures

First: 10 designs for occasion clothes inspired by the Fatimid era were drawn manually by the researcher, and these designs were modified using Photoshop and Illustrator, then each design was described by clarifying the foundations and elements of the design that were achieved in it, as well as analyzing its aesthetic and functional aspects.

Second: The ten designs were entered into the artificial intelligence application (Leonardo AI) and the Prompt for the designs of occasion clothes inspired by the Fatimid era was entered and the colors were changed in the Prompt according to the design.

Third: The ten designs were entered into the artificial intelligence application (Leonardo AI) and the Prompt for the Fatimid-inspired occasion clothing designs was entered and the colors were changed in the Prompt according to the design. We got 3 designs for each of the ten designs, meaning the total number of proposed designs was 30 designs.

Fourth: 40 designs were presented to a group of 15 Arbitrators to determine the best 20 designs suitable for outerwear and evening wear (in terms of achieving the functional aspect of the design) within the proposed design.

Fifth: The 20 selected designs were presented to a group of

Arbitrators (15 Arbitrators) to learn their opinions about the proposed designs, and a group of consumers (50) to survey their opinions about the proposed designs. After statistical analysis of the opinions of each of them, the best three designs were determined and implemented. The two designs that received the highest percentages from the point of view of the Arbitrators were the seventh, the twentieth, and the thirty-third designs. The design that received the highest percentage from the point of view of the consumers was the ninth design, and the fifth design received a percentage of 100%.

2. Theoretical Framework

2.1. Artificial Intelligence Program (Leonardo AI)

It is a free application that gives the user 150 daily opportunities. The (Leonardo AI) program contains a main menu as shown in the "Figure 1" that contains:

- 1) The number of free opportunities available daily (150)
- 2) The (Community Feed) menu, through which a list of designs for other people can be displayed, which helps you write (Prompts) easily.
- 3) The (Personal Feed) menu, through which you can access all your previous designs.
- 4) The (AI Image Generation) menu is used to enter to innovation new designs.
- 5) A menu to innovation new designs.

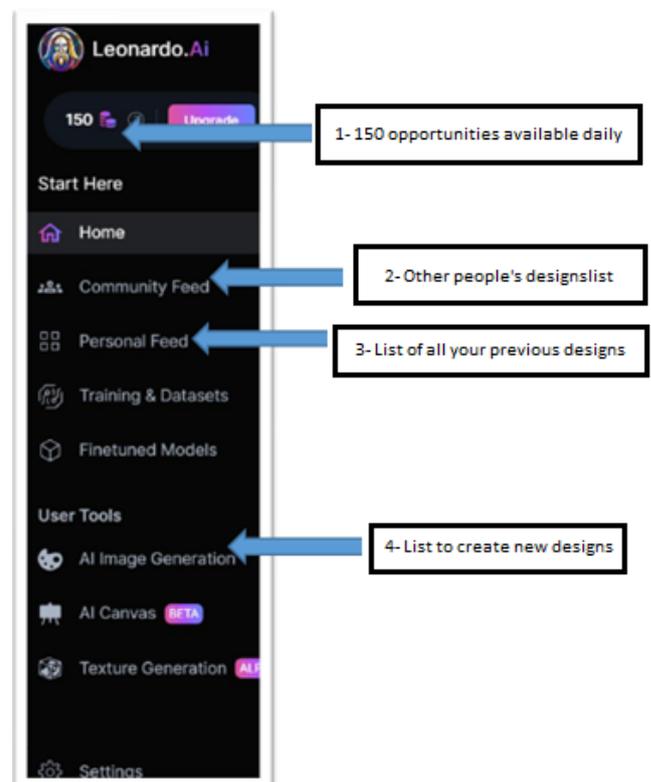


Figure 1. Program home page.

Application on the artificial intelligence program (Leonardo AI)

2.2. The Artificial Intelligence Application (Leonardo AI) Can Be Used in Two Ways

First method: You enter "Prompt", which is writing some

words and descriptive phrases for the required designs, so that the artificial intelligence algorithms analyze and process that data, then the program provides an innovative set of designs according to what was entered, as in "Figure 2" in the first bar, prompt is written, and in the second bar, Negative prompt is written, meaning everything we want to exclude in the required design.

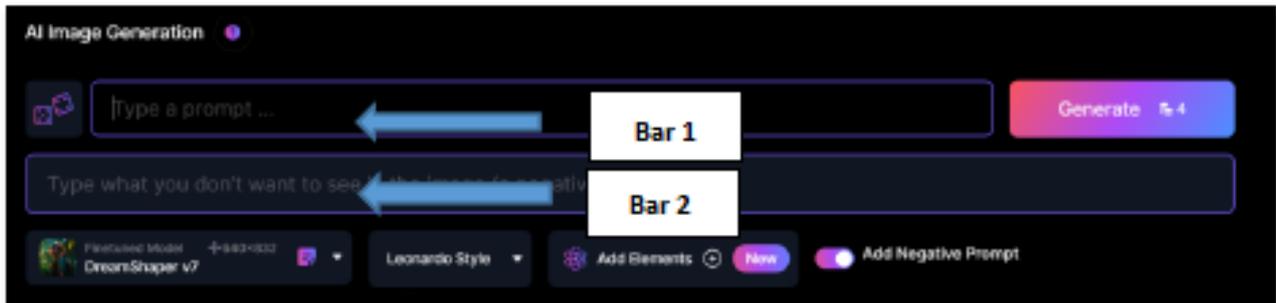


Figure 2. Writing prompt and writing Negative prompt.

Second method: You enter your designs, whether by hand drawing or designing using any program such as (Photoshop), and you also enter the "prompt" for the required design, as in "Figure 3".

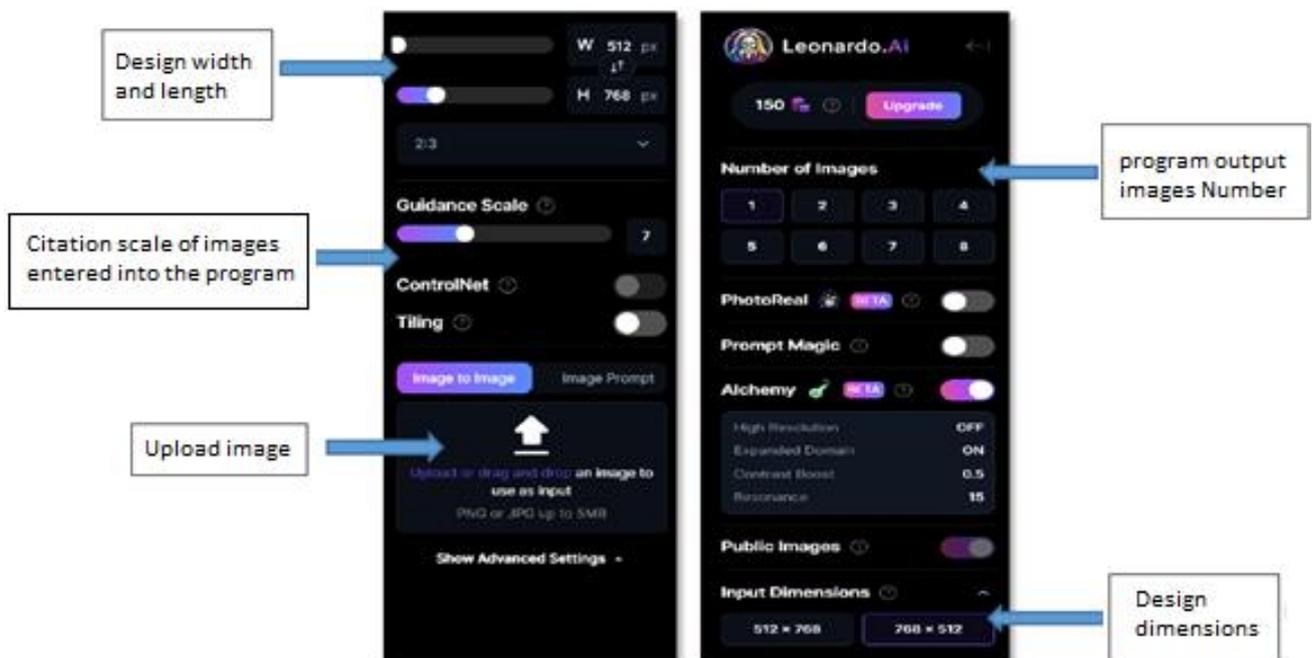


Figure 3. The list of required design specifications and how to upload an image.

Suggested designs for occasion clothes inspired by the Fatimid era
 First design:



Figure 4. First design.

Second design:



Figure 5. Second design.

Third design:



Figure 6. Third design.

Fourth design:



Figure 7. Fourth design

Fifth design:



Figure 8. Fifth design.

Sixth design:



Figure 9. Sixth design.

Seventh design:



Figure 10. Seventh design.

Eighth design:



Figure 11. Eighth design.

Ninth design:



Figure 12. Ninth design.

Tenth design:



Figure 13. Tenth design.

3. Validity and Stability

To answer the first question, which states: What is the possibility of benefiting from one of the artificial intelligence applications (Leonardo AI) in creating designs for occasion clothes inspired by the Fatimid era? A questionnaire was prepared for Arbitrators in the field of clothing and textiles to judge the implemented designs. The questionnaire includes three axes:

- a) First axis: Employing design elements and foundations for the proposed design (6 statements)
- b) Second axis: The aesthetic aspect of the proposed design (3 statements)
- c) Third axis: The functional aspect of the proposed design (3 statements)

3.1. Validity of the Questionnaire Content

Validity was calculated using internal consistency by calculating the Pearson correlation coefficient between the total score for each axis and the total score for the questionnaire. The following “Table 1” shows this:

Table 1. Values of correlation coefficients between the score for each axis and the score for the questionnaire.

Axis	Link
Employing design elements and principles	0,975**
Aesthetic aspect	0, 857**
Functional aspect	0, 864**

Where ** is significant at (0.01)

3.2. Questionnaire Stability

Reliability was calculated using Alpha Cronbach, it is clear from “Table 2” that the overall questionnaire stability coefficient is 0.822.

Table 2. Values of the stability coefficient for the questionnaire axes.

Axis	Alpha Cronbach
Overall questionnaire reliability	0,822**

3.3. Results and Discussion

First hypothesis: There are no statistically significant differences between the averages of the judges' opinions on the designs in employing the elements and foundations of the proposed design for occasion clothes inspired by the Fatimid era using the artificial intelligence application.

To verify the validity of this hypothesis, the weighted average, the weighted percentage average and the standard deviation of the Arbitrators ' opinions on the designs were calculated.

We conclude from “Table 3” the agreement of the opinions of the Arbitrators regarding the designs in terms of employing the elements and foundations of design implemented by applying artificial intelligence to designs of occasion clothing inspired by the Fatimid era.

We find that the evaluation of the quality coefficients of the implemented designs is high, as it was shown that the number of (10) designs obtained a quality coefficient that falls at the (appropriate) level.

The agreement coefficients ranged between (100%) for the fourteenth, twenty-second, and twenty-ninth designs (5, 8, 10)

and falls at an appropriate level due to the coherence of the materials, lines, and colors used in the three designs, and therefore they achieve unity, rhythm, and harmony, and the twenty-seventh design (9) has the lowest percentage (93.33%)

and falls at the (appropriate) level. This illustrates the employment of elements and foundations of the designs implemented using the application of artificial intelligence for occasion clothing designs inspired by the Fatimid era.

Table 3. Weighted average, weighted percentage average and standard deviation of Arbitrators' opinions on employing design elements and foundations implemented using artificial intelligence for occasion clothing designs inspired by the Fatimid era.

First Axis	Design	Indicator Levels			Total Weights	Weighted Average	Standard Deviation	Percentage Average Weighted (Quality Factor)	Design Level
		Suitable	Suitable to	Not Suitable					
Employing design elements and principles	(2) 1	14	1	0	44	2.93	0.07	%97.78	appropriate
	(6) 2	14	1	0	44	2.93	0.07	%97.78	appropriate
	(9) 3	14	1	0	44	2.93	0.07	%97.78	appropriate
	(12) 4	14	1	0	44	2.93	0.07	%97.78	appropriate
	(14) 5	15	0	0	45	3.00	0.00	%100	appropriate
	(18) 6	13	2	0	43	2.87	0.12	%95.56	appropriate
	(20) 7	13	2	0	43	2.87	0.12	%95.56	appropriate
	(22) 8	15	0	0	45	3.00	0.00	%100	appropriate
	(27) 9	12	3	0	42	2.80	0.17	%93.33	appropriate
	(29) 10	15	0	0	45	3.00	0.00	%100	appropriate

We conclude from “Table 4” that there are no statistically significant differences between the responses of the Arbitrators on the implemented designs in employing the design elements and foundations, as the value of (F) reached 0.697 and the significance level at (0.711) is greater than (0.05), which indicates that there are no differences between the designs in this axis.

Table 4. Analysis of variance to study the significance of differences between the responses of Arbitrators on designs in employing the elements and foundations of designs implemented by applying artificial intelligence to designs of occasion clothes inspired by the Fatimid era.

First axis	Variance Source	Freedom Degrees	Squares Sum	Squares Average	F	Significance	Significance Level
Employing design elements and principles	Between Designs	9	0.400	0.044	0.697	0.711	Not significant
	Within Designs	140	8.933	0.064			
	Total	149	9.333	-			

Second hypothesis: There are no statistically significant differences between the averages of the judges' opinions on the designs in the aesthetic aspect of the proposed design for occasion clothes inspired by the Fatimid era using the artificial intelligence application, to verify the validity of this hypothesis, the weighted average, the weighted percentage average and the standard deviation of the Arbitrators' opinions on the designs were calculated.

We conclude from “Table 5” the agreement of the opinions

of the Arbitrators regarding the designs and the aesthetic aspect of the design implemented by applying artificial intelligence to the designs of occasion clothes inspired by the Fatimid era, as we find that the evaluation of the quality factors of the implemented designs is high, as it was shown that the number of (10) designs obtained a quality factor that falls within the (appropriate) level.

The agreement coefficients ranged between (100%) for the second, twenty-second, and twenty-ninth designs (10,8,1) and

are at an appropriate level to suit the designs of occasion clothes inspired by the Fatimid era within these proposed designs, and because these proposed designs achieve a kind of distinction and creativity, and because they are consistent with the general taste of the society for which the design was

made, and the percentage (93.33%) for design (2) and is at an (appropriate) level, which clarifies the aesthetic aspect of the proposed designs by applying artificial intelligence to designs of occasion clothes inspired by the Fatimid era.

Table 5. Weighted average, weighted percentage average and standard deviation of Arbitrators' opinions on the aesthetic aspect of the design implemented using artificial intelligence for occasion clothing designs inspired by the Fatimid era.

Second Axis	Design	Indicator Levels			Total Weights	Weighted Average	Standard Deviation	Percentage Average Weighted (Quality Factor)	Design Level
		Suitable	Suitable to	Not Suitable					
design aesthetic aspect	(2) 1	15	0	0	45	3.00	0.00	%100	appropriate
	(6) 2	12	3	0	42	2.80	0.17	%93.33	appropriate
	(9) 3	13	2	0	43	2.87	0.12	%95.56	appropriate
	(11) 4	14	1	0	44	2.93	0.07	%97.78	appropriate
	(14) 5	14	1	0	44	2.93	0.07	%97.78	appropriate
	(18) 6	14	1	0	44	2.93	0.07	%97.78	appropriate
	(20) 7	13	2	0	43	2.87	0.12	%95.56	appropriate
	(22) 8	15	0	0	45	3.00	0.00	%100	appropriate
	(27) 9	13	2	0	43	2.87	0.12	%95.56	appropriate
	(29) 10	15	0	0	45	3.00	0.00	%100	appropriate

We conclude from "Table 6" that there are no statistically significant differences between the responses of the Arbitrators on the implemented designs in the aesthetic aspect of the

design, as the value of (F) reached 0.957 and the significance level at (0.478) is greater than (0.05), which indicates that there are no differences between the designs in this axis.

Table 6. Analysis of variance to study the significance of differences between the responses of Arbitrators to designs in the aesthetic aspect of the design implemented using artificial intelligence for occasion clothing designs inspired by the Fatimid era.

Second axis	Variance Source	Freedom Degrees	Squares Sum	Squares Average	F	Significance	Significance Level
Design aesthetic aspect	Between Designs	9	0.640	0.071	0.957	0.478	Not significant
	Within Designs	140	10.400	0.074			
	Total	149	11.040	-			

Third hypothesis: There are no statistically significant differences between the averages of the judges' opinions on the designs in the functional aspect of the proposed designs for occasion clothes inspired by the Fatimid era using the artificial intelligence application.

To verify the validity of this hypothesis, the weighted average, the weighted percentage average and the standard deviation of the Arbitrators' opinions on the designs were calculated.

viation of the Arbitrators' opinions on the designs were calculated.

We conclude from "Table 7" the agreement of the opinions of the Arbitrators regarding the functional aspect of the designs implemented by applying artificial intelligence to the designs of occasion clothing inspired by the Fatimid era.

Where we find that the evaluation of the quality coefficient

cients of the implemented designs is high, as it was shown that the number of (10) designs obtained a quality coefficient that falls at the (appropriate) level.

The agreement coefficients ranged between (100%) for the twelfth designs, the twentieth (7,4) and falls at the appropriate level because these designs are consistent with the designs of

occasion clothes inspired by the Fatimid era and are suitable for marketing, and the percentage (91.11%) for design (8) and falls at the (appropriate) level, which clarifies the functional aspect of the designs by applying artificial intelligence to designs of occasion clothes inspired by the Fatimid era.

Table 7. The weighted average, the weighted percentage average and the standard deviation of the Arbitrators ' opinions on the functional aspect of the designs implemented using the artificial intelligence application for the designs of occasion clothes inspired by the Fatimid era.

Third Axis	Design	Indicator Levels			Total Weights	Weighted Average	Standard Deviation	Percentage Average Weighted (Quality Factor)	Design Level
		Suitable	Suitable to	Not Suitable					
designs Functional aspect	(2) 1	13	2	0	43	2.87	0.12	%95.56	appropriate
	(6) 2	13	2	0	43	2.87	0.12	%95.56	appropriate
	(9) 3	12	3	0	42	2.80	0.17	%93.33	appropriate
	(11) 4	15	0	0	45	3.00	0.00	%100	appropriate
	(14) 5	14	1	0	44	2.93	0.07	%97.78	appropriate
	(18) 6	12	3	0	42	2.80	0.17	%93.33	appropriate
	(20) 7	15	0	0	45	3.00	0.00	%100	appropriate
	(22) 8	11	4	0	41	2.73	0.21	%91.11	appropriate
	(27) 9	14	1	0	44	2.93	0.07	%97.78	appropriate
	(29) 10	12	3	0	42	2.80	0.17	%93.33	appropriate

We conclude from “Table 8” that there are no statistically significant differences between the responses of the Arbitrators on the implemented designs in the functional aspect of the

designs, as the value of (F) reached 1.133 and the significance level (0.343) is greater than (0.05), which indicates that there are no differences between the designs in this axis.

Table 8. Analysis of variance to study the significance of the differences between the responses of the Arbitrators on the designs in the functional aspect of the designs implemented by applying artificial intelligence to designs of occasion clothes inspired by the Fatimid era.

Third axis	Variance Source	Freedom Degrees	Squares Sum	Squares Average	F	Significance	Significance Level
designs Functional aspect	Between Designs	9	1.127	0.125	1.133	0.343	Not significant
	Within Designs	140	15.467	0.110			
	Total	149	16.593	-			

Fourth Hypothesis: There are no statistically significant differences between the averages of consumer opinions on the designs in the proposed designs for occasion clothes inspired by the Fatimid era using the artificial intelligence application.

To verify the validity of this hypothesis, the weighted mean, weighted percentage mean and standard deviation of con-

sumer opinions on the designs were calculated.

From “Table 9”, we conclude the ranking of the proposed designs according to the consumers’ responses for all axes. The twelfth design (4) obtained an appropriate level with a weighted average of (3) and a percentage of (100%) and ranked first, followed by the sixth and twentieth designs (7.2)

which obtained an appropriate level with a weighted average of (2.93) and a percentage of (97.78%) and ranked second, followed by the fourteenth design (5) which obtained an appropriate level with a weighted average of (2.91) and a percentage of (97.04%) and ranked third, followed by the second and twenty-second designs (8.1) which obtained an appropriate level with a weighted average of (2.89) and a percent-

age of (96.30%) and ranked fourth, followed by the eighteenth and twenty-ninth designs (10.6) which obtained an appropriate level with a weighted average of (2.87) and a percentage of (95.56%) and ranked fifth, followed by the ninth and twenty-seventh designs (9.3) which obtained an appropriate level with a weighted average of (2.78) and a percentage of 92.56% and their sixth rank.

Table 9. Weighted mean, weighted percentage mean and standard deviation of consumer reviews on designs implemented by artificial intelligence for occasion wear designs inspired by the Fatimid era.

Forth Axis	Design	Indicator Levels			Total Weights	Weighted Average	Standard Deviation	Percentage Average Weighted (Quality Factor)	Design Level
		Suitable	Suitable to	Not Suitable					
Consumer Reviews	(2) 1	40	5	0	130	2.87	0.10	%96.30	appropriate
	(6) 2	42	3	0	132	2.87	0.06	%97.78	appropriate
	(9) 3	35	10	0	125	2.80	0.18	%92.59	appropriate
	(11) 4	45	0	0	135	3.00	0.00	%100	appropriate
	(14) 5	41	4	0	131	2.93	0.08	%97.04	appropriate
	(18) 6	39	6	0	129	2.80	0.12	%95.56	appropriate
	(20) 7	42	3	0	132	3.00	0.06	%97.78	appropriate
	(22) 8	40	5	0	130	2.73	0.10	%96.30	appropriate
	(27) 9	35	10	0	125	2.93	0.18	%92.59	appropriate
	(29) 10	39	6	0	129	2.80	0.12	%95.56	appropriate

We conclude from “Table 10” that there are no statistically significant differences between the responses of female consumers to the implemented designs, as the value of (F)

reached 2.040 and the significance level (0.033) is greater than (0.01), which indicates that there are no differences between the designs.

Table 10. Shows the variance for the study of the significance of the differences between consumer responses to the designs implemented by applying artificial intelligence to designs of occasion clothes inspired by the Fatimid era.

Forth axis	Variance Source	Freedom Degrees	Squares Sum	Squares Average	F	Significance	Significance Level
designs Functional aspect	Between Designs	9	1.127	0.125	1.133	0.343	Not significant
	Within Designs	140	15.467	0.110			
	Total	149	16.593	-			

Abbreviations

AI Artificial Intelligence
3D Three-dimensional

Author Contributions

Basma Sabbahi is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

Appendix

Appendix I: Evaluating Proposed Designs According to the Opinions of Arbitrators

Table 11. Questionnaire for evaluating proposed designs according to the opinions of Arbitrators.

#	Questionnaire Elements	First Design			Second Design			Third Design to Tenth Design		
		Agree	somewhat	Disagree	Agree	somewhat	Disagree	Agree	somewhat	Disagree

First axis: Employing design elements and foundations for the proposed design:

- 1 Harmony of the lines used with each other in the design
- 2 Harmony of the proposed colors with each other
- 3 The general shape is compatible with the occasion clothes inspired by the Fatimid era
- 4 Unity and coherence are achieved between the design elements
- 5 Ratio and proportion are achieved between the design parts
- 6 Balance is achieved between the design elements

Second axis: the aesthetic aspect of the proposed design:

- 7 The aesthetics of the proposed design are consistent with the foundations and elements of the arts in the Fatimid era.
- 8 The application of artificial intelligence affects the proposed design in terms of distinction and creativity.
- 9 The proposed design is consistent with the general taste of the society for which it is designed.

Third axis: the functional aspect of the proposed design:

- 10 The proposed design is suitable for Fatimid-inspired occasion wear
- 11 The design adds a new dimension to enriching the

#	Questionnaire Elements	First Design			Second Design			Third Design to Tenth Design		
		Agree	somewhat	Disagree	Agree	somewhat	Disagree	Agree	somewhat	Disagree
	field of Fatimid-inspired occasion wear									
12	The design is suitable for marketing									

Appendix II: Evaluating Proposed Designs According to Consumers' Opinions

Table 12. Questionnaire for evaluating proposed designs according to consumers' opinions.

#	Questionnaire Elements	First Design			Second Design			Third Design to Tenth Design		
		Agree	somewhat	Disagree	Agree	somewhat	Disagree	Agree	somewhat	Disagree
1	Harmony of the lines used with each other in the design									
2	Harmony of the proposed colors with each other									
3	Unity and coherence are achieved between the design elements									
4	Ratio and proportion are achieved between the design parts									
5	Balance is achieved between the design elements									
6	The aesthetics of the proposed design are compatible with the foundations and elements of the arts in the Fatimid era									
7	The proposed design is compatible with personal taste									
8	The proposed design is compatible with the occasion clothes inspired by the Fatimid era									
9	The design achieves a new addition to enriching the field of designing occasion clothes inspired by the Fatimid era									
10	The design can be purchased and worn									

Recommendations

1) Directing researchers in the field of fashion design to

everything new in the field of artificial intelligence technology, due to its utmost importance in enriching and developing the field.

- 2) Paying attention to studies related to artificial intelligence programs in fashion design because it is easy to use and saves time and effort.
- 3) Enriching scientific libraries with studies and scientific references that can be used to create innovative designs using artificial intelligence technology

Conclusion:

- 1) There are no statistically significant differences between the responses of the Arbitrators on the implemented designs in employing the design elements and foundations, as the value of (F) reached 0.697 and the significance level at (0.711) is greater than (0.05).
- 2) There are no statistically significant differences between the responses of the Arbitrators on the implemented designs in the aesthetic aspect of the design, as the value of (F) reached 0.957 and the significance level at (0.478) is greater than (0.05).
- 3) There are no statistically significant differences between the responses of the Arbitrators on the implemented designs in the functional aspect of the designs, as the value of (F) reached 1.133 and the significance level (0.343) is greater than (0.05).
- 4) There are no statistically significant differences between the responses of female consumers to the implemented designs, as the value of (F) reached 2.040 and the significance level (0.033) is greater than (0.01).

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Biography



Basma Sabbahi, Professor Assistant at University of Jeddah, Art and Design college, Fashion Design Departments. She completed her PhD in Digital Fashion Design from De Montfort University in 2019, and her Master of Fashion Design from Southampton University in 2012. Currently she is serving as the head of Fashion Design Department at the college of Art and Design, University of Jeddah.

Research Field

Basma Sabbahi: Fashion Design – Digital Fashion Design- Sewing- Pattern