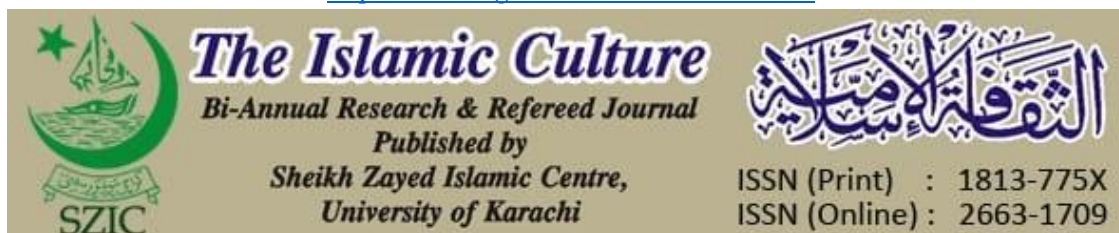


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FRONTISPIECES OF QURAN MANUSCRIPTS: THE SIGNIFICANT FEATURE OF ARABESQUE PATTERN IN ILLUMINATED QUR'AN MANUSCRIPTS FROM THE 16TH TO 18TH CENTURY

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Abstract

This study would evaluate the manuscript's design (organic and geometric), its significance, and its relevance to Islamic art and how it is proven to be a good example of visual art. A visual design is a combination of lines, textures, and colours. The creation of design depends upon the emergence of different types of lines. The development of this creative activity is associated with the evolution of the civilizations of mankind as well. Initially, the orientation of lines was used for communication and then for beautification. In this study, the specimen of Illuminated Qur'an manuscripts (16th century -18th century) has been collected from Ganjbkhsh library Islamabad (GBL) and Qatar national library. This study is conducted under the framework of physical analysis with the help of Artificial intelligence, a comparative analysis of Arabesque's typology and its attributes during the 16th to 18th century. In total, 542 images from 96 Qur'an manuscripts of GBL and 28 images from the 5 illuminated manuscripts of the Qur'an of the Qatar National library are included in this study. GBL data has been organized chronologically, as 30 manuscripts are from the 16th century, 24 from the 17th century and 42 from the 18th century whereas Qatar national library data has no defined chronological order. FastAi drew the relative chronology of the untrained data of Qatar National library and its results.

Keywords: Qur'an manuscripts, Arabesque, Ganjbkhsh Library, Qatar National Library, Artificial Intelligence

Introduction

Ornamentation increases the economic and aesthetic value of a manuscript in many ways. The beautification of a religious manuscript is considered a sacred act and an integral part of a believer's faith (Ahmad, 2019) (Grases, 2010). The purpose of the illuminated manuscript is to enhance the text with illumination, or it may have been prepared for the appreciation of holy words.

Religious manuscripts were decorated in a formal way from ancient times, mostly decorated with organic (especially with botanical forms) motifs. Human and Zoomorphic figures are forbidden in Islam. So, the religious scriptures are decorated with foliage and geometrical patterns only. Historical evidence shows that ancient, Egyptian, Roman, Greek and Iranian artists decorated buildings, scriptures and clothes with flowers and different plants along with zoomorphic images. As Ansari (Ansari, 1987) mentions, Sassanid buildings were decorated with vine stems, leaves and clusters of grapes (Pope, 2003). A variety of plant motifs was used by the Achaemenid artists such as lotus flower, palm, cypress and multi-petal flowers. These motifs inspired the Sassanid artists. Gradually, the artists took an active part to amalgamate these motifs (palm, lotus and multi-flowers) with vine leaves, grapes and pomegranates (Azmai, 2013).

According to the historian, ornamentation development belongs to the Umayyad and Abbasid periods of the Muslim era (Maghsoudy, 2019). Though the Muslim art forms flourished and developed in an impressive way, these art forms were inspired by the Iranian and Byzantine civilizations (Rice, 2005).

There is a little bit confused approach towards the Arabesque either it is an identical pattern of vegetal/geometric motifs or a combination of different lines and motifs. There is a common perception it is derived from nature, but the question is about its significant creation. Why, when and for whom it is created? It is a model of a design that is created by artists of different eras and regions to beautify the borders, upper and lower parts of the page, wall or door etc. The significance of this style is to enhance the beauty of the text, elaborate the text with botanical motifs or present the symbolized motifs that incorporate with the text such as heaven garden, fruits and plants. It is noted that it has been used for many mediums (ceramics, architecture, books, clothes etc). It had a very bright past and now present as well.

Since the mid of 20th century, endeavours have been taking place in different languages (Austrian, German, French, English, Arabic, Turkish and Persian towards the investigation and analysis of Muslim art forms. According to Terry Allen (Allen, 1988), Alois Riegl (the art historian) who critically examines the arabesque at first glance, its formation is based on vegetal. Alois Riegl (Riegl, 1992) associated the arabesque of vegetal motif derived from the classical motif of palmetto and tendril. According to Ernst Kuhnel, it had its origin in late antiquity and transformed into its latest version under the Abbasids (749-1258 AD).

Another view about arabesque is as it is a word that refers to the "Moresque" the Muslim art of Spain. However, Ernst Herzfeld explained this word in the German language, this word associated with the foliage

design of Muslim Art. But A. U Pope discusses it as an inspirational work, that Muslim artists received from Greek architectural ornamentation of anthemion (palmetto). His suggestion indicates that the origin of this art form is based on classical palmetto and tendril, which was also the ornamentation style of early Sasanid art (226-642 AD). George Marcais, Simin Daneshvar, Carl Duri and Dimand believed that the influence of Persian and Greek art traditions on arabesque design is obvious (Maghsoudy, 2019).

Arabesque plays a vital role in the process of Qur'an manuscript illumination. It may connect to the core of the text with the marginal design of arabesques (Chevalier). This art form has been modified by the artist with the help of different elements of art, vegetal, geometric and abstract forms. Initially, arabesques have been based on a single pattern with twisting branches of palm leaves and rose flowers (Maghsoudy, 2019).

In this study, the specimen of Illuminated Qur'an manuscripts (16th century -18th century) has been collected from Ganjbkhsh library Islamabad (GBL) and Qatar national library. This study is conducted under the framework of physical analysis with the help of Artificial intelligence, then draws a comparative analysis of Arabesque's typology and its attributes during the 16th to 18th centuries. In total, 542 images of 96 Qur'an manuscripts of GBL and 28 images of 5 manuscripts from the Qatar national library are included in this study.

GBL data is organized chronologically, 30 manuscripts are from the 16th century, 24 from the 17th century and 42 from the 18th century.

This study aims to examine the layout of the arabesque in Qur'an manuscripts (16th to 18th century) and to identify significant features. To explore the different patterns of arabesques. To maintain the visual typology with the help of chronological order and also study the cultural and religious influence on arabesques.

1. Analysis of Arabesques in illuminated Qur'an manuscript

This art form is not developed at a specific time and same geographical boundaries. It has been transformed into many shapes, patterns and design layouts with the passage of time among the different areas of the Muslim world.

The formation of arabesque design is distinguishable from geometric to organic which incorporates different motifs and their repeat orientation.

Most scholars divide the arabesque motifs into three or four types, geometric "Fig 1", organic or realistic such as vine leaves "Fig 4", hybrid "Fig 1" and abstract motif or palmette "Fig 7". The formation of floral arabesques is commonly designed in a circle or in a triangular shape "Fig 5". In architecture, both forms of geometric and organic are considered sacred concepts. These formations of arabesques are also found in illuminated Qur'an manuscripts.

Eva Baer (1998) mentions in the book "Islamic Ornamentation that vegetal ornamentation is divided chronologically into three periods, she indicates the first period (7th -10th century) is "formative", the second

(10th -13th century) "ornamental integration" and third (14th to 17th century) "final phase". According to her chronological order, this study lies in the "final phase".

Physical examination of the arabesque design of the Qur'an manuscript has been indicating that it is not a simple design. It consisted of different line formations (straight, curved, wave, cross and zigzag line), flowers and buds (lotus, lily, rose, pomegranate etc.), foliage (leaves and stems of the vine, pomegranate, lotus, acanthus), fruits (grapes and pomegranate) and geometric shapes (squares, triangles and circle). For arabesque different terms were used such as Islimi/Islami (in the Persian language, defined as a combination of two significant motifs of the vine and split leaves) and Rumi (in the Turkish language denoted as, long pointed leaves, from the curved side of which a second lobe often branches off).

2. Typology of Arabesque according to the formation of design

There are two main types of arabesque, geometric and non-geometric. There have been many techniques to create the design formation by line work, repetition of motifs and colour contrast "Fig 5". The line work has incorporated the formation of geometric and foliage motifs such as ovoid, ogee, ogive, six/eight-pointed star, rhomboid, diamond shapes, and 'V-shaped joint. The repetition of a motif has been created differently. The *sarloh* "Fig2", *toranj* "Fig3" and *guilloche* "Fig 6" has been designed as borders with simple, mirror, brick, split mirror and brick designs. these designs can easily be separated by colour contrast (by identifying the positive and negative spaces in the design) "Fig 9".

3. The Elements of Arabesque Design and its Transformation

Initially, the vegetal and foliage motifs were used predominantly for the decoration of manuscripts, textiles, ceramics, architecture and jewellery. Many design layouts have been used for manuscript decoration such as simple and complex/ hybrid. The simple layout of a design "Fig 5, B and C" consists of a single motif that is designed in the different repeats for the formation of a border. Whereas the hybrid layout "Fig 4" consists of different motifs. Sometimes a single floral motif is designed with heterogeneous motifs of leaves, buds, fruits or split palmettes and fir cones. This fusion of design has formed a complex style.



Figure 1 QMs 4488 hybrid style of Arabesque in A and B a collection of Ganjbkhsh library



Figure 2 border design of QMs 9570 (A). A significant Persian style of toranj, QMS 2390(B) Ganjbkhsh library,



Figure 3 toranj style of 10th century



Figure 4 A complex layout of foliage design (Pomegranate leaves, flowers and fruits), QMs 1998 a 18th century Qur'an Ganjbkhsh library.

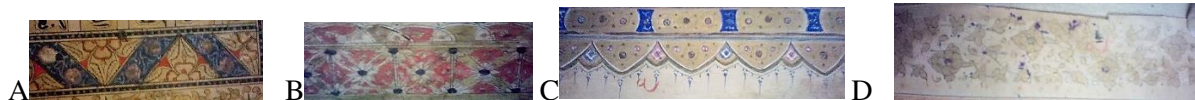


Figure 5 A border adjacent to Arabic text box of different QMs A colour contrast with positive and negative, Band C Single motif with simple repeat, D , Ganjbkhsh library



Figure 6 interlaced border



Figure 7 Palmate motif, QMs 1176(A) QMs 902(B) QMs 1176 (C)

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Figure 8 borders design, QMs 773

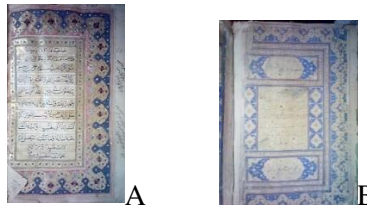


Figure 9 by the colour contrast positive and negative spaces creates the design formation in simple repeat, Ganjbkhsh library.



Figure 10 (A) stylized lily flower, (B) lotus flower



Figure 11 interlace design



Figure 12 Islami motif filled with flower



13 Figure Pages From HC_MS_02658 ABC_Page_5 of 1 Image of Indian Quran of Qatar National Library



14 Figure 60780-i24977548_split_1_page-0004 of 1 Indian Quran a collection of Qatar National Library

Discussion

According to Thackston (Thackston, 1989) the term *Islami* was used by the Baysunghur's atelier (Jafar Tabrazi) for the marginal decoration of *Shahnama* (Book of Kings). He also mentioned that Ali Ibn-e Abi Talib was the inventor of this art form called *Islami*. Mir Sayyid Ahmed related this form to Islamic design. The foundation of the *Islami* motif was inspired by Sassanian and Byzantine decorative designs such as those found in the Dome of the Rock of 691 AD. These motifs are present in the form of full and half palmettes, wings, symmetrical or stylised floral motifs, vines and leaves. Sometimes these natural motifs are used as it is or simplified motifs by the artist. Gradually these arabesque motifs transform into different shapes such as a half palmette transforming into a kidney shape, the lotus created and vine leaves into circular motifs. The marginal design and the incipit of the Qur'an manuscript (*sar-i-lauh*, *unwan*) were decorated with *Islami* by the eleventh century. According to Tanindi, Ettinghausen, Petersen and Dimand the motifs used for Qur'an illumination were derived from several sources of Coptic, Hebrew manuscripts and Sassanian minor arts (Flood, 2012). Toranj¹ "Fig 2, 3" is the earliest form of *Islami* that took place in Qur'an illumination during the 10th century. It is a composition of two leaves in a triangular form, mostly filled with blossoms (Abbas, 2018).

Band-i-Rumi refers to the style of knotting, interweaving vines with split leaves. By the 10th to early 11th century, a new formation introduced towards *Islami* was the overlay and interlace formation of design (Abbas, 2018). The interweaving of fleurons and split leaves created the fusion of arabesque. According to Takistani, this style refers to the interlacing or knotting formation of vine stems either vertically or horizontally. It flourished in the 10th to 12th century in both organic and geometric forms. It can be divided into three types of knotting (complex forms of organic or geometric in "Fig 1 A"), interlacing "Fig 8", not complicated) and interlocked "Fig 6" chain or mostly a vine with half palmettes). Devellioglu argues that this formation of the design was associated with the Byzantine and Anatolian Seljuk period due to its knotting and braiding. It is most frequently used by the artist of different parts of Iran, Central Asia and India (Ghurid invasion in the 11th century)

*Cathay*² consists of the Chinese style of floral motifs, buds and leaves. The addition of *Khata* I creates beauty in the formation of arabesque in the 13th century. the influential style of Chinese lotus, water lily, stylized floral motifs, floral spray "Fig 4" and variation of *Islami* (dragon *Islami*³) enhance the *Cathay* style of arabesque "Fig 10".

¹ In Persian the word Toranj means to place or draw together.

² It is one of the Iranian decorative arts created by combining flowers, buds and leaves and every rhythmic circle is called a Band (cutaway).

³ Inspired from Chinese motifs.

Cathay is used for the decoration of Qur'an manuscripts, valuable books, palaces, rugs, carpets and pots. With the passage of time, it flourished and transformed into different shapes and types which increased the beauty of an arabesque.

During the second half of the 15th century, the endeavours of Timurid artists created the *fassali*⁴ style. Which is a combination of *Islami* and *khata-I*. It is created with the help of two separate plant stems that overlapping or interlaced with each other “Fig 11”, but they seem joined such as *toranj*. According to modern illuminators, the supremacy of *Islami* is shown in *fassali* or maybe the imaginative association of Timurid with the Ming court (Abbas, 2018). The rules to produce the *Islami khata-I* is practised by the artist of Iran, Turkey, India and Pakistan as traditional rules for arabesque ornamentation.

The idea of a combination of different styles was not new among artists of different areas. At the beginning of the 14th century, the overlapping of motifs has been seen in the field of design. The enlarged *Islami* motif is filled with *khata I* “Fig 12” and is known as *guldar Islami* by Iranian artists and is called *hurdeleme* by Turkish artists (Abbas, 2018). It is known as the *firangi* style that resembles *siyah Qalam*⁵ (Roxburgh, 2002). The word *firangi* is used for Europeans in Arabic and Persian language. According to the historian, the significant trade relations of Italian and other Europeans with Persia caused the cultural linkages in the 14th and 15th centuries (Blair, 2009).

The modern artist describes the formation of *firangi* as it is consisting of large leaves overlapping the small blossoms (Abbas, 2018).

Result: Relative chronology of untrained data of Qatar National Library

After training the data FastAi drew the relative chronology of the untrained data of Qatar National university and its results. Total 28 images from the 5 illuminated manuscripts of the Qur'an from the Qatar national library have been analyzed by the AI.

⁴ Means division or separation.

⁵ A style of drawing from Iran and Central Asia in 15th century.

Table 1: Relative chronology of untrained Data

	label	file
0	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60780-i24977548_split_2_page-0001.jpg
1	17th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60780-i24977548_split_1_page-0004.jpg
2	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/72e696f6-04d4-408a-8aaf-34de775eb9fb_11.jpg
3	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/72e696f6-04d4-408a-8aaf-34de775eb9fb_12.jpg
4	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60733 image 2 of 1.jpg
5	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60742-i26737310_split_7_page-.jpg
6	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60742-i26737310_split_6-1.jpg
7	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/Pages From HC_MS_02658 ABC_Page_5 of 2.jpeg
8	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60733 image.jpg
9	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60742-i26737310_split_8-1 of 2.jpg
10	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/Pages From HC_MS_02658 ABC_Page_5.jpeg
11	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60780-i24977548_split_1_page-0004 of 1.jpg
12	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60742-i26737310_split_8-1 of 1.jpg
13	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60733 image 2.jpg
14	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60742-i26737310_split_9-1.jpg
15	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60742-i26737310_split_7_page- of 4.jpg
16	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/Screenshot 2022-03-24 235359.png
17	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60780-i24977548_split_2_page-0001 of 3.jpg
18	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60742-i26737310_split_6-1 of 1.jpg
19	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60742-i26737310_split_7_page- of 3.jpg
20	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60733 image of 3.jpg
21	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60782-i24984668_split_7_page-0001 of 1.jpg
22	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60742-i26737310_split_7_page- of 1.jpg
23	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60782-i24984668_split_7_page-0001 of 2.jpg
24	17th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/Pages From HC_MS_02658 ABC_Page_5 of 1.jpeg
25	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60742-i26737310_split_8-1.jpg
26	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/60782-i24984668_split_7_page-0001.jpg
27	18th Century	/Volumes/Data/Fun Coding/other/saima/Quran/test/72e696f6-04d4-408a-8aaf-34de775eb9fb_5.jpg

Table 1 shows in its results that only 2 images “Figures 13 and 14” identified by the software are from the 17th century and 26 images are from the 18th century. The results show that 5 manuscripts from Qatar national library belong to the 18th century and one manuscript has some common features of the 17th century. All manuscripts are Indian Qur'an also due to their features, colour combination and decoration styles.

For the prediction of the relative chronology tensor-based method has been used in this study. For the classification of the images the tensor-based algorithm performed well (Klus, 2019). Basically, a tensor is a significant data structure of deep learning algorithms. It is a mathematical object that describes matrices (used for linear transformation) to high dimensions, however, a tensor can be used for many transformations large-scale datasets, multidimensional data such as visuals (patterns, design, images and videos etc.). Through this technology, huge data can be organized, time-lined, and categorized easily in a short time with the help of AI experts. Here are some limitations as well, digitized and huge data is required, and for relative chronology pre-trained data (physical analysis of images,) and typologically organized data are required for the generation of results.

Conclusion

Artificial intelligence software has got the capability to extract vital information from digitized images that may be very helpful in pattern recognition. In the field of medicine particularly where the study of images is required such as radiology and histopathology, the application of AI has revealed very encouraging results (Syed Usama Khalid Bukhari, 2020) . It is also very helpful in art and design patterns such as arabesques and artefact recognition.

Since arabesques had been used in the illuminated manuscript of the Qur'an. This art form is not developed at a specific time and same geographical boundaries. It transformed into many shapes, patterns and design layouts with the passage of time among the different areas of the Muslim world. The formation of arabesque design is distinguishable from geometric to organic which incorporates different motifs and their repeat orientation.

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