



Application of Computer Aided Technology in Interior Art Design

Na Yu^{1*} and Shuang Guo²

¹Art Design College, Henan Institute of Technology, Xinxiang 453003, China,
yn@hait.edu.cn

²Art Design College, Henan Institute of Technology, Xinxiang 453003, China,
guolizhong1980@163.com

Corresponding author: Na Yu, yn@hait.edu.cn

Abstract. With the development of computer technology, computer-aided design software plays an increasingly important role in all walks of life. In addition, with the development of social economy and the improvement of people's culture and living standards, the requirements for living space are getting higher and higher. To achieve this effect, in addition to the reasonable layout of the house, the more important thing is the proper decoration and design of the interior. With the continuous improvement of architectural decoration design tools, under the widespread application of computer-aided design in architectural decoration engineering, changing the original product design and production mode and forming a new architectural decoration engineering design mode has become the biggest change in the decoration industry.

Keywords: Computer aided; interior art design; optimization

DOI: <https://doi.org/10.14733/cadaps.2022.S8.23-32>

1 INTRODUCTION

With the progress and development of society, people pay more and more attention to the living environment after meeting the most basic survival needs, and traditional interior design can no longer meet people's needs. Rai et al. [1] thinks believed the emergence of modern interior design enables people to put the design of the spiritual world into the computer-aided design software, which brings intuitive visual enjoyment. Jerez et al. [2] consider it can be seen from this that computer-aided design software occupies a particularly important position in interior design, as shown in Figure 1. Nowadays, interior design software will develop in the direction of intelligence and diversification. Petra [3] thinks as a high-efficiency electronic tool, the computer is mainly used in industrial fields such as machinery, aviation, and electronics. However, due to the rapid development of computer software, computers also began to play an important role in other fields that were not originally related to science and technology. Through AutoCAD, Photoshop and other

related auxiliary design software, computers also began to play an auxiliary design role in the field of art design.



Figure 1: Interior art design.

Romina [4] considers the traditional way of creating design models with the help of drawing tools and manual production is time-consuming and labor-intensive, and designers' design concepts are often constrained by the limitations of manual production. The application of computer-aided software can combine 2D drawing and 3D drawing, Plan and three-dimensional drawings are displayed together. Glissen and Berzin [5] think that the advantages of computer drawing are far superior to traditional drawings. It is convenient to repeatedly modify design works, and the designed model can be integrated with the real environment to simulate the real scene of light shining on objects. The introduction of technology and animation technology has greatly compensated for the insufficiency of static manual drawing. It can not only accurately and intuitively reflect the content of the designer's design work, but also the design effect is more realistic and vivid, and the work efficiency has also been significantly improved. The Chinese people's pursuit of beauty continued to rise, especially the pursuit of beauty in living and living environment. This led to the emergence of architectural design with beauty as the scale[6,7].

Interior design is a highly practical subject. In traditional interior design teaching, the teaching materials based on teachers are only some fixed picture information and theoretical knowledge in textbooks. These teaching materials are rigid and lack flexibility, and cannot be simulated training, nor can they apply theoretical knowledge to practical operations. Before the advent of computer-aided software, drawings and models were manually operated by students, which not only took a lot of time, but also was not easy to modify and perfect. In fact, such teaching is tantamount to talking on paper. Students in secondary vocational schools have poor learning foundation in junior high school. Faced with these boring and complicated learning content, it is easy to lose interest in learning, which in turn affects the teaching quality of design majors, and has a negative impact on students' employment and future. Computer-aided design software can display the content of the work more intuitively and vividly, so that the content that cannot be expressed in words and drawings can be displayed, and the design work can be repeatedly revised, which can improve the students' artistic appreciation taste and hand-painting level. The quality of interior design works

makes the design of the works more perfect. With the continuous improvement and popularization of computer graphics software functions, computer-aided design software has also entered the classroom of interior design majors in secondary vocational schools, improving the teaching efficiency of this major, and then cultivating students' modern interior design concepts for the society. A new type of talents with professional design quality have been recruited [8-10].

2 A BRIEF INTRODUCTION TO COMMONLY USED COMPUTER AIDED SOFTWARE

Today, computer-aided technology has entered the design field in an all-round way. The increasing perfection of the computer's structure, storage, speed, network and other technologies, coupled with the combined use of excellent auxiliary software, printers, scanners, plotters and multimedia, has expanded the scope of artistic design and brought design work into a new stage. For art designers, the development of computer software technology is mainly about application software, that is, to complete the design work with the aid of computers. Apple's Windows graphical interface and Microsoft's WINDOWS operating system have solved many problems that were difficult for designers to solve. The use of a series of commonly used software such as 3Dstudio, painting software Painter, etc., can quickly complete the process of scanning, drawing, modifying, combining, moving, positioning, displaying, printing, etc. A series of advances in design, 3D animation, and printing technology. In graphic design, a variety of feelings can be expressed in works through computer-aided technology. For example, inputting various materials into computer software and combining them with graphics or text can introduce tactile texture into visual communication, making people feel Associating and feeling the effect of the material, it produces contrasting tactile sensations such as softness, hardness, thickness, and smoothness, as well as more and more complex visual experiences. Using the techniques of computer simulation photography, you can also change the shape and color of the object, so that the image changes and produces a sense of movement. In environmental design, the three-dimensional modeling and rendering technology of computer-aided technology enables designers to observe changing miniature models and rich materials and lights from time to time when designing and drawing, which can show all sides and details of objects, and can be used in space. The shape can be modified from the viewpoint, and the material effect, type and distribution of lighting can be set reasonably, which enables the designer to think and solve the problem from a three-dimensional space close to reality, and helps the designer to achieve a high level of Complete architectural art design drawings to facilitate later construction and effect reproduction. The animation processing technology of computer-aided technology makes it more convenient for humans to study dynamic objects, such as the walking between objects, the state of motion, the explosion effect, etc., which can show the design results more intuitively and vividly. The convenience of computer software technology has continuously provided new resources for designers' design materials and methods; images, text, and colors in the design process have also undergone more complex and rich changes, constantly transforming thinking into graphic displays, it liberates many monotonous and repetitive manual operations, improves work efficiency, and enriches the imagination of design artists.

The rapid popularization of computer-aided technology among the general public and the development of network technology have instantly popularized the work of "art design", which originally required a lot of professional basic training, and also shortened the time for many people to study design, allowing more people to learn more. Many people have entered the field of art and design, and countless employment and entrepreneurial opportunities have also been created. The emergence of digital technology, such as the use of digital cameras, has made more non-designers notice that they should process and beautify their own photo materials; a large number of design software tutorials on the Internet provide opportunities to teach people to use design software, and can also to achieve more sophisticated and exotic effects.

In interior design, the most commonly used computer-aided design drawing software is AutoCAD, which belongs to the top computer-aided software in the design field. It can use drawing, editing commands and dimensioning of graphics to complete the drawing and editing of more

complex two-dimensional graphics. At the same time, it can also complete the drawing, modeling and model rendering of 3D graphics, which can effectively avoid the shortcomings of manual drawing and achieve a significant improvement in drawing efficiency.

On a global scale, the most widely used 3D drawing software is 3Dmax. It has powerful 3D modeling functions and outstanding expansibility, and plays a very important role in animation production. The compatibility is relatively strong, and it can cooperate closely with other related software. Through the close cooperation with AutoCAD, the processing effect of materials and lighting can be strengthened, and it has a good support for DWG software and is very convenient to operate.

When doing lighting rendering work, Vray and Lightspace are the most commonly used lighting rendering software. Regarding Vray, it has fast rendering speed and good compatibility. Through cooperation with 3Dmax, it can create virtual models and use many lighting and shadow effects.

(1) CAD

CAD software, shown in Figure 2, as a common interior design software, is mainly used in interior design drawing. After continuous upgrading and expansion, it has become the most excellent auxiliary software in the design field. The main feature of CAD is the integration of architectural graphics and design graphics, through drawing, editing instructions, dimensioning, area calculation and so on. CAD can draw and edit more complex two-dimensional graphics, and can also generate three-dimensional graphics, modeling, rendering, etc. with the help of basic data. Defects that are not precise and accurate enough.



Figure 2: Computer aided software.

(2) 3D Max

3DMax software, shown in Figure 2, is used to draw interior renderings and has powerful modeling functions. After the CAD layout design is completed, 3DMax software needs to be used to display the designed interior layout, such as wall partitions, floors, embedded parts, etc., with three-dimensional images, which can allow designers and customers to see the interior design effect more intuitively. Import the CAD plan into 3DMax. The 3DMax software not only has the basic cube, sphere, cylinder and other conventional modeling tools, but also provides more advanced granular, wave, arrow and other irregular modeling elements. The three-dimensional graphics can be changed from multiple angles, zoomed in, zoomed out, distorted, etc., so that the interior design renderings have a more realistic landscape. The operation of 3DMax software is very intelligent and user-friendly. For example, when designing a bedroom, the designer inputs the relevant furniture and furnishings of the bedroom to be designed in the software operation interface according to the size of the room structure, such as window size, wardrobe size, bed size, bathroom size, etc., the software can automatically draw the initial simple model according to these parameters, and then the designer further optimizes the model, adding lamps, TV cabinets, murals and other decorative objects, after drilling, swinging, rotation and a series of intelligent operations to make the model closer to the real scene that the owner wants. Compared with the

traditional plane manual drawing, the renderings displayed by 3DMax software can check in advance whether the interior space structure design is reasonable, whether the color of the home decoration is coordinated, whether the window size and design can be realized, and can find the difference between the design concept and the actual operation. The difference can be paid attention to during the actual construction. The evaluated amplitude is shown in Figure 3.

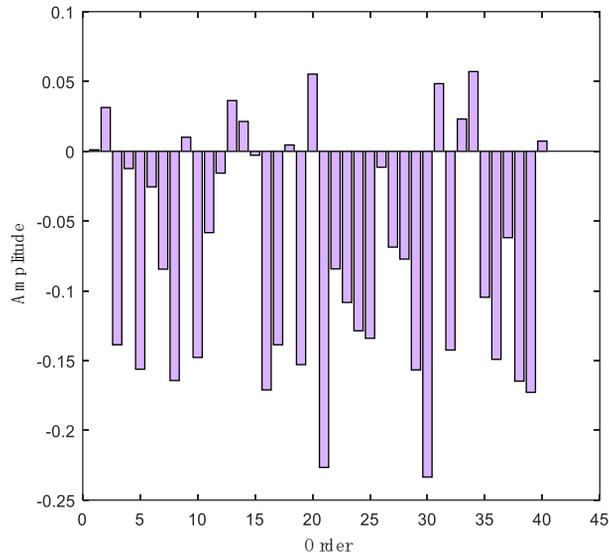


Figure 3: Amplitude.

(3) V-Ray

V-Ray software, shown in Figure 2, is mainly a renderer. V-Ray renderer can simulate direct lighting and indirect lighting in reality. Lights are generally divided into sky light, sun light, and lighting. 3DMax software also comes with a renderer, but the global V-Ray renderer The real scene effect simulated by lighting and lighting is unmatched by 3DMax software. V-Ray renderer and 3DMax software have good compatibility. After 3DMax software modeling is completed, the built-in renderer can be converted into V-Ray renderer, open the parameter panel of V-Ray renderer, and use V-Ray according to customer requirements for different scenes. Lights are assigned to various light sources and materials of various objects in the scene. The basic settings of V-Ray materials generally include the adjustment of the three basic properties of diffuse reflection, reflection, and refraction. These global lighting, indirect lighting, and direct lighting of the V-Ray renderer, lighting, material simulation can make the interior design closer to the real scene to the greatest extent. For example, in a sunny environment during the day, the outdoor light includes sky light and sunlight. After the sky light and sunlight are turned on, these two kinds of light will come in from the window, and then you can see the entire indoor environment during the day. Effect. At night, when a light is turned on in the living room, the corridor next to the living room will be indirectly illuminated through the reflection of the ground and the wall, resulting in a lighting effect that combines direct lighting and indirect lighting. Using the V-Ray renderer, according to the scene effect, continuously debug the lighting, and adjust the parameters step by step until a satisfactory effect is achieved. The evaluation is shown in Figure 4.

(4) Photo Shop

Photo Shop software, shown in Figure 2, is a picture processing software, developed by Adobe, usually built as PS. This software is not only widely used in the field of interior design, but also has a good reputation and application effect in other graphics processing fields. PS software can edit, synthesize, color tone, effect production, etc. for images, and can comprehensively combine

various graphic effects and special effects. Therefore, in interior design, PS software can help achieve graphic synthesis and rendering output, etc.

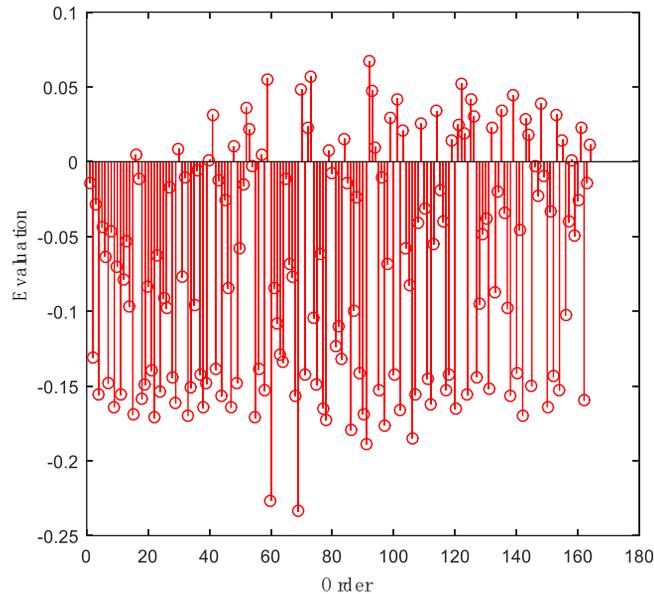


Figure 4: Evaluation.

3 APPLICATION OF COMPUTER AIDED SOFTWARE IN INTERIOR DESIGN

The popular computer-aided design software in the current society is mainly divided into video editing software, picture and animation rendering software, three-dimensional model modeling software, two-dimensional drawing software, etc. In the process of interior design, it is necessary to have novel thinking, and then use two-dimensional drawing software to promote abstract design ideas to be displayed, and then through three-dimensional modeling, rendering and other related operations, a relatively complete interior will be obtained. Design works.

The main process of interior design, the first step is AutoCAD drawing, inspecting the actual site, and drawing through AutoCAD software according to the actual site data. The second step is to make a 3D model, and use a 2D map to create a 3D model through 3D Max software. The third step is rendering. After modeling, use V-Ray software to render. The fourth step is image processing. After rendering, image processing is performed by Photoshop software. The fifth step is post-processing, the image processing is completed, and the Premiere Pro software is used for touch-up processing and adjustment. The specific applications of various software are described below. The color map of data is shown in Figure 5.

In interior design work, the use of CAD software is generally throughout the whole process, mainly used to draw the interior layout, as well as the construction drawings of the plane, elevation and section. materials and costs. Before designing, the designer must first measure the exact size of the room, and have an overall grasp of the interior style desired by the owner, and use CAD software to design and plan the overall layout of the interior, as well as various living rooms, bedrooms, kitchens, etc. In the functional space, the details of each structural part are expressed on the design drawings with precise data. When designers use CAD to draw a plane layout, they cannot simply apply traditional interior design templates. First, they must consider the overall characteristics of the house structure and the homeowner's home needs, and carry out precise design in specific space and room size, according to local conditions. Avoid too closed

space, and make full use of the indoor space. During the specific construction process, make certain modifications to the CAD drawings according to the actual situation and the owner's requirements in a timely manner to maintain the overall consistency, and combine the customer's conception and design. Incorporate some modern elements to ensure the permeability of the entire room while realizing the diversification of the interior space.

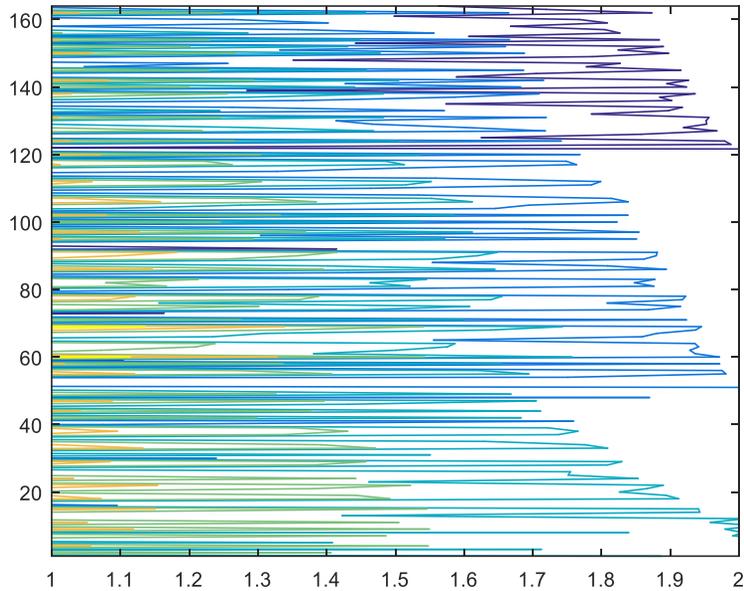


Figure 5: Color map of data.

3.1 Drawing

CAD software is used throughout the interior design process. First, the designer should conceive the design ideas according to the needs of the customers; then, according to the size parameters of the house, the design ideas and ideas should be presented with the help of CAD software, so as to draw the preliminary plan. AutoCAD software is mainly used for drawing graphics. Whether it is indoor or outdoor floor plans, three-dimensional drawings, construction drawings, or three-dimensional drawings, the software AutoCAD is required to operate. The percentage is shown in Figure 6.

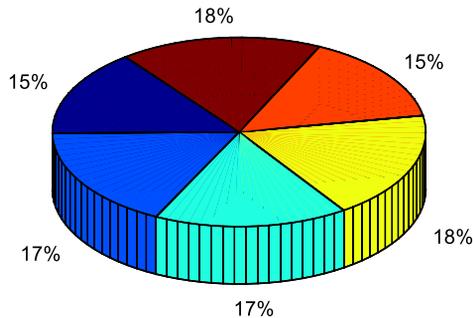


Figure 6: Percentage.

3.2 Modeling

The role of 3D Max is mainly used for modeling, material, lighting and model display. 3D is the most frequently used and most widely used design and drawing software in the interior design industry. Its function is not only powerful, but also has better expansibility. 3DMax has unique advantages in character animation. It is not only simple to operate and easy to use, but also has a highlight - rich plug-ins. 3D Max has a wealth of modeling tools, material tools, lighting functions, and supports DWG files. It can import plumbing, home, three-dimensional, floor plans and other graphics produced by AutoCAD into 3D Max for lighting, material and other processing. 3DS MAX is mainly used in interior design for design performance, and what we finally see is a real-life rendering. The production process of renderings: modeling according to CAD drawings (house model) making and placing furniture models assigning materials to all models (simulating object reflectivity, real color, gloss, etc. lighting (simulating real environment) Lighting effects under set rendering parameters (another supporting software Vray) finally render the interior renderings.

3.3 Rendering

VRay is a kind of rendering software often used in the industry, and it is also the most popular rendering engine in the industry. It provides high-quality animation renderings and pictures for 3D modeling software for interior design. The software is widely used in interior design because of its fast speed and simple operation.

3.4 Image Processing

Photoshop software is mainly used for image processing, and the rendered image is made more realistic through Photoshop. Use Photoshop to adjust the color effect of the image, the light and shade of the image, and to design the surrounding environment of the room.

3.5 Post processing

Post-processing the interior design with Premiere Pro software is the last step in the entire design process, and it can be polished and adjusted. And you can export video animations in Premiere Pro, so people can clearly see the final effect of the interior design.

At present, interior design has entered the industrialization mode. Although the design itself is a creative process, its products have become products and gain market value. The introduction of computer-aided software itself has brought the production of interior design products into a more intelligent and efficient environment. Designers can use auxiliary software to help complete the tedious work of drawing, color matching, lighting adjustment, etc. in the past, and can easily change the scene to reflect different design experiences, and can also realize the simulation and simulation of "imagination". In this way, designers can get more inspirations in comparing different design schemes and trying schemes, and can also present the final design scheme more completely to customers, which undoubtedly improves the market adaptability of interior design products. Therefore, the importance of computer-aided software for interior design is self-evident. Its influence on interior design is also huge.

(1) Computer-aided software makes interior design more professional

Completing the design with the help of software allows designers to achieve continuous experimentation and innovation, and to reflect their ideas in the software. Constant trial and learning comparisons can make the design products more professional, practical and aesthetic. It can be said that professional computer-aided software improves the professionalism of interior design.

(2) Computer-aided software enriches the connotation of interior design

In the past, interior design was mostly carried out in a limited thinking space and mode. Now, with the help of the Internet and computer software, more design use cases and concepts have been introduced into interior design. Designers can learn and try various possibilities. We can learn

from advanced thinking modes, design schemes, etc. Such rich design examples and elements will undoubtedly expand the designer's vision and help them design more advanced works.

(3) Computer-aided software expands the design radiation range

Although interior design is for a specific field, the rich computer-aided software can expand the designer's horizons in the process of using it. Using CAD, 3D Max, PS and other software to design, the designer will understand architecture, plane, Relevant knowledge of products and other fields can also promote designers to expand their horizons. Such use and design process will undoubtedly give interior design products richer connotations. Designers can also expand their horizons and even complete design works across borders. The predicted value is shown in Figure 7.

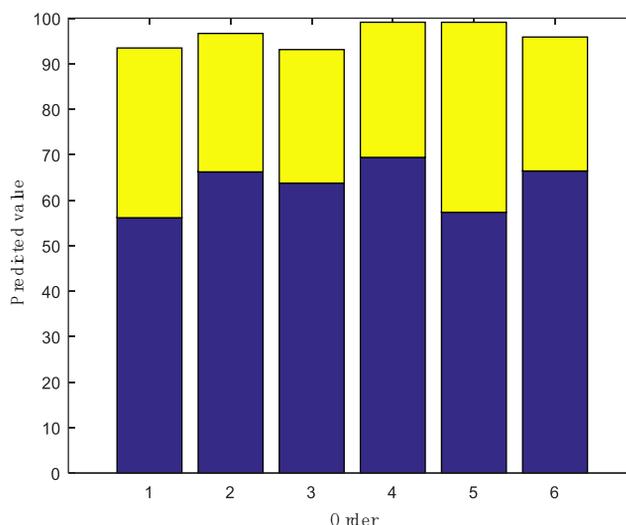


Figure 7: Predicted value

4 CONCLUSION

Computer-aided software is the crystallization of the wisdom of human application of computer and network technology. Various commercial computer software helps the design work of various industries to be more convenient and efficient. my country's interior design industry is booming with the improvement of people's living standards, and customers' requirements for interior design are also increasing. Through the above analysis, it can be seen that in order to achieve high-efficiency production of interior design and meet the aesthetic needs of the public, the designer must effectively display the design scheme, design effect, etc. in the design stage, and can achieve rapid correction and improvement, computer-assisted software is required Among them, advanced graphics processing and editing software such as CAD and 3D Max have undoubtedly become the biggest design assistance. Whether today or in the future, powerful computer-aided software will enable more diversified use case selection, more convenient and efficient design operations, and more comprehensive solution display functions, while designers will devote more energy to creativity and innovation. I believe that then the interior design will be more diverse and innovative.

Na Yu, <https://orcid.org/0000-0001-6146-7745>

Shuang Guo, <https://orcid.org/0000-0003-4251-9073>

REFERENCES

- [1] Rai, P.; Yadava, V.; Patel, R.: Computer aided design of Bezier horns using finite element analysis for rotary ultrasonic machine, *Journal of Advanced Manufacturing Systems*, 5(1), 2020, 1-9. <https://doi.org/10.1142/s0219686720500250>
- [2] Jerez, D.; Gallego, A.; Castellon, L.; Mayorga, J.; Fuenzalida, C.: Computer-aided design and computer-aided manufacturing (CAD/CAM) in mandibular reconstruction with fibula free flaps, *International Journal of Oral & Maxillofacial Surgery*, 48(1), 2019, 140-140. <https://doi.org/10.1016/j.ijom.2019.03.432>
- [3] Petra, K.: Measuring the accuracy of a computer-aided design and computer-aided manufacturing-based indirect bonding tray, *American Journal of Orthodontics & Dentofacial Orthopedics*, 158(3), 2020, 315-315. <https://doi.org/10.1016/j.ajodo.2020.06.018>
- [4] Romina, B.: No evidence of differences between 2 ceramic materials used to fabricate onlays using the computer-aided design and computer-aided manufacturing technique after 5 years, *The Journal of the American Dental Association*, 151(2), 2020, e15-e15. <https://doi.org/10.1016/j.adaj.2019.09.013>
- [5] Glissen, R.; Berzin, M.: EndoBRAIN-EYE and the SUN database: important steps forward for computer-aided polyp detection, *Gastrointestinal Endoscopy*, 93(4), 2021, 968-970. <https://doi.org/10.1016/J.GIE.2020.09.016>
- [6] Lee, J.-E.; Hur, S.; Watkins, B.: Visual communication of luxury fashion brands on social media: effects of visual complexity and brand familiarity, *Journal of Brand Management*, 25(5), 2018, 449-462. <https://doi.org/10.1057/s41262-018-0092-6>
- [7] Wenjuan, L.: The Integration of Contemporary Art Visual Elements in Visual Communication Design, *Journal of Frontiers in Art Research*, 1(3), 2021, 4-7. <https://doi.org/10.23977/jfar.2021.010302>
- [8] Fan, M.; Li, Y.: The application of computer graphics processing in visual communication design, *Journal of Intelligent & Fuzzy Systems*, 39(4), 2020, 5183-5191. <https://doi.org/10.3233/JIFS-189003>
- [9] Ignaszak, Z.; Wojciechowski, J.: Analysis and Validation of Database in Computer Aided Design of Jewelry Casting, *Archives of Foundry Engineering*, 20(1), 2020, 9-16. <https://doi.org/10.24425/afe.2020.131275>
- [10] Dustin, A.; Arturo, R.: Development of a computer-aided engineering-supported process for the manufacturing of customized orthopaedic devices by three-dimensional printing onto textile surfaces, *Journal of Engineered Fibers and Fabrics*, 15(2), 2020, 155-163. <https://doi.org/10.1177/1558925020917627>