

Retraction

Retracted: Optimal Method of Vision Sensor Digital Image Edge Detection for Commercial Investment in Film Field

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] Z. Liu, "Optimal Method of Vision Sensor Digital Image Edge Detection for Commercial Investment in Film Field," *Journal of Sensors*, vol. 2021, Article ID 5805071, 12 pages, 2021.

Research Article

Optimal Method of Vision Sensor Digital Image Edge Detection for Commercial Investment in Film Field

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With the rapid development of the national economy, the film industry has risen rapidly under these conditions, and the development of film occupies a more important position in this process, which has led to the development of investment in the film field, an internationally recognized cultural space. This paper studies the commercial investment in the film field based on the edge detection of the digital image of the visual sensor. The purpose of the research is to point out the direction of commercial investment in the film industry by studying the effect of the edge detection of the digital image of the visual sensor on the application of the film object. The image edge detection algorithm based on wavelet transform and morphology and the application of these image edge detection algorithms such as wavelet theory analyze the shortcomings of movie, sound effects, and pictures and make a comparison before and after the improvement. Audiences, as the direct enjoyers of the cultural product of the film, their opinions, and evaluations of the film, largely determine the quality of the work. On the contrary, a good work can attract the public's attention and bring a large impact. The data acquisition in this process is mainly based on the questionnaire survey of the audience. The experimental results show that before applying digital image edge detection to transform the clip, 7 people thought that the clip needed to be further improved to improve the quality of the film itself, and only 1 person affirmed the film; after the modification, 9 people proposed the film praise; in addition, 15 people audience watched the film processed by the edge detection method and gave high evaluations to the three aspects of sound effects, special effects, and editing, especially the editing part, with a score of 8.9.

1. Introduction

Based on the pursuit of the film industry, a large amount of capital has poured into the film industry. Film investment and capital scale continue to expand, and the financial risks caused by investments also follow [1]. The competition between investment and investment groups in the production process of China's film industry has directly promoted the development of China's film industry and the further expansion of the scale of the industry [2]. According to the theory of industrial organization, the transaction relationship, behavior relationship, resource occupation relationship, and interest relationship among enterprises in the industry must be balanced to promote the development of the industry. In the context of the "Internet+" upgrading of China's film industry, a new wave of film investment and financing has also ushered in. Film investors and creators

need to differentiate their audiences more finely and grasp the changes in audience mentality in a timely manner, according to different audiences and different schedules., different markets, different needs, and accurate positioning. Edge detection is a basic problem in early-stage vision theory and algorithms, and it is also one of the important factors of the success or failure of mid- and later-stage vision processing [3, 4]. It has many applications in technology, military, medicine, and so on. The edge of the image carries many details of the image and is the basic part of the image. It has many applications in the fields of image recognition, image sharing, image enhancement, and image compression [5]. The understanding of images depends on their texture properties, and the textures presented by movie pictures are different. The extraction of these texture properties has an extremely close relationship with edge detection. And the screen is composed of multiple dimensions, and feature

extraction is performed on it to form multiple attribution categories. After the conversion of compression, storage, interactivity, etc., a new picture is obtained. The quality of edge detection directly affects the effect of subsequent imaging and even determines its success or failure. Visual culture is the attraction generated by stimulating retinal image and the sensory input received by the cerebral cortex. The quality of the detection algorithm directly affects the accuracy of contour extraction and the performance of the system and therefore affects the development of visual culture [6].

Because edge detection plays an important role in the field of image processing, many scholars have conducted in-depth research, done a lot of work, and achieved certain research results. There are various existing edge detection technologies such as Sobel, PSOPrewitt, Laplacian, and Laplacian of Gaussian. These technologies have limitations, such as fixed edge thickness and some parameters, such as thresholds that are difficult to achieve. Although Dhivya R has proposed many different edge detection methods for grayscale, color, and multispectral images, they still face when extracting edge features from hyperspectral images (HSI) that contain a large number of spectral domains with very narrow bands [7]. Shaik mainly makes a brief study on different edge detection algorithms of noisy images. Prewitt, Sobel, Robert, and Canny edge detection algorithms are studied. By comparing the experimental results, a better method in the process of image edge detection is finally found, and Canny edge detection algorithm gives better results [8, 9]. The purpose of Hajipour's research is to find a suitable method to detect the edges of noisy digital images by eliminating the influence of noise. By applying all these thresholds to a self-organizing map (SOM) neural network input optimized by a learning and training-based optimization algorithm (TLBO), threshold clustering will be performed. The segmented image will be the edge detected by the entropy method. By determining the highest frequency of brightness intensity instead of the average brightness, the abovementioned weaknesses will be eliminated [10, 11]. The edge detection capability of the existing broadband spectrum sensing technology is poor. Pmp proposes a method based on S transform (ST) to solve these problems. For missing samples, the proposed method improves the accuracy of estimation. ST can also be used to store spectrum occupancy information. The simulation results show that the proposed scheme is better than other schemes in improving the accuracy of edge detection. In addition, the simple implementation of ST in the frequency domain is the advantage of real-time applications [12]. The sensor has low delay (less than 1 ms under average illumination conditions), low power consumption (19ma), and reduced data flow when detecting spatial contrast. Lenero-Bardalloja proposed a new method to calculate spatial contrast based on interpixel event communication, which is less prone to mismatch effect than diffusion network. The sensor is manufactured by a standard ams4m2p0.35 micron process. A detailed system level description and experimental results are provided and applied to movie images [13]. One of the key technologies to improve the performance of EO/IR sensors is to develop advanced antireflection coatings

with broadband and omnidirectional characteristics. Sood research shows that nanostructured antireflective coatings manufactured by oblique angle deposition can enhance light transmission through transparent windows by reducing the broadband reflection loss to less than 1%, which is a major improvement over traditional thin-film antireflective coating technology. The stepped antireflection structure also shows excellent omnidirectional performance, which has recently been demonstrated on a 6 inch diameter substrate [14]. The feature tracking algorithm benefits from the help of the 100 Hz IMU. Its accelerometer and gyroscope data provide inertial feature prediction, which improves the execution speed and tracking efficiency. In the space mission environment, Chermak demonstrated the robustness and accuracy of the 6-DOF trajectory generated in real time by our visual mileage calculation method. Performance evaluation is comparable to ground truth measurements from external motion capture systems [15]. These studies are carried out by applying different algorithms of vision sensors or image edge detection. However, through the careful study of their research, there are still certain shortcomings in the analysis of experimental data, and the experimental methods are mainly aimed at a certain small area.

This research is mainly divided into two parts. One is to refer to existing image edge detection algorithms based on wavelet transform and morphology and introduce wavelet theory from the perspective of filter bank and multiresolution analysis. The concept of filter bank is clear, and the theory of multiresolution analysis is clear in other research literature. Then, design the corresponding algorithm; study the wavelet from scale function, wavelet function, and finite-length filter bank through simulation; deepen the understanding of wavelet theory; and analyze the results. Edge detection is an essential foundation for image analysis fields such as image segmentation, target region recognition, and region shape extraction. By improving the parallelism of the algorithm, the speed of edge detection of movie screens can be greatly improved, and the gray level of surrounding pixels can be stepped through the simulation algorithm. Or the collection of pixels that change on the roof can be detected and processed, which can provide a technical guarantee for the data. The second is to explore the development of the film industry in recent years, adhering to the principle of improving quality and bringing economic benefits to achieve the goal of investment optimization in the film field for the improvement of the film itself, using digital image edge detection to detect film images, sound effects, special effects, etc. To deal with it, it is necessary to design a questionnaire to demonstrate the analysis of the application of digital image edge detection in movies. Among them, the model of film investment mode and the analysis of the relationship between visual culture and film and television and the application model of digital image edge detection in image processing are designed.

2. Exploring the Optimization Method of the Film Industry

2.1. Investment Optimization in the Film Sector. The income of movie products not only refers to the income of the movie

industry but also refers to the spiritual value. This is the dual characteristics of the film market, that is, the technical characteristics and heavy film characteristics of the film market [16]. The artistry of movie products is the same as many concepts in real life. Movies have humanistic value, outlook on life, global vision, etc., which guide and promote human beings; the product characteristics of movie products can be used in national or regional business plans. The main types of budgets in the film industry are internal budgets and external budgets. Different budget topics have different relationships. Although the internal budget comes from the film industry capital, some corporate actions between the government and the film industry will have a large impact on the film industry capital. Filmmakers face different budget channels and different types of investment, and the corresponding channels will be different [17], achieving a high-level industrial development of the Chinese film industry is the ultimate goal of the development of the film industry. When the development of the film industry reaches a mature level, the Chinese film industry will achieve higher investment and financing efficiency and will also enhance Chinese film and Chinese culture. The influence of the world has won more space for the development of Chinese film art, and the prerequisite for the development of industrialization is a large amount of capital investment and extensive participation. From different bases of different film companies, different sources of adoption, and different film product risk management methods, this has led to differences in the main body of funding channels, especially in our country's investment and financing. The construction and development of China's film industry investment financial mechanism are an important stage of the development of China's film industry [18, 19]. The need for risk management in the development of enterprises is the driving force for the investment and financial development of the film industry. Completing the investment and financing of China's film industry through market competition will ultimately drive the establishment and continuous development of film industry investment and financial planning technology and promote the sustainable development of China's film industry [20]. The investment process of the film industry is shown in Figure 1.

The basis of the development of film industrialization is film industrialization. Film industrialization requires standardized and standardized process control for film production, to realize a more scientific and orderly film production process, to achieve the film product level required by the development of film industrialization. Film industrialization is the basic requirement of the development of film industrialization. At present, the investment and financing system does not match the development degree of China's film industry and China's film industry investment, and financing market is still in the initial stage of development. The rapid expansion of the scale of China's film market has promoted the development of film industrialization, but how to achieve more scientific and efficient industrialization of China's film industry needs theoretical guidance. Due to the lack of theoretical research and preparation for the development of domestic film industry, to a large extent, the theoretical guidance for the development

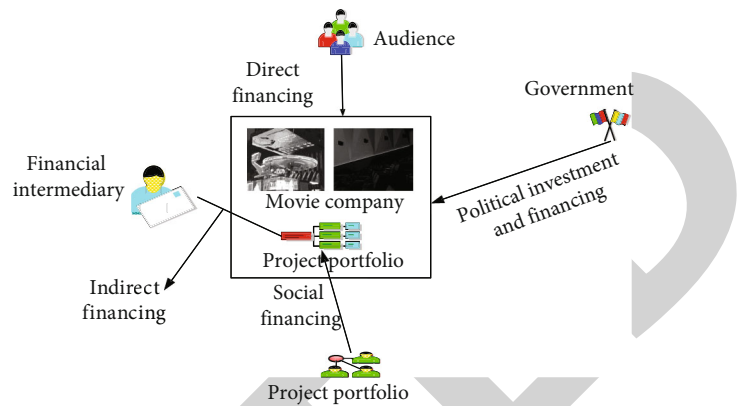


FIGURE 1: Film industry investment development mechanism.

of China's film industry is to learn from the development theories and experience of foreign film industry. To a certain extent, this has helped China's film industry improve its industrialization development capacity and actively learned from the mature experience of foreign film industry development [21].

2.2. Digital Image Edge Detection Technology. Edge is a model of image information retention and change, which can be represented by gradient. This is also a popular research method in the current edge detection methods. The gradient calculation of each operator in the picture has become the main problem of finding the edge [22]. For color images, considering the fusion and interaction between color channels, a gradient system based on a vector system is better than simply calculating the gradients of three color channels and then integrating them. Generally, the edge of the image is divided into two types: step type and roof type [23]. In the time domain, the scale changes from large to small, and the corresponding frequency domain scale changes from small to large. The low-pass filter can get large-scale information; that is, the low-frequency information is the signal profile information, and the high-pass filter can get the small-scale information, that is, signal high-frequency information, that is, noise and mutation information. The step level refers to the obvious change in the gray value on both sides of the edge, and the roof level refers to the edge where the gray value increases or decreases. Mathematically, the derivative of gray level can be used to write the change of the edge space, and the first and second derivatives of the step edge and the edge can be calculated, respectively. A movie is a segment formed by an uninterrupted connection of multiple color images. The gray-scale standard deviation can have an important influence on the noise ratio of the sound quality of the movie image and the sharpness of the image screen. The displacement factor formed by the pixels of the image is calculated. The gray-scale ratio calculation produces the conversion. Finding the edge is one of the most important and difficult tasks in computer vision and image processing. Various mathematical morphological edge detection algorithms have their own shortcomings and shortcomings. The average brightness of digital noise images cannot well represent the initial threshold. Noise causes the

average intensity of brightness to be far away from the main range of image intensity. Therefore, the resulting edge detection image will be severely disturbed and cut off. The research of edge image detection methods and the improvement of edge detection quality can provide a good foundation for subsequent image processing, analysis, and understanding [24].

It is essential to choose the threshold of image segmentation in edge detection [25]. The most commonly used edge detection algorithm is used to simulate the movie image screen, which conforms to this rule: edge detection is the point where the gray level of the image changes drastically, and the sudden change of the gray level will produce a larger value. It can be expressed as

$$\therefore f(a, b) = \left[\frac{\gamma f(a, b)}{\gamma a}, \frac{\delta f(a, b)}{\gamma b} \right]^{\gamma-1} \delta \quad (1)$$

$$\therefore f(a, b) = [f_a(a, b), f_b(a, b)]^{\gamma-\delta}. \quad (2)$$

This formula represents a certain prominent point (a, b) on the image, and the vector of the image gray change value on the vertical gradient represents \therefore . According to the gradient detection method, the direction and amplitude of the above formula are calculated as

$$|\nabla f(a, b)| = \sqrt{f_a^2(a, b) + f_b^2(a-1, b+1)}, \quad (3)$$

$$\vartheta(a, b) = \tan \left(\frac{f_{(a+1)}(o, a)}{f_{b-1}(a+1, b)} \right). \quad (4)$$

Use \forall for the direction, ϑ for the amplitude, and o for the approximate value of the image threshold in the digital image. Use the local difference value in the fixed area to detect the edge, if the current pixel value is (m, n) . Then, there is

$$A_m = f_m(m, n) = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}, 1, \quad (5)$$

$$\sum f(m, n) = |f(m-1, n-1) - f(m, n)| \int (m, n-1). \quad (6)$$

A_m is the directional difference value, and the difference value of the processing partial image operator is $\sum(m, n)$. These two formulas combine individual image pixels in the local difference value for calculation. For the detection of intersections, we can replace the algorithm to ensure smooth processing. The formula is

$$H(a, b, c) = \frac{1}{2\pi\zeta^2} \sum \left(\frac{-a^2 + b^2}{2\zeta^2} \right). \quad (7)$$

It can be processed by applying a smoothing filter to get the function:

$$h(a, b) = H(a, b, \zeta) \otimes f(a, b), \quad (8)$$

$$\exists^2 h(a, b, \zeta) = 3 \left(\frac{a^2 + b^2 - 2\zeta^2}{\zeta^2} \right) \oint_{c=1} (a, b/\zeta). \quad (9)$$

When $\exists^2 - c > 1$, ζ^2 is the best edge step state and has the characteristics of normal distribution; when the zero point crosses, $\oint_{c=1}(a, b/\zeta)$ is an axisymmetric function, and the average value is 1.

Based on the wavelet multiresolution analysis method, the load sequence is decomposed into sequences with different frequency characteristics. Then, according to the characteristics of the decomposed components, different neural network models are constructed to predict each component separately. For edge detection, the wavelet algorithm can also be used to divide the image into equal partitions and calculate the initial threshold of the image partition. The most typical of them is

$$C_t = \int_r \frac{ga}{a^2} \int_r |T_f(a, b)|^2 \sum_{c=0}^1 \frac{1}{\zeta} ga, \quad (10)$$

$$f(a) = C_r^{\frac{1}{2}} \oint T_{r-1}(a, b)(c) \frac{ga - gb}{a^2}. \quad (11)$$

C_t represents the digital image broadcast signal at time t , and $\oint T_{r-1}$ is the value after performing wavelet inverse transformation on this broadcast signal. In this inversion process, the scale factor and displacement factor are assumed to be x and y . For detailed analysis, the formula can be used to describe it as

$$\kappa_{x,y}(i) = x^{-\frac{1}{2}} \eta \left(x^{-j} (i - b^h) \right), \quad (12)$$

$$\kappa_{x,y}(i) = |2^j|^{-\frac{1}{2}} \eta \left(\frac{h - y^i}{x^{j-1}} \right). \quad (13)$$

Among the $2^j = x^{-j}$, it is a single calculation for the discrete value and the value of the basic wavelet η .

2.3. Visual Culture and Film Commercialization Development. As a culture, visual culture can bring people spiritual pleasure. In most cases, people will not limit visual culture to the perceptual level, but will bring visual culture to the rational level. Visual culture can not only bring people visual and spiritual pleasure but also economic satisfaction. Because now is an economic society, people will put into economic behavior to obtain spiritual pleasure, and a visual cultural product that people are willing to pay for must also be a visual cultural work that can create economic value. It is a cultural work with cultural heritage that can definitely bring spiritual pleasure to the audience [26]. Visual culture is a kind of commercial culture, and it can be said that it is a cultural center. The development of modern Chinese visual culture is placed in a new historical context by the integration of economic and culture. The characteristics of commercial products have transformed it from Chinese art culture into a commercial culture, and a culture of famous artists, new phenomena, and new characteristics is constantly presented from this. Visual culture is the product of economic and business partners [27]. Culture and art

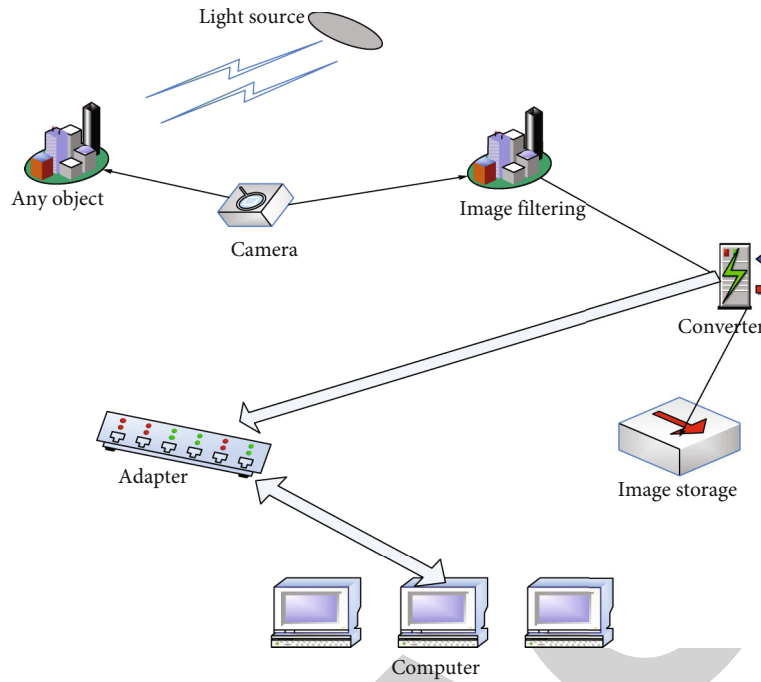


FIGURE 2: Film image acquisition.

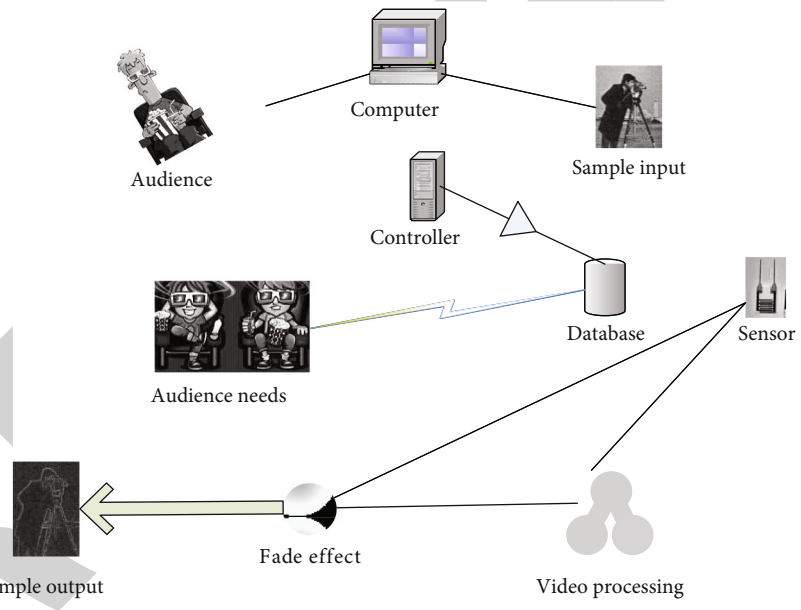


FIGURE 3: Digital image edge detection for film image processing.

should have spiritual value and social benefits, and the social benefits of visual culture are closely related to marketing, which is conducive to the development and integration of visual culture as the basis of popular culture and its economic interests. The sensor is conceived as a node of a smart camera network. The network is composed of several independent autonomous nodes that send information to a central node. The user can switch the operation and read mode through two control bits [28]. The application of digital images in film image collection is shown in Figure 2.

Use a two-dimensional fuzzy set to describe the relationship between visual culture and film commercial development as

$$R = \{((o, p), v_r(o, p)) \mid \downarrow o \notin O \subseteq [0, 1]\}, \quad (14)$$

$$R = \iint_{o \in O} \frac{\beta_r(o, p)}{(o, p)}. \quad (15)$$

R is the visual culture of the large area, and β_r is the

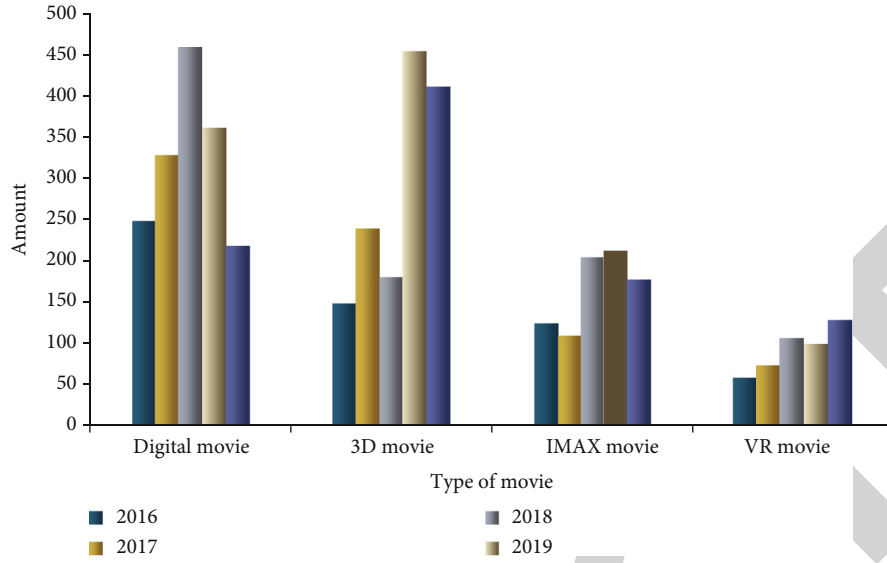


FIGURE 4: The total number of digital movies, 3D movies, IMAX movies, and VR movies in the past 5 years.

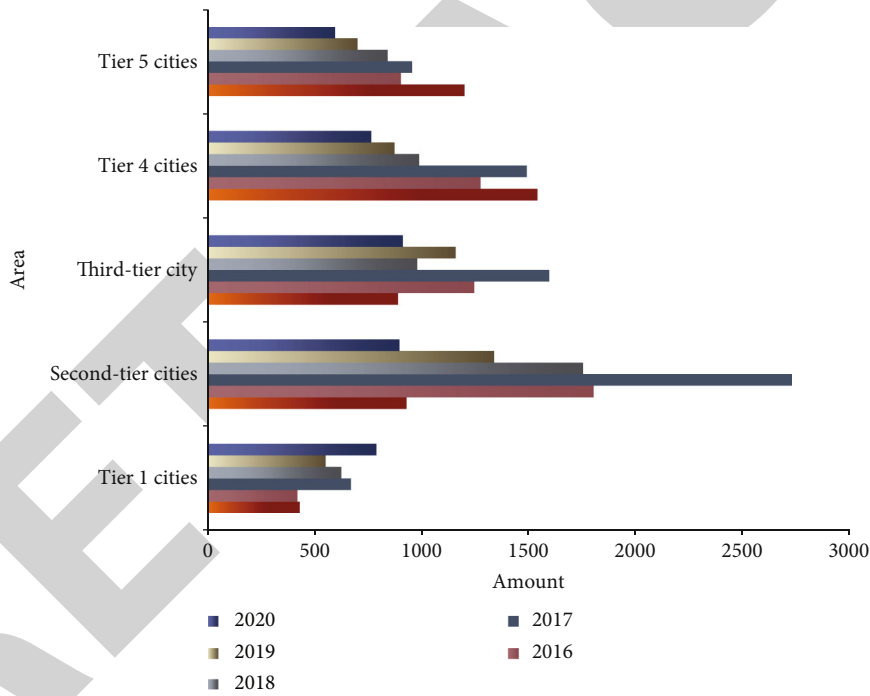


FIGURE 5: Number of theaters in the region from 2015 to 2020.

commercial value corresponding to the fields involved in the film business and visual culture and represents the subsidiary value. The ancillary value itself can be expressed as

$$R = \int_{o>p} \frac{f_h(p)/o}{o} * \int_{p=1} p/o, \quad (16)$$

$$L(r_1, r_2) = \frac{\int \varphi_{R_1}(O_1) \uparrow \varphi_{R_2}(O_2) / O_1}{O_1 + O_2} \bullet P_1. \quad (17)$$

O_1, O_2 is an example of two partitions in the expansion

of the commercial value brought by the movie, which conforms to the expansion principle of fuzzy sets, and the sub-membership can be used to distinguish these extended partitions, that is,

$$\varphi_1 = \sum_{h=1}^r hg(i) / \sum_{i=1}^{r \bullet (i-1)}, \quad (18)$$

$$\varphi_2 = \sum_{h=A+1} (A-1)hg(h+1) \pm A(A+1)\beta. \quad (19)$$

Among them, h represents a constant, A is actually all values of visual culture, including material value and spiritual value β , the submembership degree of the corresponding partition is φ , and the overall submembership degree can be expressed as

$$S_i^{o,p}(r) = \frac{r_{o-1}^p}{\sum_{g=1}^{A-1} (r-1)} \otimes (o, p). \quad (20)$$

r_{o-1}^p For the value of the target we want to explore.

3. Experiment and Data Analysis

First of all, we have to know the application of digital image edge detection methods. Construct a model of digital image edge detection and film image processing, as shown in Figure 3.

The rapid development of the film industry has not only played an important role in promoting the development of our country's film industry, but also has significant commercial and cultural value to the cultural industry. The Chinese government has always supported the development of the film industry. With the comprehensive development of the national film system, the domestic film market has developed rapidly, setting a number of box office records. With the development of film marketing, commercial films are restricted by factors such as their products, price, channels, and publicity. At the same time, the development of new media makes the marketing, and communication of family commercial films needs to have more unique characteristics, including communication mode, communication strategy, content, and communication effects. As the screen link at the bottom of the industrial chain, the film chain has lower business risk and stable return compared with the production and distribution link. Therefore, we should understand the current situation of film development. The first is the film itself. This part of this study mainly makes data statistics on the film technology level in the film development technology environment, as shown in Figure 4.

It can be seen from the above figure that the development of technology has led to the diversification of viewing experience. The number of digital films, 3D films, IMAX films, and VR films continues to appear, which can give people a higher viewing enjoyment. These technologies are broken through the sense of picture experience. Therefore, combining with the edge detection technology of digital images can bring more economic benefits. To make the research more comprehensive, the number of regional cinemas from 2015 to 2020 is counted, as shown in Figure 5.

The data in the figure shows that the number of movie theaters in first-tier cities has always been smaller than that in other regions, while the number of movie theaters in second-tier cities fluctuates greatly, and the total amount is also the largest. This is because the region takes advantage of the population to promote the increase in the number of movie theaters. For this reason, the production situation of domestic films in recent years is recorded in Table 1. The reasons for audience viewing, such as novel themes,

TABLE 1: Production of domestic films in the past 7 years.

Years	Feature film	Animated film	Documentary	Science and education film	Love videos
2014	23	49	40	32	26
2015	61	46	89	9	23
2016	45	33	111	72	38
2017	52	42	73	101	62
2018	71	20	59	68	51
2019	127	54	39	46	82
2020	143	20	49	61	97

attractiveness, topics to talk about following the crowd, passing time, and age, are based on 1-10. For the statistical analysis of evaluation records, for each level, the larger the value, the more relevant it is, as shown in Figure 6.

It can be seen from the table that the types of domestic films are diversified, and the number of various types is different each year. Animation films produced the most in 2014, and documentary films reached the most in 2015; love films and feature films in 2016 were both higher than the previous ones. The year has increased. In 2017, the number of domestically produced science and education films was the most, and the number of cartoons in 2018 was the least; in 2019 and 2020, there were the most feature films and the least documentaries. Understanding these data has certain reference significance for the direction of investment and can use investment to promote the development of our country's film industry and film industrialization. Different age groups have different spiritual pursuits for films. For example, people under the age of 14 following the crowd and going to see what looks good; people aged 14-18 pay attention to the novelty of the theme, because they are in a stage of thirst for knowledge and pursuit of new things; people aged 19-30 generally pay attention to the attraction of the film as the fun of life; people over the age of 30 are more insipid and will not ask for special requirements. To make a clear comparison, the market share of domestic films and imported films over the years is analyzed, as shown in Table 2.

From the table, it is found that in 2017, the share of close-knit films exceeded the market share of domestic films. A questionnaire survey was conducted with 30 people randomly selected from movie audiences to improve the satisfaction of domestic movies. The statistics are shown in Figure 7.

As can be seen above, of the 30 film viewers who participated in the questionnaire, 9 were very satisfied with the performance of the domestic film actors, and 8 were dissatisfied with this aspect. There were 11 who were relatively satisfied with the specific technique for domestic films. And with the diversity of the subject matter, there were 9 who were not very satisfied and 8 who were not satisfied. This suggests that we need to proceed from these two aspects for the production of domestic films. To make the economic benefits as much as possible, the specialized research on marketing means is also necessary. Traditional marketing

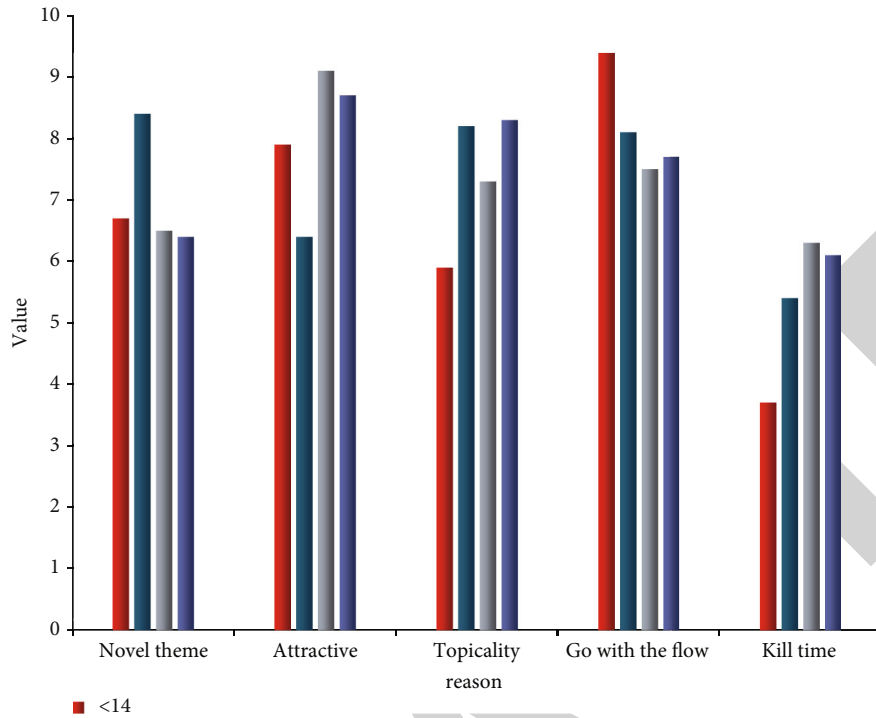


FIGURE 6: Reasons for the audience to watch the movie.

TABLE 2: Market share statistics of domestic and imported films.

Years	2014	2015	2016	2017	2018	2019	2010
Domestic film box office	119.01	225.18	275.63	372.15	682.34	927.73	827.14
Imported film box office	107.07	117.24	269.82	471.24	571.37	398.37	624.18

is the way of marketing film with television stations, newspapers, flat advertising, and others as the main means. New media marketing refers to film promotion using web communication platforms such as microblogging and WeChat. Compared with traditional marketing, new media marketing must produce a suitable set of marketing strategies for film locations and different audience groups. A repeat survey was conducted with these 30 viewers, with statistics on the pathway to understanding before their usual views, as shown in Table 3.

It can be seen from the data in the above table that the understanding of movies before watching movies is mainly through video websites, Weibo, Tieba and forums, fan websites, search engines, social networking sites, theme sites, smart phones, and other channels. Among the movie audiences surveyed, 90% of them use smartphones to learn about movies, and 76.7% of them use themed websites, followed by fan websites, which account for 63.3% of the total number of people surveyed and only 20% of them. People use Weibo to learn about trailers and promotional clips. Take “Anti-Corruption Storm 2” released in 2016 and “Anti-Corruption Storm 4” released in 2019 as examples to analyze the interaction, convenience, segmentation, timeliness, and sharing (1-10) of film marketing. The impact of box office revenue is shown in Figure 8.

From the results of the box office revenue of these two films, we can find that it is essential to pay attention to the focus of segmentation in the marketing process, the audience is regarded as a whole, and the collective interests are considered in a detailed analysis. Moreover, “Anti-Corruption Storm 4” far exceeds “Anti-Corruption Storm 2” in terms of interaction, convenience, focus, timeliness, and sharing. Among them, the difference in the scores for convenience is the largest. For 2, this is also due to the blessing of communication methods, communication strategies, and communication effects, and the value of edge detection as an inaccessible part of the communication production process is self-evident. The application effect of digital image edge detection is demonstrated from the aspects of production technology and marketing effect, to achieve the purpose of improving the quality of the film. Intercepted segment of the movie that is currently on air invited 15 viewers to evaluate the viewing experience of the segment before and after the application of digital image edge detection technology and discussed from three aspects: visual experience, film quality, and word-of-mouth. The first is the statistics of visual perception, as shown in Figure 9.

After discussing with these 15 viewers, it is concluded that the processing of digital image edge detection technology on the image can enhance the picture quality of the film;

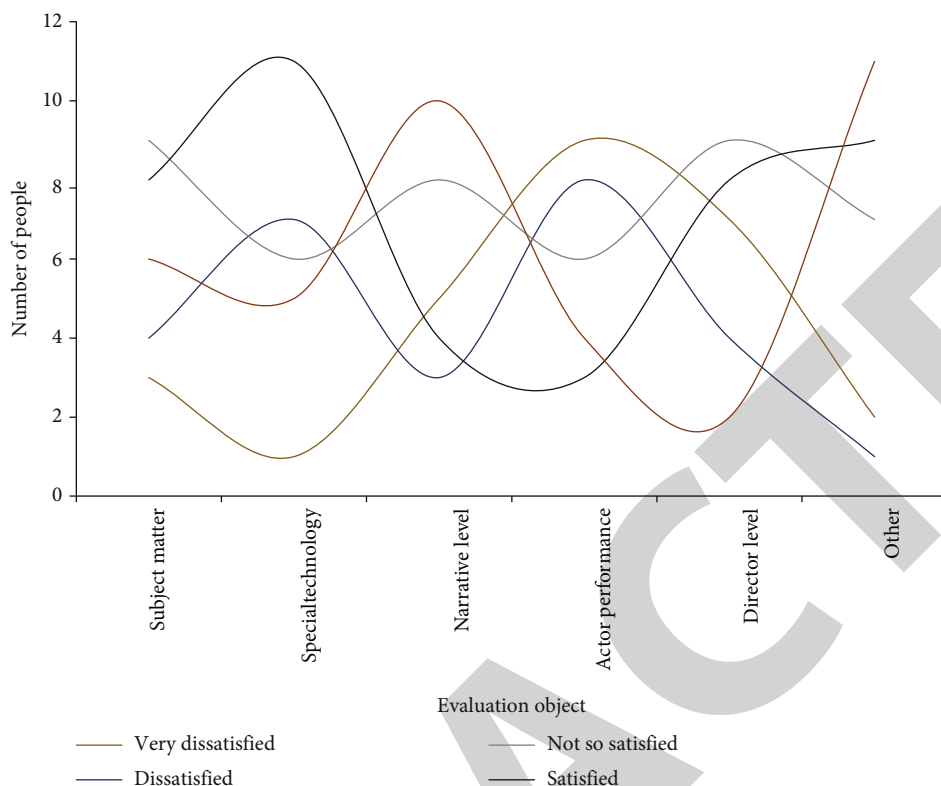


FIGURE 7: Movie audiences' satisfaction with improving domestic films.

TABLE 3: Ways to understand before watching the movie.

Method	Number of people	The proportion
Video site	7	23.3%
Weibo	6	20%
Postbar and forum	8	26.7%
Fan site	19	63.3%
Search engine	17	56.7%
Social networking site	11	36.7%
Theme website	23	76.7%
Smart phone	27	90%

the color of the processed film is brighter and more textured, and the sound effect has also been greatly improved. The picture is smoother. Then, the quality of the film is scored from 1 to 10 in terms of screen sound effects, editing, and special effects. The data is shown in Figure 10.

Before it was processed, everyone's opinions on the clip were similar in terms of sound effects, special effects, editing, and pictures, and the evaluation of these aspects was not very good, and after processing this clip, the sound effects, special effects, and editing these three aspects have been highly praised by the audience, especially the editing part, with a score of 8.9. On the whole, the audience has made statistics on the application effect of digital image edge detection on the film, as shown in Figure 11.

Before applying digital image edge detection to transform the clip, 7 people thought that the clip needed to be further improved to improve the quality of the film itself, and only 1 person affirmed the film; after the modification, 9 people proposed the film praise. It can be seen that digital image edge detection has a great effect on image processing, and its application in the film field can greatly enhance the value of the film and bring more economic benefits.

4. Discussion

The quality of movie films is a key factor that affects the benefits of movie production, that is, movie box office. Different from other products, it is necessary to reposition and confirm the factors that determine the movie box office under economic market conditions and make recommendations for the subsequent investment direction of the movie. The industrialization development process of Chinese film is to a large extent equivalent to the process of guiding diversified capital into the Chinese film industry, eliminating barriers for different types of capital to participate in the Chinese film industry, and the continuous entry and participation of diversified capital will become the development of China's film industrialization. At the same time, based on the capital's own risk-averse instinct, the entry of a large number of different types of capital will promote the further construction and improvement of China's film industry investment financial mechanism and promote the further development of the film industry. The construction and

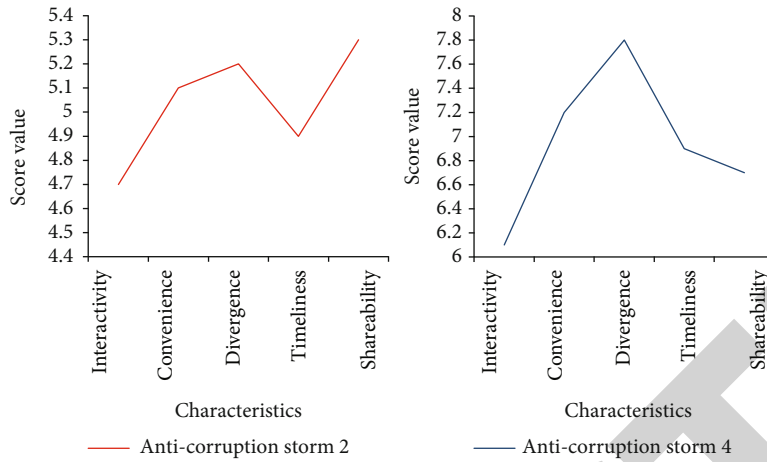


FIGURE 8: Film marketing analysis.

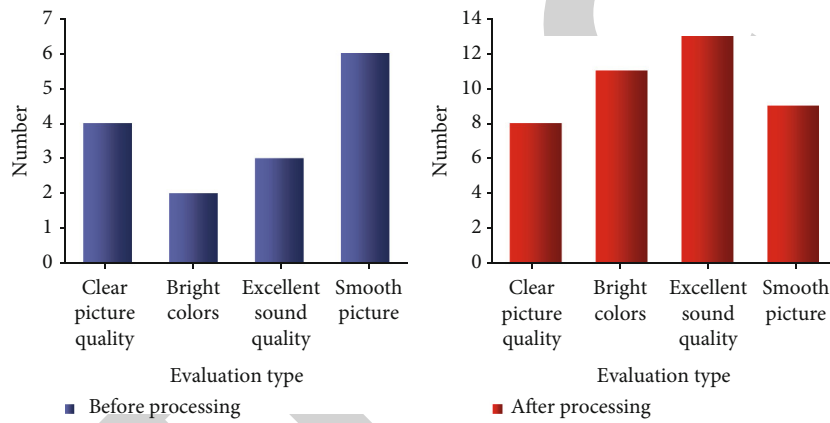


FIGURE 9: Survey of audience's visual perception.

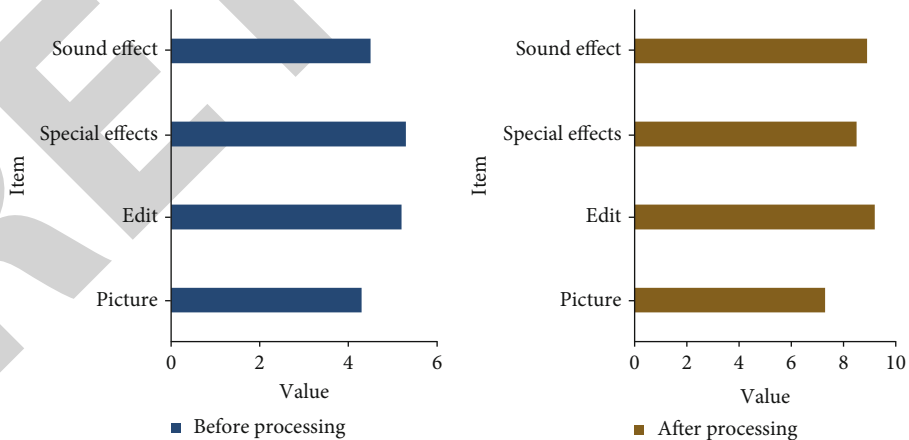


FIGURE 10: Film quality evaluation.

investment and financial planning of China's film industry are a process of industrial development. The negative correlation between industrial product risk and industrial demand is a powerful source of investment, construction, and implementation in the film financial industry. Con-

structing a multilevel, multi-institution, multisystem, and multiparticipating film industry development model is the basic direction of the investment and financing implementation of China's film industry to solve the obstacles to industrial development.

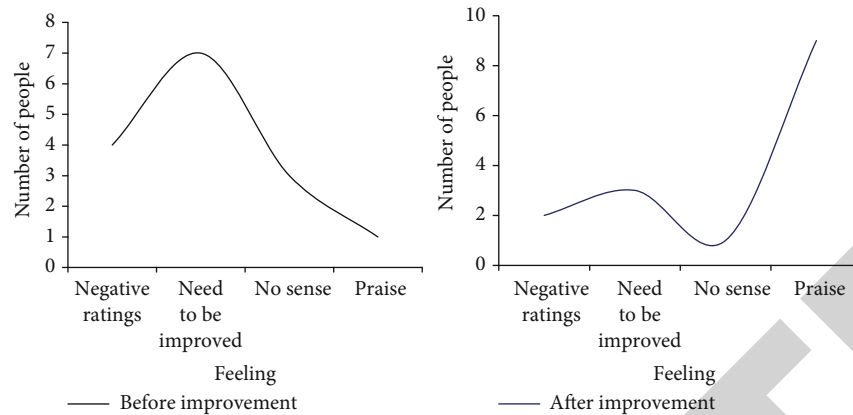


FIGURE 11: Audience recognition.

5. Conclusion

Edge detection is one of the classic research contents in the field of image processing, image analysis, and computer vision. It is the basic method of model recognition and image information extraction. The edge of the image is the most important part of the image, and it is also the most basic part of the image, which is the image segmentation. It is an important feature that depends on the matching between different images. Using image edge information to analyze images cannot only reduce the amount of information processing, shorten the image processing time, and increase image speed but also better maintain the image processing system to achieve the purpose of identifying and analyzing images. Edge detection has always been a hotspot and focus of research. In addition to processing the image itself, in this process, how the real-time image combined with noise can eliminate false alarms caused by noise interference while ensuring the accuracy of the position has become an important issue that needs to be resolved in human ear detection. The commercialization process of domestic films is developing very rapidly in our country, and the box office numbers that increase substantially every year are the best proof. However, while the film industry is developing vigorously, it has also been accompanied by many problems; especially in recent years, it has aroused the concerns of many people in the industry. And domestic films, whether it is the subject matter of the film, the choice of actors, the shooting skills, the concept of the film, and even the way of publicity and marketing of the film, seem to affect the box office income. In the past ten years, the rapid development of China's economy has driven the prosperity of the cultural industry, and culture and economy have developed simultaneously and complemented each other. Culture will be restricted by economy, but it cannot be replaced by economy. The cultural industry and culture are two completely different things. The prosperity of the cultural industry does not mean that the culture is prosperous. The reflection is especially obvious in the film industry. From investment companies to film screenwriters and directors, they are all engaged in the profession of film for the sake of making money. Many investors use movies to make

money rightly, and profit becomes their only value pursuit. With this original intention and mentality of creation, it is impossible to produce good movies. The final result of this situation is bound to be the continuous decline of the quality of Chinese movies.

Data Availability

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

Conflicts of Interest

The author declares that he has no conflicts of interest.

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References

- [1] C. Lv, K. Wang, G. Gu, and Y. Pan, "Accurate full-edge detection and depth measurement of internal defects using digital speckle pattern interferometry," *NDT & E international*, vol. 102, pp. 1–8, 2019.
- [2] Q. Sun, Y. Qiao, H. Wu, and J. Wang, "An edge detection method based on adjacent dispersion," *International Journal of Pattern Recognition & Artificial Intelligence*, vol. 30, no. 10, pp. 1655026–1655951, 2016.
- [3] S. Rani, "A novel mathematical morphology based edge detection method for medical images," *Csi Transactions on Ict*, vol. 4, no. 2-4, pp. 217–225, 2016.
- [4] P. Wang, "Measurement of local and volumetric deformation in geotechnical triaxial testing using 3D-digital image correlation and a subpixel edge detection algorithm," *Acta Geotechnica*, vol. 15, no. 10, pp. 2891–2904, 2020.
- [5] S. Haixin, "A 6.5–8.1-GHz communication/ranging VWB transceiver for secure wireless connectivity with enhanced bandwidth efficiency and energy detection,"

- IEEE Journal of Solid-State Circuits*, vol. 55, no. 2, pp. 219–232, 2019.
- [6] L. Zhang, Z. Xu, S. Wei, X. Ren, and M. Wang, “Grain size automatic determination for 7050 Al alloy based on a fuzzy logic method,” *Rare Metal Materials and Engineering*, vol. 45, no. 3, pp. 548–554, 2016.
 - [7] R. Dhivya and R. Prakash, “Edge detection of satellite image using fuzzy logic,” *Cluster Computing*, vol. 22, no. S5, pp. 11891–11898, 2019.
 - [8] M. A. Shaik, A. Ramesh, and Y. Kumari, “The performance analysis of edge detection algorithms for images processing in presence of noise,” *International Journal of Computer Science Engineering and Information Technology Research*, vol. 7, no. 2, pp. 1–8, 2017.
 - [9] Z. Wan, Y. Dong, Z. Yu, H. Lv, and Z. Lv, “Semi-supervised support vector machine for digital twins based brain image fusion,” *Frontiers in Neuroscience*, vol. 15, p. 705323, 2021.
 - [10] K. Hajipour, “Edge detection of noisy digital image using optimization of threshold and self organized map neural network,” *Multimedia Tools and Applications*, vol. 80, no. 4, pp. 5067–5086, 2021.
 - [11] E. L. Lydia, J. S. Raj, R. P. Selvam, M. Elhoseny, and K. Shankar, “Application of discrete transforms with selective coefficients for blind image watermarking,” *Transactions on Emerging Telecommunications Technologies*, vol. 32, 2021.
 - [12] A. Pmp and B. Gp, “S-transformation based integrated approach for spectrum estimation, storage, and sensing in cognitive radio,” *Digital Communications and Networks*, vol. 5, no. 3, pp. 160–169, 2019.
 - [13] J. A. Lenero-Bardallo, P. Hafliker, R. Carmona-Galan, and A. Rodriguez-Vazquez, “A bio-inspired vision sensor with dual operation and readout modes,” *IEEE Sensors Journal*, vol. 16, no. 2, pp. 317–330, 2016.
 - [14] A. K. Sood, G. Pethuraja, R. E. Welser et al., “Development of large area nanostructured antireflection coatings for EO/IR sensor applications,” *Advances in Computational Sciences & Technology*, vol. 9, no. 1, pp. 87–100, 2016.
 - [15] L. Chermak, N. Aouf, and M. Richardson, “Real-time smart and standalone vision/IMU navigation sensor,” *Journal of Real-Time Image Processing*, vol. 16, no. 4, pp. 1–17, 2016.
 - [16] Q. Meng, H. Wang, and W. Xu, “A coupling method incorporating digital image processing and discrete element method for modeling of geomaterials,” *Engineering Computations*, vol. 35, no. 1, pp. 111–431, 2017.
 - [17] J. Li, S. Li, G. Gu et al., “A novel method based on digital image processing technique and finite element method for rapidly modeling optical properties of actual microstructured optical fibers,” *IEEE Photonics Journal*, vol. 8, no. 6, pp. 1–14, 2016.
 - [18] Y. Zeng, P. H. Tsui, W. Wu, Z. Zhou, and S. Wu, “Fetal ultrasound image segmentation for automatic head circumference biometry using deeply supervised attention-gated V-net,” *Journal of Digital Imaging*, vol. 34, no. 1, pp. 134–148, 2021.
 - [19] C. Corinne, “Future trends and Italian SMEs,” *American Journal of Business and Operations Research*, vol. 1, no. 1, pp. 52–59, 2020.
 - [20] Y. Lu, C. Li, and Y. Wu, “Preparation of dimer acid-based polyamide film by solution casting method and its properties optimization,” *Journal of Polymer Research*, vol. 28, no. 3, pp. 1–12, 2021.
 - [21] R. Parhi and V. Goli, “Design and optimization of film-forming gel of etoricoxib using research surface methodology,” *Drug Delivery and Translational Research*, vol. 10, no. 2, pp. 498–514, 2020.
 - [22] W. W. Ma, M. G. Rasul, G. Liu, M. Li, and X. H. Tan, “Climate change impacts on techno-economic performance of roof PV solar system in Australia,” *Renewable Energy*, vol. 88, pp. 430–438, 2016.
 - [23] S. Xu, Z. Yao, G. Pei, X. Luo, X. Wu, and Y. Lin, “Preparation and properties of sapphire by edge-defined film-fed growth (EFG) method with different growth directions,” *Journal of Wuhan University of Technology-Mater Sci Ed*, vol. 33, no. 5, pp. 1022–1027, 2018.
 - [24] T. H. Rehm, S. Gros, A. Renken, and P. Löb, “Photocatalysis with visible light - optimization and scale-up for the falling-film microreactor,” *Chemie Ingenieur Technik (CIT)*, vol. 88, no. 9, pp. 1334–1335, 2016.
 - [25] R. Parhi and P. Suresh, “Formulation optimization and characterization of transdermal film of simvastatin by response surface methodology,” *Materials Science and Engineering*, vol. 58, no. Jan., pp. 331–341, 2016.
 - [26] H. Y. Lin, S. W. Wang, C. C. Lin et al., “Effective optimization and analysis of white LED properties by using nano-honeycomb patterned phosphor film,” *Optics Express*, vol. 24, no. 17, pp. 19032–19039, 2016.
 - [27] L. H. Jin, Y. Bai, C. S. Li et al., “Growth of YBCO film by chemical solution deposition with an optimization fluorine process,” *Materials Letters*, vol. 250, pp. 34–37, 2019.
 - [28] M. Kelishami, “Optimization of the blowing ratio for film cooling on a flat plate,” *International Journal of Numerical Methods for Heat and Fluid Flow*, vol. 27, no. 1, pp. 104–119, 2017.