Professional Course System of Film and Television Photography and Production Under Data Technology

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Abstract. With the rapid development of technology, digital technology has become an important tool for film and television photography and production in China, and university students, as future film and television professional practitioners, should be fully familiar with the digital technology context during their school years. This paper is based on the reform of the curriculum system of film and television photography and production under the background of ant colony algorithm. This paper briefly describes the changes brought by digital technology to film and television photography and production, followed by the analysis of the main points of the construction of the curriculum system of film and television photography and production industry under the background of ant colony algorithm. Finally, the ideas for the construction of a specific professional curriculum system are elaborated. Through this paper, we hope to provide educational administrators and teachers of film and television photography and production with some reference materials for curriculum reform.

Keywords: Ant colony algorithm · Film and television photography and production · Curriculum reform

1 Introduction

After 2000, the 16th National Congress explicitly proposed the development of cultural industries, of which the film and television cultural industry is an important part, and the large-scale education and training of arts and communication talents at this time not only led to the formal establishment of the film and television photography and production major, but also the education and training of film and television talents to meet the needs of the film and television industry. 2012, the state adjusted the catalogue of undergraduate majors, for the first time in several major universities to create a new major–Film and Television Photography and Production. At this stage, as an emerging speciality, the construction of this speciality is still being explored by universities, and a systematic and theoretical curriculum has not yet been formed.

Digital technology and electronic computer technology go hand in hand to produce different forms of graphics, sound and image. Digital technology has a wide range of

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applications, both in the professional computer field and in the film and television photography and production industry. The world's film and television industry has entered a new phase of development, with creators choosing advanced digital technologies to create new categories of films in order to present complex images. Categories such as magical films, science fiction films and fictional films are recognized by the public [1]. The importance of applying digital technology to update the actual value of the film and television production industry has been established as indispensable. With the goal of cultivating talents to adapt to society and the industry, domestic institutions should create courses in film and television photography and production with a focus on digital technology in response to this situation where the digital technology context continues to mature. This paper explores the reform of the professional system of film and television photography and production based on the background of the ant colony algorithm.

The learning system is shown in Fig. 1.

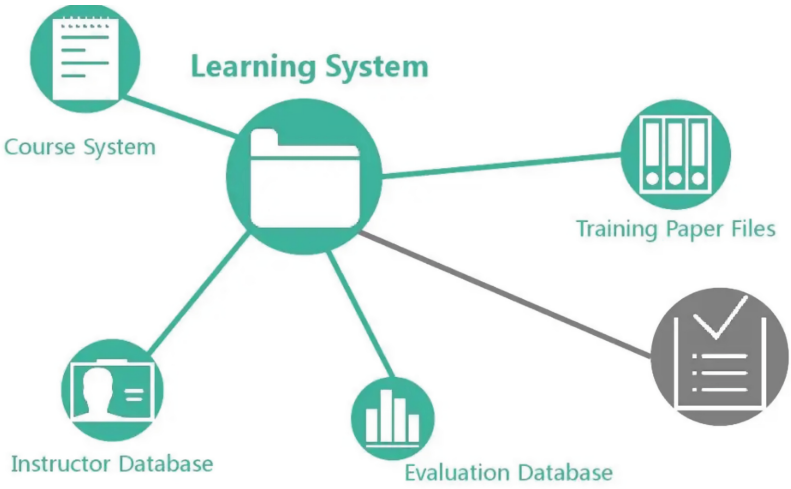

Fig. 1. The learning system

2 Ant Colony Algorithm

2.1 Description of the Ant Colony Algorithm

The ant colony algorithm can be seen as a probabilistic search algorithm that guides the search by parameterising the solution space of the problem in terms of the pheromones released by the ants. Each ant constructs a feasible solution, or part of a solution, from the initial state according to the criteria given by the problem. The parameters of the solution space are updated with the solutions already produced, allowing subsequent ant searches to focus on a range of high quality solutions. The following four components play a decisive role in modelling the ant colony algorithm:

(1) Description of the problem solution space

Since computers deal with discrete events, they cannot completely describe a continuous plane. This requires that the continuous plane must be discretized into a discrete plane consisting of a set of points, so that the artificial ants can move freely on the abstracted points. Since ants moving on a continuous plane always pass through discrete points, the problem space solved by an ant colony algorithm can be described by a data structure called a graph. Since graphs are suitable for describing many problems, this makes possible a wide range of applications of ant colony algorithms.

(2) Construction of feasible solutions

While ants determine the direction of their progress during the search for a food source based on the pheromones on the path, artificial ants move on the nodes of a plane, so the process of moving from the anthill to the food source can be abstracted as the construction of a solution in the algorithm by abstracting the pheromones as trajectories that exist on the edges of the graph. At each node, the artificial ant sense calculates the probability of moving towards the next node based on the magnitude of the concentration of pheromone trajectories on the edges connected to that node. The artificial ant selects the next node from the initial node according to certain state transfer rules, and so on until it reaches the target node, thus obtaining a feasible solution to the desired problem.

(3) Pheromone trajectory update

In the ant colony algorithm, the decision of when and how much pheromone to release into the environment should be designed according to the problem to be solved. Ants can release pheromones immediately after they have constructed a feasible solution, i.e. after moving from one node to another, using local information; or they can release pheromones after they have already constructed a feasible solution, i.e. after they have reached the target node, using global information. The positive feedback mechanism plays an important role in the ACO: the more ants an edge selects, the more the edge is rewarded (through pheromone release), and the more attractive the edge is to the next ant. The amount of pheromone released is proportional to the quality of the solution constructed by the ant. If an edge contributes to the generation of a high quality solution, then its pheromone will grow and be proportional to its contribution.

2.2 Ant Systems (AS)-Prototype Ant Colony Algorithm

The ant colony algorithm has evolved over the years into various versions, but these algorithms are still largely similar to the AS. The program flow diagram for the ant system is shown in Fig. 2.

Flowchart of the ant System algorithm is shown in Fig. 2.

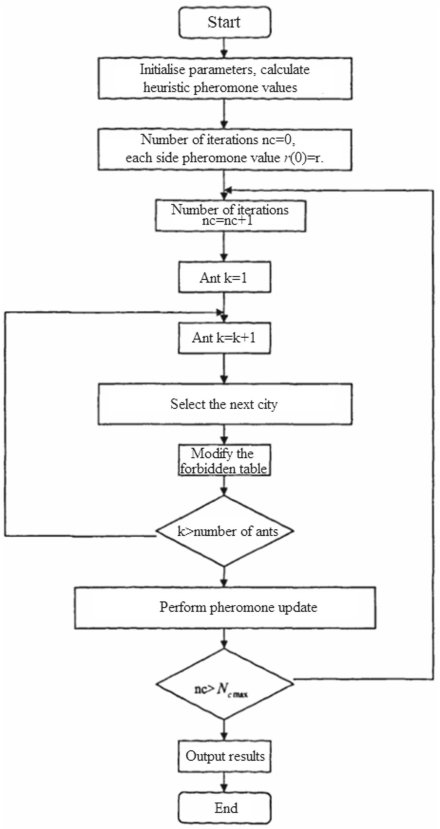

Fig. 2. Struts frame structure

3 Changes Brought About by Digital Technology for Film and Television Photography and Production

3.1 Computer Compositing has Become an Important Tool in Film Production

The industry related to film and television photography and production has been in a constant state of renewal for many years. The content of work in the film and television industry is inherently creative in nature. The value of the work is related to the talent and ideas of the creator. Some creators specialise in creating realistic work, which corresponds to the art of cinematography and production, with a bias towards techniques such as editing and articulation. Some creators are more imaginative, and are able to create film and television material that is beyond the real world, either through their scripts or their artistic perception. Such creators therefore need to use digital technology to restore their inner film images. Digital technology can be used to synthesise virtual film images by capturing realistic material. The collision of the virtual and the real clearly creates a strong visual impact for the viewer. And the successful sell-out of films such as Star Wars once again proclaims the epoch-making value of the integration of digital technology

with the film and photography industry [2]. Digital technology not only brought visual impact to audiences, but also had a direct impact on the film production industry. Since then, the filmmaking industry has officially embraced computer technology as a key tool in the production of films. This has had a disruptive effect in terms of the innovative changes that digital technology has brought to the film and television photography and production industry (Fig. 3).

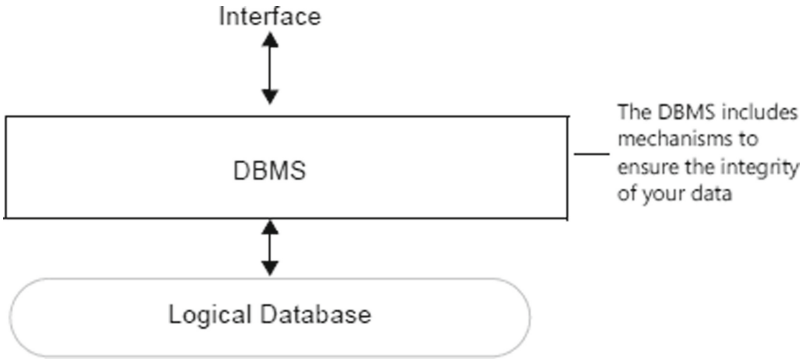

Fig. 3. The structure of data base for course system

3.2 Digital Technology Presents Transformational Challenges for the Film and Television Industry

The profession of cinematography and production is essentially a service to film and television productions, but in reality it is the audience that the profession serves. The audience is the main audience for film and television, and it is the audience that decides whether a film is a hit or whether a television series is a ratings winner. However, some filmmakers believe that while the audience plays a judging role, as thinking filmmakers, filmmakers should play a role in leading the aesthetic direction of the art of film. And when digital technology was not integrated into the film and photography industry decades ago, people could only keep making films within the known limits and valuing the content of the film. This in turn prevented the profession of cinematography and production from exercising its professional competence. And when digital technology officially entered the film and television production industry, the capabilities of the photography and production profession were officially opened up. At the same time, the profession of photography and production had to be transformed, retaining traditional production techniques and photographic thinking, but also incorporating the modern features of digital technology to become a film and television technology that could stand on its own.

3.3 Digital Technology Provides Innovative Ideas for the Film and Television Industry

In the course of its development, the film and television industry usually makes every effort to avoid entering into the genre film creation trend. In reality, however, after many years of development, the choice of subjects and forms of filmmaking is largely based on a fixed range. This is an inevitable situation for the art industry, as it is for the music and painting industries. Digital technology has a fictional character, and fiction means that the creators of art have more scope for development. Currently, some realistic films also make use of digital technology, using compositing techniques to make the main characters appear in the same frame in a film, for example. Thus, digital technology is also providing the film industry with innovative ideas to help cinematographers and producers to innovate in their field of expertise [3].

4 Research on the Reform of the Curriculum of Film and Television Photography and Production Based on the Background of Ant Colony Algorithm

4.1 Basic courses

(1) Confirmation of teaching objectives and curriculum goals

The basic courses mainly run within the first and second semesters, and it is necessary to confirm the talent training objectives of the film and television photography and production major first. With the digital technology context as the main focus, the talent cultivation goal of the film and television photography and production major is to cultivate film and television photography and production professionals with digital technology application thinking, and professional practical ability. To address this, the university should offer courses in art and design, photography, directing, sound and editing creation at the foundation course stage. The foundation courses should be characterised by the need to be detailed but not repetitive. Different skills should be divided into different course structures, but there also needs to be some connection between the different courses. In this way, students can link the different knowledge points as they engage with the individual courses. Each institution has a different teaching style, and the school can choose different main courses as a basis on top of the in-school teaching, and then add digital technology-related content.

(2) Curriculum construction

It is important to update the equipment or tools used in the school as part of the foundation programme. Each activity room can be equipped with functional computer equipment, and the value of the equipment can be guaranteed. Each class that enters the activity room to participate in the exercises should be reported in advance to the activity room manager. In order to achieve a high quality of supervision, a schedule of times for each class to use the activity room could be set in advance and given to the manager, who would then be responsible for monitoring that the room is used in the required manner. Students in Film and Video Photography and Production will enter the activity room at a set time and, after watching the teacher

in action, edit the video according to the textbook or task list. However, it is clear from observing the actual teaching process that most students' main activity time is concentrated outside of class, i.e. they will work on the basics of photography skills and modelling techniques after completing their classroom learning tasks. Therefore, teachers should also be required to set staged learning tasks when conducting foundation courses. This means that teachers can use a semester as a limit for different course content and ask students to complete tasks individually or in small groups. Tasks could be set as simple photo competitions, or short videos with a fixed theme, etc. Students must use digital technology to populate the video work, making sure to apply their knowledge of digital technology, to the work. This form of education and teaching can, on the one hand, consolidate students' mastery of the basic knowledge of film and television photography and production, and, on the other hand, exercise their practical skills and help them to become familiar with the professional working mode of film and television photography and production in the context of digital technology.

4.2 Professional Practice Courses

(1) Confirmation of teaching objectives and curriculum goals

Professional practice teaching courses refer to the practical courses conducted within the campus. The teaching objectives of professional practice courses are to develop students' mastery of professional practice skills in film and television photography and production in an on-campus environment. For example, camera skills, directing skills, editing skills and a sense of the application of digital technology. The course is characterised by two things. One, the in-school practical course is run by in-school teachers. Teachers use contextual or task-based teaching methods more often in the course of delivering the course. Teachers provide more assistance to students and can fully exercise their practical skills. Secondly, the on-campus practical course is based on studios and laboratories, which can exercise students' professional skills but cannot develop students' practical experience in film and television photography and production [4]. The course is set up with the objective that students need to really exercise their professional practical skills. Teachers need to reduce their own dominant role in the course and make students the central members of the practical teaching. The number of practical courses can be limited to a certain number, and the practical teaching can be in the form of integrated teaching mode, so as to exercise the comprehensive strength of students in a limited time.

(2) Construction of the curriculum

The professional practice courses are basically carried out in the studio or in the editing laboratory. Teachers are responsible for consolidating theoretical knowledge for students and setting learning objectives for them. Students need to be taught or guided by the teacher to complete the practical objectives set by the teacher. Teachers can set practical sessions using digital technology and students can use their own artistic aesthetics to engage in practice. In addition to retaining some basic practical courses, teachers can also include some new practical courses in media management, or new media practice courses on the internet, etc. This will

enable students to develop their professional skills in the new media environment, and will enable them to develop a stronger grasp of professional application skills in a digital technology context. In practical courses, teachers can include simulations, for example, by asking students to form specific film and television photography and production teams to work with other students in the school. In the process, students can gain real work experience. Students can work for students on campus, opening up avenues of work on campus. They can also provide short video services or photography services for various departmental events. By combining practical courses with real work, students can develop their practical skills as well as their language coordination skills. However, the teacher needs to play the role of a monitor during the students' creative process, i.e. to regularly observe the progress of the students' work, remind them to use digital technology to create, etc. The students need to be able to create new ideas in the practical sessions, not just the same ones.

4.3 Industrial Practice Courses

Industrial practice is directly oriented towards internships, i.e. students are required to work in film and television companies or other internal partners to participate in actual film and television photography and production work. The university has two types of industrial practice courses, one of which is conducted within the school's training base. The second is an in-company practical training course. To conduct the practical training courses within the school, the school and the enterprise can run in a co-operative way, i.e. the courses within the school will be integrated with the actual work in the society, but managed by the school alone, with the enterprise as the supervisor for the co-operation. The enterprise is responsible for docking the work with the teachers. After the enterprise has given the work objectives or work instructions, the students in the school will complete the work project within a specified period of time. The work project is professionally appraised by the enterprise after it has application value. A professional work team consisting of students in film and television photography and production can formally complete the docking with the enterprise. The enterprise will send special educators and staff into the institution to play a management and industry practice education role. Helping students within the school to better integrate with the digital technology context.

5 Conclusion

In summary, this paper has conducted a more in-depth research and analysis of the idea of reforming the curriculum system construction of film and television photography and production based on the background of ant colony algorithm. The research results show that the school curriculum is divided into basic courses, professional practice courses and industrial practice courses. Based on the ant colony algorithm, it has a positive impact on improving the standard of education and teaching in film and television photography and production.

With the continuous development of information technology, there are some evaluation systems supported by computers. For example, the automatic scoring system for

programming test developed by Harbin Institute of technology can carry out on-board tests at the middle and end of the term. It can not only test the students' program running results, but also analyze some errors in the process and give reasonable scores, which is very close to the scoring results of teachers' personnel. This is similar to the way coursera and others use simple online testing, and udacity and EDX use the combination of online testing and training and examination center. Through the collection and analysis of students' learning process data, they can timely feed back evaluation opinions on students' learning situation, so as to truly test students' learning effect.

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