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The emergence of digital media has a huge impact on the dissemination of information, even the majority of film and television industries have begun to introduce digital media technology, which not only has an impact on the creation of film and television art but is also experiencing an unprecedented change with the addition of digital media technology. Digital filmmaking has opened up greater possibilities and opportunities for filmmakers than ever before. This paper will discuss how digital media technology impacts the film industry through five aspects, they are "algorithmic video editing", "autonomous drone cameras", "4K 3D technology", "3D printing" and "After Effects".

First of all, with the advent of the digital era, the rapid development of digital technology and computer technology has been applied to the editing platform, and the traditional editing techniques have become easier to achieve. Then, algorithmic video editing was introduced to the stage. So, what is algorithmic video editing? It seems quite complicated, but algorithmic editing is indeed referring to editing footage to schema or plan. "That schema could be as simple as "every four frames, switch from camera A to camera B for two frames, and then return to camera A", or even simpler: "use one frame of footage from A and one from B, and repeat" (*Russ*). Algorithmic editing is based on the premise that video would follow a pre-planned roadmap or a direct procedural approach. It's a method of cutting and reassembling footage based on a blueprint, schematic, or schema. Many other early filmmakers used algorithmic editing technology to produce great effects, many of which were creating experiential films. This concept is undoubtedly conducive to more avant-garde film production

methods. For example, the idea of a basic flicker movie. Using two clips, one all

black and the other all white, edit one clip together, from one clip and then another

frame, and repeat until the end of the clip. This technology will produce a very unique

and potentially disgusting result. In other words, this is a very pure algorithm.

However, for algorithmic editing projects, the linear nature of this part is not

necessarily the standard. Many algorithms developed in the software will contain

random variables that may change part of the equation. Therefore, we'll take the same

project, but add a random variable to deal with just how many frames are selected

from the second clip, leaving only one frame from the first clip. What we end up with

is a frame from clip one, a random number frame from clip two, another frame from

clip one... And so on. When we edit clips on Premiere Pro, FCPX, media composer or

any platform we prefer, we consider our video as a clip with a beginning, middle and

end, and we cut it out. This is time-based and it is correct. Our editing platform is

based on film editing. When we put a clip on the timeline, we see the digital

equivalent of an analog movie clip. In algorithm editing, the method is to consider the

clip in different aspects, rather than access it in the same way. We are not looking at

the whole clip and deciding what to keep and get rid of. We are considering direct

access to any frame of any clip within a location by using this technique. The location

can be a database or just a folder on your computer (*Russ*).

For autonomous drone cameras, they are not exactly new. There are many

consumer versions of autonomous drone cameras that exist on the market, people can

easily buy them on Amazon. But in the film industry, we are looking for different

type of drones. It should be designed for filmmaking and has the necessary camera angles, techniques and almost sentient, especially, it should have the ability to avoid obstacles and capture moving objects. In other words, an autonomous drone camera system is needed as a result of the difficulty of operating a manual UAV (unmanned aerial vehicle) to perform all the necessary perception and motion planning tasks simultaneously. A manual UAV usually needs multiple expert pilots. It takes a high attention to identify the actors, predict how the scene evolves, control the UAV, and avoid obstacles to achieve the ideal perspective. The unique challenge in developing an autonomous drone camera system is the need to closely integrate contextual and geometric threads. Contextual reasoning includes processing camera images to detect actors, understanding how the scene will evolve, and selecting the desired viewpoint. Geometric reasoning considers the three-dimensional structure of the object in the environment to evaluate the visibility quality of a specific viewpoint and whether the UAV can reach the viewpoint safely. Although the two threads have significant differences in perception mode, computational representation and computational complexity, they both play a crucial role in solving the whole autonomous filming problem. However, there are some challenges. For instance, actor poses estimation with challenging visual inputs. A drone shoots a dynamic actor from different angles, hence it is crucial to accurately locate the actor's position and direction in 3D environment. In fact, it is impractical to use external sensors such as motion capture systems and GPS tags for pose estimation; A robust system should only rely on visual location. The challenge is to deal with all possible views, scale, background, lighting

conditions, motion blur caused by dynamic actors and cameras. Likewise, in operating

in the unstructured environment: drone flies in a different unstructured environment

without prior information. In a typical task, it follows an actor through different

obstacle types, such as mountains, slopes and narrow paths between trees or

buildings. The challenge now is to maintain an online map that has high enough

resolution to explain the occlusion of viewpoints, and update fast enough to ensure the

safety of vehicles (*Bonatti*).

In addition, 4K 3D technology is not a new product, but it definitely impacts the

film industry and upgrades the whole watching experience. Technologies like 4K +

3D or Ultra HD 3D are now used to capture action sequences. To capture details that

show better content on screens, the camera employs two or more lenses. It records

live action and replays it, as well as editing plug-ins and virtual reality audio

recording. With 4K technology, you can see the image on your screen more clearly

with 4K resolution. IMAX had released a new 4K 3D camera, it is a 4K 3D 65mm

camera. It is smaller and lighter than most 3D camera arrays and still offers ultra-

high-definition recording with 26% more image standard cameras. However, there are

absolutely some challenges existing. At the moment, filming in 4K is very expensive.

Unlike the advent of digital, which made filmmaking more accessible to more people

by lowering the entry barrier. 4K filmmaking, on the other hand, is more expensive, at

least for the time being. Most filmmakers and video producers consider 4K 3D to be a

luxurious upgrade. Fortunately, it is a technology that is still in development, which

means that it will improve over time while also becoming less expensive. As Moore's

Law has demonstrated over the last four decades, anything digital increases in power as it decreases in size and cost. There will be more advanced editing platforms and storage systems, as well as specialist lenses, which will be developed around the continued development of 4K 3D. (*Matt*). It is possible to argue that in a couple of years 4K 3D will be more commonplace and we will see a proliferation of it throughout theatres and homes.

Three-dimensional printers are one of the most significant inventions of in this era. The industrial applications are virtually limitless and have great potential. 3D printers are a particularly useful piece of technology, from 3D printing houses to tools in outer space. Filmmaking is actually quite well suited to reducing costs by using 3D printers. First of all, "3D printing or additive manufacturing is a process of making three-dimensional solid objects from a digital file. 3D printing or additive manufacturing is a process of making three-dimensional solid objects from a digital file" (*What is*). Then, for the film industry, a 3D printer eliminates the need for equipment transportation. As a result, you will not have to ship from one location to another. You do not have to pay exorbitant shipping fees. Not with 3D printing for props, costumes, and equipment. Apparently, 3D printers cannot print a camera or lens, but they can print the necessary parts. There are many films had used 3D printing, such as Avatar, Iron Man, Star Wars: The Force Awakens, and Black Panther, among other films, have used 3D printing to create props, sets, and various parts. The film industry can now capitalize on the design freedom and flexibility of 3D technologies by putting them on the big screen. Additionally, the goal of

producing as detailed a play as possible can take a long time of work. Traditional manufacturing techniques necessitate a significant amount of manual labor. This is particularly difficult as there are a vast number of characters to dress, such as in scenes featuring whole army legions. In this aspect, 3D printing enables some degree of reproducibility. In the field of film, 3D printing allows for the creation of designs or the printing of several different copies to compare them. This gives you more options. If a part breaks while recording, it can be easily printed again. Furthermore, a role can be constructed before the actor has even tried it out, with a simple alteration (*What*).

Lastly, "After Effects" is one of the most successful and powerful digital software that impact the film industry. It brings "life" and motion to graphics, whether it is as simple as animating a title across the screen or as complex as building a 3D world. After Effects compositing tools enable you to combine multiple layers of video and images seamlessly into the same scene. After Effects includes not only the special processing and synthesis of images but also the editing of materials. With the rapid development of digital film, film post-production also plays an increasingly important role. AE software can realize the non-linear editing of the material to complete the combination of the scenes, at the same time, it can modify any part to achieve the desired results. Digital technology has changed the original process of post-editing using sample film and magnetic film, therefore today's film editing and modification have become very simple and efficient, and more and more digital scenes and special effects are gradually used in film and television works. In addition, in recent years,

film and television production, animation, multimedia, and computer games have the related application of video post-production. There are many professional technologies involved in the post production of film and television, among which the application of computer software is the most crucial thing. AE software, as a professional non-linear editing and post synthesis software, plays a great role in video post-production, which enables the editor to make motion images and effects with visual innovation effect in an accurate and fast way, and apply it to film and video. In some aspects, AE enables designers to better express their ideas, show natural interaction logic, present richer results, and make product design closer to users.

In conclusion, there are more and more digital technologies that have been used in filmmaking and the industry. The film has experienced the transformation from silent to sound, from black and white to color. In the 21st century, the new change that the film is facing is the extensive use of digital technology in the film. The application of digital media technology in film and television will change the mode of film and television production from consuming a lot of manpower to relying on computer technology. Great changes have taken place with the integration of media technology, which is inseparable from the development of digital media technology. The convenience of digital media technology makes film and television production save time in the early script creation. With the help of computer technology, the producer can restore the ideal split image, establish the simulation scene and work out the best shooting scheme. Entering the mid-term shooting stage, the computer-generated picture can be combined with the shot picture to immediately monitor the

final effect of the picture, which greatly improves the efficiency of mid-term production. In post-editing, non-linear editing further processes, synthesizes, and finally generates pictures, which makes film editing easier and more efficient. In addition, the powerful function of digital media technology is also reflected in the processing of picture color, lens editing, and sound effect. Digital media technology has injected new blood into film, but the development of things must have two sides, so we should pay attention to the balance between the two, and reject unilateral supremacy. Indeed, digital media technology has driven the development of film and television art. The expressiveness of film art has been enlarged, and the works have attracted more audiences. For film industry, the significance and value of digital media technology is huge and unpredictable.

Work Cited

Bonatti, Rogerio, et al. "Autonomous Aerial Cinematography in Unstructured Environments with Learned Artistic Decision-making." *Journal of Field Robotics*, vol. 37, no. 4, 2020, pp. 606–41, doi:10.1002/rob.21931.

Meyer, Trish, and Chris Meyer. *The After Effects Apprentice : Real-World Skills for the Aspiring Motion Graphics Artist / Trish & Chris Meyer.* Third edition., Focal Press/Taylor & Francis Group, 2013.

The Rise of 3D Printing : Opportunities for Entrepreneurs : Hearing before the Committee on Small Business, United States House of Representatives, One Hundred Thirteenth Congress, Second Session, Hearing Held March 12, 2014. U.S. Government Printing Office, 2014.

-, Russ Fairley, et al. "The Art and Science of Algorithmic Editing." *Videomaker*, 2 Nov. 2020, www.videomaker.com/how-to/editing/the-art-and-science-of-algorithmic-editing/.

Matt. "What Is The Future of 4K Resolution in Filmmaking? • Filmmaking Lifestyle." *Filmmaking Lifestyle*, 9 Apr. 2021, filmlifestyle.com/4k-resolution/.

"What Is 3D Printing? How Does a 3D Printer Work? Learn 3D Printing." *3D Printing*, 27 Mar. 2021, 3dprinting.com/what-is-3d-printing/.

"What Impact Does 3D Printing Have on the World of Cinema?" *3Dnatives*, 4 Aug. 2020, www.3dnatives.com/en/3d-printing-cinema-040820204/#!

"The New World of Digital Filmmaking." *Film Connection Film Institute*, 9 Jan.

2013, www.filmconnection.com/reference-library/film-entrepreneurs/the-new-

world-of-digital-filmmaking-0411/.