Postprint of Applied Research on DaVinci Resolve in Television Program Production

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Date: 2023-10-08T00:00:00+00:00

Abstract

In the contemporary domain of television program production practice, the DaVinci Resolve color grading software system has been comprehensively applied and promoted. Traditional DaVinci system color grading processing was limited to adjusting image colors; however, through the transformation and innovation of color grading system technical methods, the current-stage DaVinci color grading system can already be applied throughout the entire television program post-production process, from material acquisition, program editing, subtitle color adjustment, to program packaging and output, fully demonstrating the favorable practical effects of applying the aforementioned color grading software' s automated processing system in producing various types of television programs. On this basis, post-production personnel for television programs need to clarify the specific technical implementation points for the application of the DaVinci color grading system.

Full Text

ChinaXiv Collaborative Journal: Research on the Application of DaVinci Resolve Color Grading System in Television Program Production

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Abstract

In contemporary television program production practice, the DaVinci Resolve color grading software system has achieved comprehensive application and promotion. While traditional DaVinci systems were limited to color adjustment, technological transformation and innovation have enabled the current DaVinci Resolve system to be applied throughout the entire post-production process,

from material acquisition and program editing to subtitle color adjustment and program packaging output. This demonstrates excellent practical results when using this automated color grading software system in producing various types of television programs. Based on this foundation, post-production personnel must clearly understand the key technical implementation points of the DaVinci Resolve color grading system.

Keywords: DaVinci Resolve color grading system; technical features; television program production; color grading software

CLC Number: TN948.13
Document Code: A
Article ID: 1671-0134(2021)02-126-03
DOI: 10.19483/j.cnki.11-4653/n.2021.02.038
Citation Format: Duan Meiling. Research on the Application of DaVinci Resolve Color Grading System in Television Program Production [J]. China Media Technology, 2021(02): 126-128.

Traditional DaVinci color grading systems were limited to color adjustment operations for television programs. However, in today' s complete television program production and output workflow, post-production personnel can utilize specialized DaVinci software for material acquisition, editing and color grading, subtitle packaging, and program output. Specifically, when acquiring, recording, editing, and outputting television program content, color grading system equipment with significant processing capabilities must be employed as an auxiliary tool, thereby demonstrating the important application value of color grading systems in the field of television program production.

As a crucial television program color grading software, the DaVinci Resolve system comprises multiple functional modules with color grading capabilities. These system modules can be used to change program image colors in real time, employing either local or global color grading techniques to process television program images and achieve optimal color configuration effects. [1] The DaVinci color grading processing system primarily utilizes RGBY information-based and automated processing software, enabling production personnel to flexibly adjust and filter various program production images. With the assistance of DaVinci Resolve, production staff can flexibly adjust the height and dimensions of recorded shots, ensuring accurate and real-time floating-point color grading effects for program images. [2]

In the current context, the automated color grading processing software of DaVinci Resolve can flexibly handle various types of raw program recording materials, performing high-quality adjustments to the color and brightness of program images. Following this automated system color grading process, television images with moderate saturation, chrominance, and brightness should be produced. [3] Additionally, the color grading software system features two distinct levels of image color adjustment control modules, thereby achieving the goal of improved color grading efficiency.

For instance, when performing color adjustment operations on detailed facial features in images, production personnel must utilize the aforementioned color grading system to regulate subtle changes in facial color, employing tracking processors to judge and adjust color transformation processes in various regions of the television image. After comprehensively adjusting all detailed parts of the program image, production staff load and process shots, selecting the best-performing image clips, and present the television program recording and playback effects with optimal color harmony through comparative screening methods.

2.1 Primary Color Grading Process for Television Programs

When using the DaVinci Resolve color grading system to adjust colors in various parts of program images, the process must first enter the primary automated color grading processing stage. In this phase, the system color grading software employs techniques for overall image color difference adjustment to alter image colors, primarily involving color correction bars, color correction wheels, and Log software color grading tools. Throughout the primary color grading process, the application of these system tools should reflect the following key operational points:

2.1.1 Primary Color Bars

The automated color adjustment control software for primary color bars should primarily include automatic color grading function selection items for Gamma, Lift, and Gain, as well as automatic correction of color casts in the image. When the primary color bars specifically perform necessary correction and processing for image color casts and exposure, the key is to accurately control the brightness of various image regions, improving program image colors through real-time color difference correction operations.

Additionally, the color bar tools can be used to adjust complementary colors in the image, ensuring control of the color phase difference in the vectorscope at 180°. [4]

2.1.2 Primary Color Wheels

Primary color wheels, like primary color bars, also include several key automated color adjustment tools for Gamma, Lift, and Gain. These automated adjustment tools can all be used to adjust system color casts and complete system exposure processing. Under this premise, the key operational points for using primary color wheels should include color transformation adjustments for mid-gray areas, dark areas, the overall image, and bright areas of the image. When necessary, production personnel should reasonably utilize auxiliary color grading panels to ensure effective processing of image color casts and exposure issues within a short timeframe. [5]

2.1.3 Log Color Grading Tool Interface

When adjusting image mid-tones, shadows, and highlights, the Log color grading tool interface is generally required. This is because these different image states within the program image area must achieve a harmonious and complementary effect. Therefore, technicians using the Log tool will focus on adjusting the two image regions with more pronounced color differences: the bright and dark areas. Through precise automated image color difference adjustment operations, technicians ultimately ensure high-precision image color difference control and coordination effects, processing and adjusting original recorded image materials within a relatively short time frame. [6]

Furthermore, the DaVinci Resolve color grading process can guarantee optimal program image adjustment and control effects. Therefore, compared to ordinary non-linear image editing and processing software, the DaVinci Resolve color grading system reasonably simplifies cumbersome and complex color grading operation procedures, skillfully employing techniques of suppressing dark areas and enhancing overall image brightness to demonstrate effective softening processing results.

Figure 1 [Figure 1: see original paper] Primary Color Grading Correction System Interface

2.2 Secondary Color Grading Process for Television Programs

From the perspective of secondary color grading technology, using the DaVinci Resolve color grading system primarily involves the flexible application of tracker tools, curve color grading tools, sharpening processing tools, and window tools. After subtle color grading processing in the secondary color grading phase, the overall image brightness will achieve a significantly enhanced state, ensuring that program audiences do not notice the suppressed dark area characteristics of the image. Moreover, DaVinci Resolve color grading tools feature specialized automated software tools for softening image hue, brightness, and saturation, thereby fully ensuring optimal overall image color harmony and preventing abrupt image color combination effects.

For example, when transforming and processing the overall color characteristics of human faces, technicians using DaVinci Resolve' s professional color grading software can present high-quality images with harmonious brightness contrast in a short time, ensuring that program audiences can view complete and clear facial contours and forms. The color processing software tools can provide necessary brightness adjustment operations for teeth, hair, and cheek areas of human faces, ultimately presenting facial features with higher degrees of color perfection.

Figure 2 [Figure 2: see original paper] Comparison of Visual Color Effects Before and After Brightness Adjustment

2.3 Important Considerations

Image contrast and brightness constitute key points for color adjustment processing in program production. Therefore, post-production personnel must pay close attention to the aforementioned color difference adjustment processes. As post-production staff, they must possess keen image color perception abilities and be adept at employing clever image color combination and brightness adjustment techniques to achieve the goals of reducing program production processing difficulty and improving television program color adjustment work efficiency. [7] When performing preliminary processing operations on television images with large dynamic ranges and high color brightness requirements, the following key points should be noted when applying DaVinci Resolve color grading techniques:

2.3.1 Reasonable Control of Minor Color Differences

Techniques for controlling minor color differences must be implemented throughout the entire television program processing and production chain to prevent the consequence of amplifying small color differences due to the lack of subtle color difference adjustment processes. Specifically, for SDR live studio recording techniques, technicians must perform comprehensive coordination processing on the teeth color, facial color, and hair color of recorded subjects, ensuring that subtle facial color differences can be reasonably controlled and preventing significant defects in facial processing effects caused by minor color differences. [8] During this process, program recording personnel must adjust monitor recording and shooting brightness in real time to ensure the aperture is limited within a reasonable range. [9]

For example, when dealing with scenes and human figures in high-position front lighting areas, using DaVinci Resolve color grading methods can easily lead to contrasting effects between teeth color and facial color that violate basic audience visual perception laws, even resulting in situations where teeth appear darker while faces appear brighter. [10] Therefore, character styling and shooting technicians should ensure proper adjustment of facial colors and overall stage color backgrounds, strictly adhering to fundamental visual perception laws to avoid image color combination phenomena that violate audience visual perception due to excessive pursuit of color contrast effects.

2.3.2 Softening Edges of High-Brightness Scene Images

If edges of television images with high color brightness are not softened, the inherent color light-dark hierarchy of the image will be destroyed, resulting in very abrupt television image color processing consequences. Therefore, if program post-production selects DaVinci Resolve professional processing software for image softening operations, the light-dark effects of edge areas must be adjusted in real time to avoid creating very abrupt visual impressions for audiences from image edge areas. This is particularly important when processing television image scenes with metallic gloss surfaces, where the softening of image edge areas

must be emphasized.

For example, when dealing with high-brightness stage background colors, using DaVinci Resolve system software requires particular attention to smooth transitions of color differences in image edge areas. Only through effective color softening processing can optimal program visual effects be presented. When necessary, post-production personnel must apply special color grading treatments to actor costume colors and overall stage background colors, ensuring proper application of edge color softening and high-brightness image color suppression techniques to display more gentle overall television image scenes, highlighting stage character costume colors and styling features. Post-production personnel must combine the use of Log tools and color grading window tools to perfect image color processing techniques.

The DaVinci Resolve professional system software, with its powerful program production and processing capabilities, focuses on the comprehensive integration of program editing production workflows, program audio mixing output processing workflows, program material collection processes, and program packaging processing stages. It effectively coordinates color differences in specific image areas and fundamentally simplifies program material editing operations and material acquisition processing procedures. Compared to traditional business software that only performs program editing and processing, the DaVinci Resolve system possesses more powerful software integration processing functions, fully demonstrating the significant practical advantages of the DaVinci Resolve color grading system over traditional color grading systems.

DaVinci Resolve is a versatile software that excels in material acquisition, editing, packaging (name bars and lyrics), and audio mixing output, surpassing the capabilities of traditional editing software. Program production personnel typically require the DaVinci Resolve color grading system when performing preproduction processing, adjusting program image colors, and setting subtitles for different types of television programs. Through comprehensive innovation and transformation of automated color grading techniques, the current DaVinci Resolve color grading system can already satisfy diverse image color adjustment requirements, effectively ensuring that program images achieve optimal broadcast visual effects.

The DaVinci Resolve production workflow primarily encompasses all stages from program creation to completion, mainly involving new project creation and settings, media pool, editing, color grading, subtitles, audio adjustment, and delivery. Audio is a crucial component—clear sound helps programs better deliver content, enabling clean voice processing and superior mixing. Audio meters, monitors, enlarged timelines, and mixing consoles allow for adding effects to various sounds or performing overall processing on entire audio tracks through the mixing console. Additionally, the delivery panel is similar to the editing panel but adds rendering settings and a render queue. Users can select preset exports or customize settings, and after confirming the container format, frame rate, resolution, bitrate, filename, and export location, they can click to add to

the render queue and begin rendering, thus completing the video. After compositing the color-graded and mixed versions, appropriate audio-visual formats must be selected during generation, and subtitles must be set to burn-in.

Regarding the processing of adding subtitles, song title bars, name bars, and lyrics, song title bars and name bars are primarily designed in PNG format or TGA format with alpha channels, imported directly within the background plate range that includes channels. For lyrics production, Arc Time Pro is mainly used to import video files and audio files, followed by comprehensive production and processing of lyrics templates, saving the given template parameter content. Based on calibrated text, the text is placed within the right-side border, and the audio waveform area is dragged to modify file length data, after which the subtitle file is exported. With DaVinci Resolve system support, SRT subtitle files imported in the media pool can be directly dragged onto subtitle tracks.

DaVinci Resolve possesses powerful color grading functions that provide complete control over image colors, and the entire panel is highly intuitive. The preset area can save color grading presets or LUTs for application to other clips or for exporting screenshots. The node area is a panel that records color grading operations and effects, with each node influencing the image in sequence. Reasonable use of various nodes can help separate different image regions for independent color grading. Additional effects can also be added to further transform the image. The lower panel contains various essential color grading tools, including color wheels and curves. Any operation will be registered on the selected node and affect the image. Beyond simple color grading, image stabilization, noise reduction, or tracking can also be performed here, helping to create extremely stunning colors.

For program broadcast safety and playback quality, future file-based broadcasting will employ safety broadcast warning systems to monitor program playback effects, promptly identify program broadcast segments with safety hazards, and urge post-production technicians to seriously rectify television program review workflows. The information-based television program broadcast warning system holds important practical value for supervising and managing safe program broadcasting. The post-production hardware system platform serves the crucial function of transmitting television programs. If the hardware facility platform suddenly experiences failures such as hardware damage or line connection interruptions, it will cause significant interference to the safe program broadcasting process. Post-production technicians should monitor the safe operation status of hardware infrastructure in real time, relying on information network monitoring methods to control the operation of hardware infrastructure and perfect the supervision mechanism for television program production. Specifically, all subtitle content and subtitle presentation forms after software processing and production should undergo strict review operations to effectively avoid errors in the subtitle production process.

Through analysis, it is evident that current television program editing processing and program image color adjustment procedures require the DaVinci Resolve

color grading system to achieve the goal of flexibly transforming and adjusting program image colors, presenting television program audiences with high-quality program images featuring harmonious color combinations. Throughout the entire implementation process of television program production, post-production personnel must accurately master the basic operational norms of the DaVinci Resolve color grading system and combine these with television program editing and production requirements to achieve optimal technical application effects of the program color grading system.

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(Responsible Editor: Zhang Xiaojing)

Note: Figure translations are in progress. See original paper for figures.