



Practical Use of Machine Learning in Visual FX and Animation: A Case Study From 'Superman and Louis' TV Series

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1 INTRODUCTION

At Boxel Studios, we stand at the intersection of technology and artistry, constantly pushing the boundaries of what's possible in visual effects (VFX) and animation. Our presentation at SIGGRAPH 2024 will focus on the transformative role of machine learning (ML) in streamlining production processes, as exemplified by our work on the clients we have serviced. This talk will provide an in-depth look at how ML has revolutionized various aspects of our production pipeline, resulting in enhanced efficiency, cost savings, and creative flexibility.

2 MACHINE LEARNING MOTION CAPTURE

One of the most significant challenges in producing a Super Hero Network for Broadcast TV Series is the need for high-quality animation within tight deadlines. Traditional motion capture methods, while effective, are time-consuming and impractical for such a rapid production pace. To overcome this, Boxel Studios has adopted trackless motion capture powered by ML. This innovative approach allows us to capture actor performances from a single camera angle and convert them into motion data quickly.

Beyond animating detailed digital doubles, this technology has significantly accelerated the animation process for complex characters like the creatures. By collaborating closely with the stunt coordinator, we can now record stunt performances without the need for motion capture suits or specialized stages. This approach has drastically elevated the dynamics and realistic physics of the animations, particularly for fight scenes, throwing actions, and falling reactions.

Although the capture data is not perfect, the right pipeline and tools provide animators with the versatility and speed needed to deliver high-quality shots. This flexibility not only streamlines the pre-visualization process but also enriches the animation workflow, making it possible to integrate rapid content visualization with artistic flexibility seamlessly.

The impact of ML-powered motion capture on our animation production and decision-making processes has been profound. It has led to a positive shift in our production schedule, allowing us to meet tight deadlines without compromising on quality. As a last remark a typical hand animated shot with traditional motion capture would take from capture, process, clean and final polish about 2 weeks to finish. Now this shots take 4 days to be considered final.

3 PLATE PREPARATION ENHANCEMENT

Shows that rely heavily on green screen technology, traditionally require extensive manual work that naturally become the first bottle neck for final compositing. By incorporating Nuke's "Copycat" and "Carry Tools," we have accelerated our plate preparation process. Now, a single artist can efficiently process an entire sequence, significantly reducing labor costs and idle time.

In practical terms, dealing with green screens means that a sequence can have anywhere from 8 to 20 shots that need to be rotoscoped and keyed. Under tight deadlines, the only feasible way to deliver the plates on time for the compositing department is to divide the work so that each artist handles one shot, aiming to complete one shot per artist per day. This often necessitates forming teams of 8 to 15 artists to finish a sequence within a week. With the help of ML tools, the time required for each shot can be reduced to about 20 minutes, allowing a couple of artists to tackle an entire sequence in just a few days.

4 MACHINE LEARNING PLATE RELIGHTING

Machine learning has also revolutionized plate relighting, especially for problematic shots where traditional methods fall short. Utilizing technology from Beeble Switchlight, we can automatically generate essential maps such as normal, specular, roughness, and albedo data. This enables us to relight plates with remarkable accuracy and efficiency.

Traditionally, plate relighting involves labor-intensive processes, requiring artists to manually adjust lighting to match different backdrops or environmental conditions. This process can be especially challenging for shots with complex lighting dynamics or when

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integrating new elements into an existing scene. However, with ML-driven tools, we can streamline this process significantly.

One real-world application of this technology is during a sequence where the lighting needs to transition from a bright outdoor scene to a night time. with ML-based relighting, we are now able to automate the process, maintaining the quality and consistency of the lighting without the extensive manual effort.

The ability to generate these maps automatically means that we can handle a higher volume of shots in a shorter timeframe, significantly reducing the workload on our artists. This capability is particularly valuable for green screen and virtual production work, where the need for precise and adaptable lighting solutions is paramount.

This breakthrough offers a cost-efficient solution for high-quality VFX, making it a game-changer for both green screen and virtual production work. By reducing the time and resources needed for

relighting, we can allocate more effort towards creative aspects of the project, ultimately enhancing the overall production value.

5 CONCLUSION

The integration of machine learning into VFX and animation production at Boxel Studios marks a new era of efficiency and creativity. While the rapid evolution of technology presents challenges, it also offers unprecedented opportunities to enhance our artistic processes. Our commitment to leveraging ML ensures not only the advancement of our projects but also enriches the filmmaking process itself. As we continue to explore these technologies, we remain focused on their potential to improve the quality of life and the art of storytelling. We look forward to sharing our insights and experiences at SIGGRAPH 2024, hoping to inspire and educate our peers about the incredible possibilities that ML offers for the future of VFX and animation.