Editing High Resolution Video for Consistency

John Kilgo

Literature Review #1 - COMP.5460

While selecting a topic for my literature review, I looked towards media types that are prevalent in today's society. I was able to find an intriguing paper called *Gigapixel Panorama Video Loops* which coincides closely with an issue I was experiencing at work this past week: I have been experimenting with the ability to use video and panoramic images to advertise apartments. Some of the issues presented in the paper are exactly ones that I experienced while filming, such as not being able to scale well in a vertical direction with panoramas. This paper referenced my secondary source, the paper titled *Selectively De-Animating Video*, which looks at making detailed motions within a larger video easier to see.

Selectively De-Animating Video looks at the challenges of minimizing distractions from a larger motion within a video frame that could impede the ability for the human to observe the more detailed areas of motion within a subset of the frame space. These authors reference a warping method that is created as the end user of their system is selecting objects that they would like to highlight and propose a novel approach to filtering out what should be the noise and what should be the region of video whose motion is clarified. They describe two approaches that they take, the first being the aforementioned warping, and the second being an algorithm looking at both time and relations in space within a video. It appears that they slice these "temporal" and "spatial" components up into smaller pieces that are manipulated by their algorithm. What is most important, I believe, about their approach, is that they wish to give the user who is editing the video the ability to make decisions on how they want motion to be preserved rather than letting an algorithm dictate, and possibly restrict artistic freedoms the end user editor may wish to make. As is the purpose of most computers, they want to minimize the repetitive manual activities the algorithm is looking to replace.

Within the gigapixel panorama study, these authors appear to seek to do the same; to simplify editing and making panoramic scenes clearer and more realistic. Using off the shelf components, the researchers created an algorithm to splice together the source footage, correcting for changes in brightness, color, and lighting conditions. One proposal they make to their algorithm is to try to manipulate the motion within several distinct video captures more realistic by what I would describe as smoothing out the inconsistencies. This is much like what I believe the earlier approach the authors to the de-animating video took in trying to give flexibility to the editor but also being realistic.

The goal that both these research approaches is trying to achieve is to simplify processing of large amounts of imagery data (such as video) by automating certain components of the process, while allowing the user (our editor) the ability to still exercise control by their ability to add their human element and perspective. What is most interesting is to see how this space will develop because we know that machines are becoming smarter and can think more heuristically like humans do. I believe we are not far off where these approaches to processing large

amounts of visual data can be automated to produce not-yet-envisioned real-time media experiences. After all, improving computer graphics is about improving human-machine communication. Machines do not need to view the world like we do.

References:

[1] Bai, J., Agarwala, A., Agrawala, M., Ramamoorthi, R. 2012. Selectively De-Animating Video. ACM Trans. Graph. 31 4, Article 66 (July 2012), 10 pages. DOI = 10.1145/2185520.2185562 http://doi.acm.org/10.1145/2185520.2185562.

[2] Mingming He, Jing Liao, Pedro V. Sander, and Hugues Hoppe. 2017. Gigapixel Panorama Video Loops. ACM Trans. Graph. 37, 1, Article 3 (November 2017), 15 pages. https://doi.org/10.1145/3144455.

Gigapixel Panorama Video Loops is my primary article.