In Mixed Reality scenarios, background replacement is a common way to immerse a user in a synthetic environment. Properly identifying the background pixels in an image or video is a difficult problem known as matting. In constant color matting, research identifies and replaces a background that is a single color, known as the chroma key color. Unfortunately, the algorithms force a controlled physical environment and favor constant, uniform lighting. More generic approaches, such as natural image matting, have made progress finding alpha matte solutions in environments with naturally occurring backgrounds. However, even for the quicker algorithms, the generation of trimaps, indicating regions of known foreground and background pixels, normally requires human interaction or offline computation. This research addresses ways to automatically solve an alpha matte for an image in real-time, and by extension video, using a consumer level GPU. It does so even in the context of noisy environments that result in less reliable constraints than found in controlled settings. To attack these challenges, we are particularly interested in automatically generating trimaps from depth buffers for dynamic scenes so that algorithms requiring more dense constraints may be used. We then explore a sub-image based approach to parallelize an existing hierarchical approach on high resolution imagery by taking advantage of local information. We show that locality can be exploited to significantly reduce the memory and compute requirements of previously necessary when computing alpha mattes of high resolution images. We achieve this using a parallelizable scheme that is both independent of the matting algorithm and image features. Combined, these research topics provide a basis for Mixed Reality scenarios using real-time natural image matting on high definition video sources.

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The public is welcome to attend.