In recent years, fluorescent light microscopy and cryo-electron microscopy saw tremendous technological advances. Using light microscopes, we routinely image beyond the resolution limit, acquire large volumes at high temporal resolution, and capture many hours of video material showing processes of interest inside cells, in tissues, and in developing organisms. Cryo-electron microscopes, at the same time, are capable of visualizing cellular building-blocks in their native environment at close to atomic resolution. Despite these possibilities, the analysis of raw images is usually non-trivial, error-prone, and cumbersome. Here we show how machine learning, i.e., neural networks, can help to tap the full potential of raw microscopy data by applying content-aware image restoration (CARE) techniques. Several examples in the context of light microscopy (LM) and cryo-electron microscopy (EM) illustrate how downstream analysis pipelines lead to improved (automated) results when applied to content-aware restorations. While our recently published results on LM data [1] do profit from the fact that single high-quality, low-noise acquisitions can directly be recorded, in other occasions, this is not possible (e.g. for cryo-EM). Hence, we developed CARE variations [2,3,4] that do not require the acquisition of high-quality examples but can be trained from noisy images alone.