

Abstract

Inconsistent illumination and color variation caused by endoscopic light and recording towers can lead to challenges in modern diagnosis and treatment planning during laryngoscopies. We propose a computer vision pipeline to standardize laryngoscopic images for a later improved treatment planning and unified data collection as well as comparison across examinations and visits. Two laryngoscopes were used to capture twenty videos from 14 patients with halogen and strobe lights. Stills from these videos were extracted and supplemented with publicly available laryngoscopic images. After preprocessing, images were grouped into bins based on color similarity, and two intensity thresholds were adjusted per bin to enhance dark pixels and over-illuminated areas. Using the average histogram from a selected target bin, histogram matching was used to transform the images into the target pixel intensity distribution. The correlation between each image and the target histogram was assessed before and after histogram matching to evaluate color transformation. The image enhancement and histogram matching increased the correlation for 441 images out of the 474 images transformed, representing a better correspondence with the target histogram. The pipeline standardized the correlations of our own data to fall within the range of the target bin in 96% of images. Our pipeline enhanced image quality and standardized the pixel intensity distribution across light sources and laryngoscopes. Standardizing laryngoscopic images has the potential to improve diagnosis and treatment planning in clinical routines or to create standardized datasets for artificial intelligence tasks