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DEEP LEARNING METHODS TO IMPROVE IMAGE COLORIZATION

HP INC

Deep Learning Methods to Improve Image Colorization

This disclosure relates to the field of image colorization. This disclosure involves using an automated colorization process using deep learning-based segmentation and Generative Adversarial Network (GAN) colorization algorithms to improve colorization of black and white images.

Images can invoke memories for a user. Some images may be black and white images. For example, certain photographs may be black and white images as the photographs are old, may have been taken by a black and white camera, etc. Colorization of these images can engage a user, which can drive printing behavior regarding these images.

Colorization techniques are being developed. For example, one process can include utilizing image editing tools to manually colorize an image. As another example, another process can include utilizing machine learning techniques to automatically colorize an image. One machine learning technique includes using a GAN. However, GANs may not apply a same color across an object. For example, use of a GAN to color an image having a first object surrounded by a second object can often lead to an area around the first object having a different color from the rest of the second object, which can lead to inconsistent and unacceptable results. This may result from the GAN making incorrect inferences regarding objects in an image when the GAN is trained.

A method and system are disclosed that can utilize a stepwise approach to consistently color an image. The system can include a computing device including a processing resource and a memory resource. The memory resource can include instructions that can be executed by the processing resource to color an image.

An image can be segmented into a first object and a second object by executing instructions included in the memory resource. For example, the image can be segmented using a deep learning segmentation model. The first output object and the second output object can include preset parameters of border pixels with decreasing alpha value.

The individual objects can be sent to a GAN based colorization model to colorize the objects by executing instructions included in the memory resource. For instance, the first

object and the second object can be run through a GAN based colorization model. The output from the GAN based colorization model can include individual objects that are colorized (e.g., colorization of the first object and the second object).

An image toning algorithm can be used to even out the color tone of the entire image. This can ensure there are no major variations in color values across the objects.

The individual objects can be stitched back together and final color values can be adjusted by executing instructions included in the memory resource. The stitched together image can be sent to another GAN based colorization model to adjust final corollary values. Such a method and system can improve colorization and produce consistent colorized images.

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