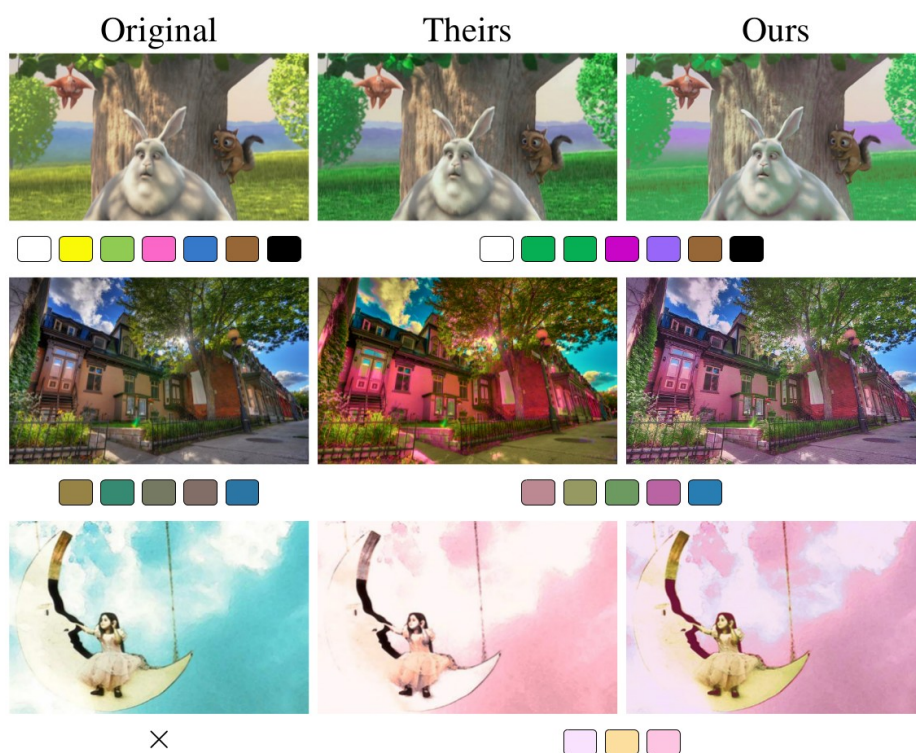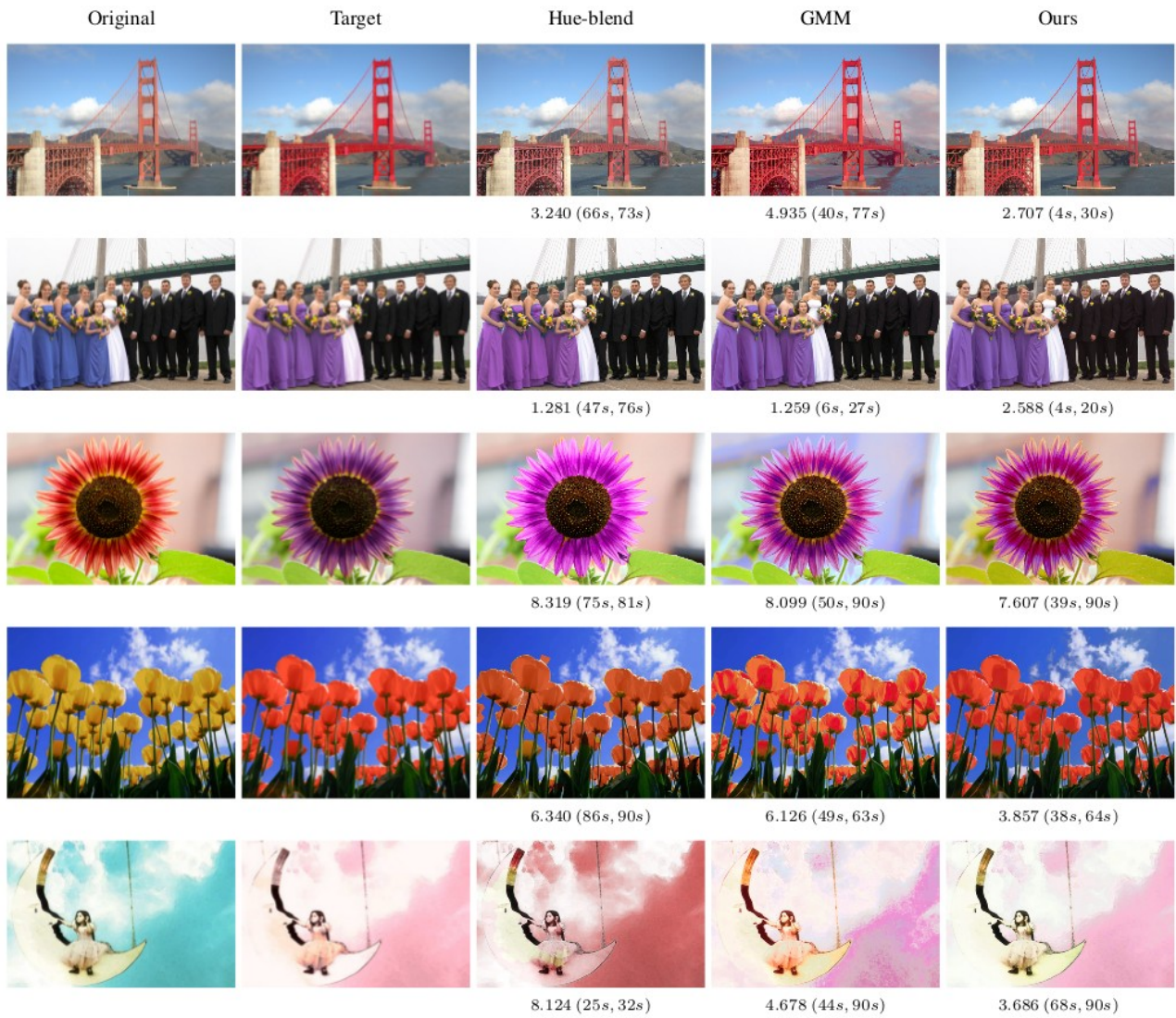Chang et al. in their article, *Palette-based Photo Recoloring*, present an approach to generate a color palette from the input image and to allow for changing colors of close resemblence by the means of modifying the palette with an easy to use GUI. The motivation behind the work is the lack of utilities that are simple to use by novices and provide lots of flexibility.

The solution offers performance gains over other approaches and can be adopted for real-time use (video recolouring) and better interactivity.

The technique presented in the paper involves two steps: automatic palette selection and the color transfer. The palette selection is done by assigning individual pixels to bins in a b x b x b (RGB) histogram (usually b = 16). For each bin, mean color is computed in LAB color space space. K-means algorithm is used on the bin colors (rather than individual pixels) to create a color palette. Next, color transfer is performed. The process is broken down to two seperate steps: one for Lightness parameter, the second for a and b components of LAB color space.

 The authors evaluate their work in two ways. First, they make a direct comparison of image recoloring with three other methods (). The same initial colour palettes were used. The authors believe their approach adheres more closely to the color palette in case of each image. They also make claims that their approach is faster but do not publish any experiment to back up these claims. The second evaluation involved a user study. The users were asked to recolour images so that they resemble provided target images as closely as possible using Hue-blend and Gaussian Mixture Model (avaliable in Photoshop) and the software presented in this paper. Two metrics for evaluation were the **CIEDE200 distance** and the time to complete the task. Chang et al. conclude that the their technique produced slightly different results (according to aforementioned distance metric) than the other two. They explain the metric favours the other approaches and that otherwise there is no easy way of telling which end-results are better. At least the completion time was favourable to their own software.

Original   Theirs   Ours

Original	Target	Hue-blend	GMM	Ours
		$3.240\ (66s, 73s)$	$4.935\ (40s, 77s)$	$2.707\ (4s, 30s)$
		$1.281\ (47s, 76s)$	$1.259\ (6s, 27s)$	$2.588\ (4s, 20s)$
		$8.319\ (75s, 81s)$	$8.099\ (50s, 90s)$	$7.607\ (39s, 90s)$
		$6.340\ (86s, 90s)$	$6.126\ (49s, 63s)$	$3.857\ (38s, 64s)$
		$8.124\ (25s, 32s)$	$4.678\ (44s, 90s)$	$3.686\ (68s, 90s)$

The ideas presented in this article are worthy of further investigation since I am on the lookout for various image processing techniques. The proper use of the approach presented can give suprising results. Perhaps parts of this technique can be used for NPR.

References

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