Near-Infrared Depth-Independent Image Dehazing using Haar Wavelets

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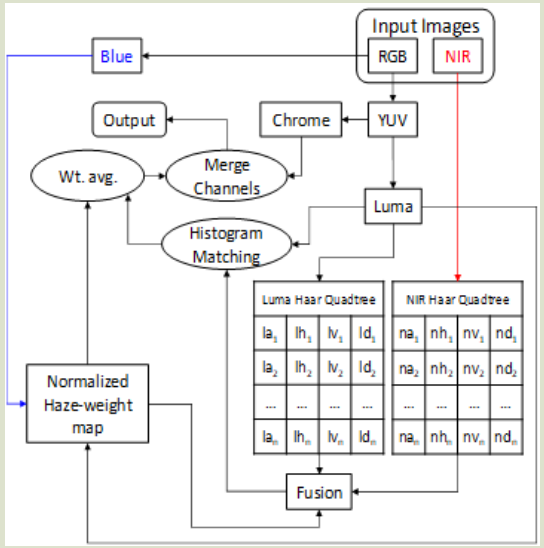
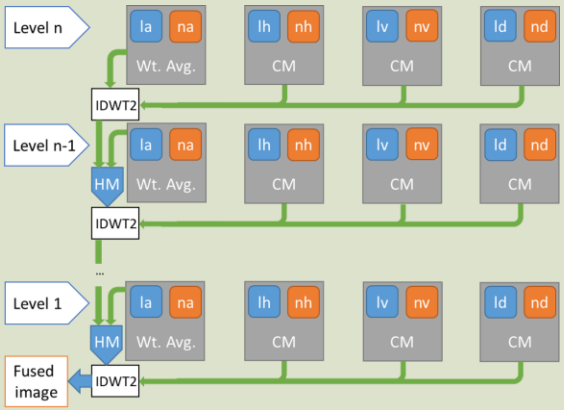
OBJECTIVE

Conventional approaches rely on the image degradation model to dehaze images. We propose a depth-independent Haar wavelet-based fusion algorithm. We also introduce a haze-weight map based on the blue channel to proportionately distribute the RGB color information and NIR edge features during fusion.

PROPOSED APPROACH

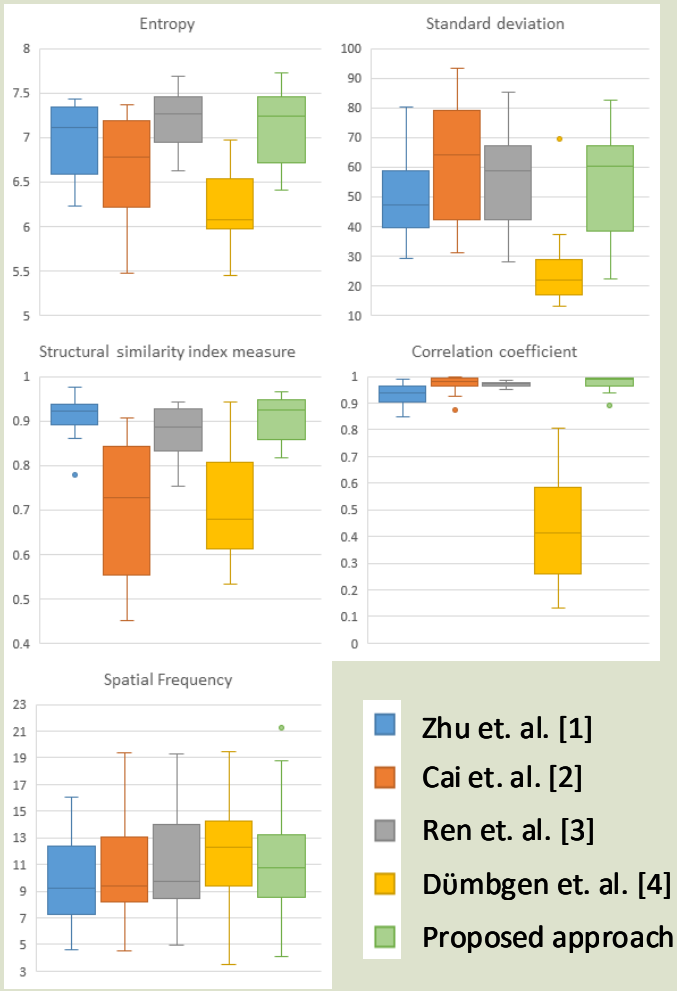


(a) Flowchart of the proposed method

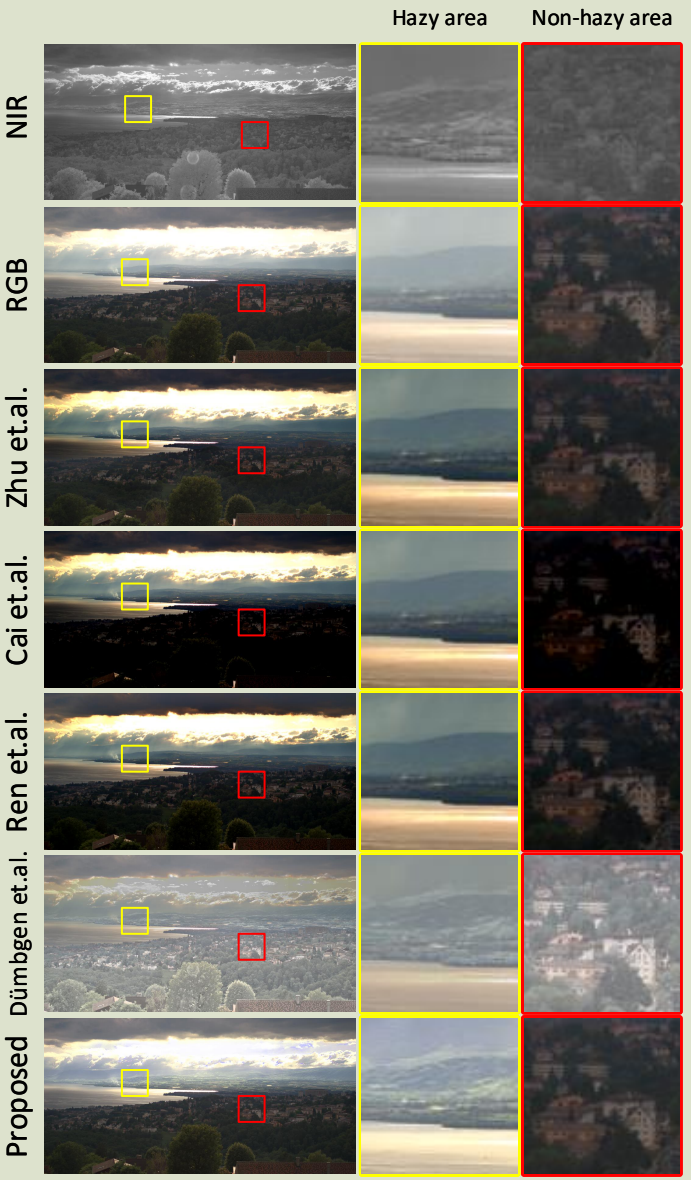


(b) Fusion process of Haar coefficients

QUANTITATIVE ANALYSIS - Comparison with state-of-the-art methods [1-4] based on the five metrics



QUALITATIVE ANALYSIS - Comparison with state-of-the-art methods [1-4]



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QUALITATIVE ANALYSIS

QUANTITATIVE ANALYSIS - Comparison of the proposed method with the state-of-the-art algorithms based on the blind measures of Hautière et.al.'s method[5].

		Zhu et.al.	Cai et.al.	Ren et.al.	Dümbgen et.al	Proposed
country/0000_rgb	e	-0.024	-0.003	**0.063**	-0.220	0.043
	σ	**0**	28.625	0.345	**0**	**0**
	$\bar{r}$	0.967	0.806	1.033	1.084	**1.104**
country/0008_rgb	e	**1.016**	0.952	0.784	-0.056	0.621
	σ	**0**	0.002	0.027	**0**	**0**
	$\bar{r}$	1.462	1.310	1.456	1.556	**1.809**
country/0021_rgb	e	0.013	-0.101	0.014	-0.124	**0.137**
	σ	**0**	8.752	0.004	**0**	**0**
	$\bar{r}$	1.033	1.073	1.019	1.592	**1.668**
country/0039_rgb	e	0.178	-0.199	**0.370**	-0.030	0.200
	σ	**0**	38.437	1.318	**0**	**0**
	$\bar{r}$	1.027	0.865	1.119	**2.581**	1.270
mountain/0000_rgb	e	0.068	-0.0134	**0.273**	0.211	0.191
	σ	**0**	26.381	2.639	**0**	**0**
	$\bar{r}$	1.017	0.790	1.048	**3.704**	1.260

CONCLUSION

We propose a fusion algorithm that combines color information from RGB image and edge information from its corresponding NIR image. Experimental results demonstrate the effectiveness of our proposed method with the final recovered images having better color distribution and revealing more details of the scene.

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