

Application of Analysis and Classification Method for High Dynamic Range Images from Sky

Felipe G. Figueiredo (IC), Hélio Pedrini (PQ), Dennis F. Souza (PQ), Paulo S. Scarazzato (PQ)

Abstract

The capacity of High Dynamic Range Images in storing data of luminance distribution has allowed the research of new methods for classifying and identifying the type of a sky Image. The main objective of this work is to apply a new classification method recently developed at Unicamp, improving its associate algorithm routines and its performance.

Key words: High Dynamic Range, Image Processing, Image Analysis.

Introduction

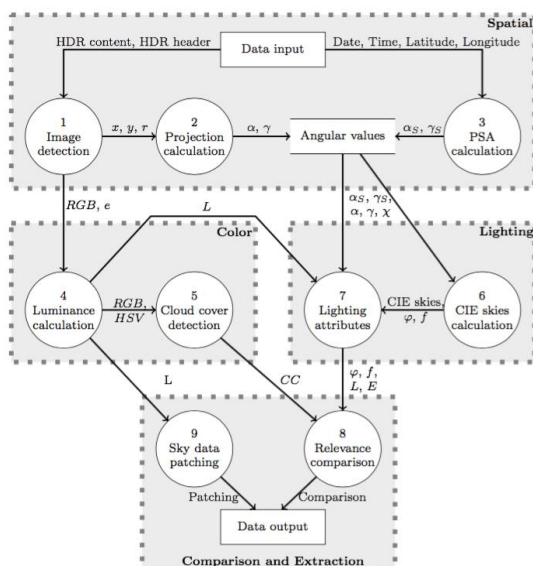
The classification of skies using High Dynamic Range Images is usually performed through unidimensional methods that classify a sky type by choosing only one sky condition as the most relevant. However, the method applied in this research is based on a multidimensional approach [1]. It studies all the characteristics of an HDR image simultaneously and then finds the most similar CIE sky type by combining all these results.

The main purpose of this work was to improve the method routines and implement them in a compiled language. The performance of the method was the primary focus since HDR images can represent a great challenge to the current processing power if not handled carefully.

Results and Discussion

The method was implemented in C++ programming language. The development was divided into three stages of analysis and one last stage of classification. The complete methodology is illustrated in Figure 1.

Figure 1. Method implementation.



The performance improvements were noticed on all stages of the development. Table 1 shows the running time comparison of each stage between the original method in MatLab and the one developed in this research.

Table 1. Running time in seconds.

	Original method (s)	Developed method (s)	Performance Improvement
Spatial Analysis	48.7	10.7	4.5 x faster
Color Analysis	8.6	1.5	5.7 x faster
Light Analysis	124.6	27.6	4.5 x faster
Classification	0.002	0.0005	4 x faster

Conclusions

We have observed an increased performance in all the implemented routines. However, there is still room for improvements, since some modules could have been executed simultaneously (multithreading) and the method does not have a graphic user interface.

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¹ D.F. Souza; P.S. Scarazzato; H. Pedrini. *High Dynamic Range Imaging Applied to the Study of Sky Vault Luminance Distribution Mapping*. University of Campinas, S085h, 2014.