Chapter 10
Approach to Minimize Bias on Aesthetic Image Datasets

Adrian Carballal
University of A Coruña, Spain

Luz Castro
University of A Coruña, Spain

Nereida Rodríguez-Fernández
University of A Coruña, Spain

Iria Santos
University of A Coruña, Spain

Antonino Santos
University of A Coruña, Spain

Juan Romero
University of A Coruña, Spain

ABSTRACT

Over the last few years, numerous studies have been conducted that have sought to address automatic image classification. These approaches have used a variety of experimental sets of images from several photography sites. In this chapter, the authors look at some of the most widely used in the field of computational aesthetics as well as the capacity for generalization that each of them offers. Furthermore, a set of images built up by psychologists is described in order to predict perceptual complexity as assessed by a closed group of persons in a controlled experimental setup. Lastly, a new hybrid method is proposed for the construction of a set of images or a dataset for the assessment and classification of aesthetic criteria. This method brings together the advantages of datasets based on photography websites and those of a dataset where assessment is made under controlled experimental conditions.

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INTRODUCTION

In the history of humanity we have always used art as a form of expression for our inquisitiveness, thoughts and experiences. However, it is with the birth of IT and Artificial Intelligence that art and aesthetics have come into the sphere of computerized systems.

In recent years computer systems have been developed that are able to classify and rank sets of images similarly to the way humans do. For the purposes of this classification such criteria as aesthetics, originality or theme are followed. To this end, large groups of images are used to contrast information, a determining factor to be able to obtain conclusive and easily comparable results. Most of them are built from the same sources (website, online photography competitions, …). In the pages that follow we will also analyze a set that includes pictures and photographs from a number of books and a set of images from other sources.

We know of no other study to date that has focused on establishing the validity of these datasets or on whether they are able to provide a generalized representation for classification tasks. In this chapter we will therefore study some datasets that have been used in the past in computational experiments dealing with aesthetic quality and we will put forward a new method for the construction of this type of sampling sets.

The classification of images meets its first handicap due to a marked characteristic of human nature. An aesthetic evaluation can be influenced by a great quantity of subjective aspects, which if not actually mistaken, may not be wholly universal. For this reason, images are classified according to criteria merely aesthetic or objective such as shapes, colours and composition which allow us a quantitative evaluation, leaving to one side the content. The features used in both the studies analyzed in the state of the art section and the proposal we put forward can be calculated for each image regardless of its nature and content.

Employing these sample groups simple characteristics will be detailed which will be used to classify the images in function of a series of quantitative criteria. Later, with the results obtained, an individual analysis will be carried out on each dataset separately. We will present a study showing their capacity for generalization about images obtained both from the same and different sources in such a way as to show if it is possible to extrapolate from their results.

This chapter is structured as follows: (i) State of the Art of the datasets used in the automatic image classification studies; (ii) study of the most widely used image sets from photography websites; (iii) experiment to assess the ability to generalize of the datasets from photography websites; (iv) study of a set of data suggested by psychologists; (v) a proposal of a new construction method for sample sets; (vi) discussion of results and conclusions.

STATE OF THE ART

Datta, Joshi, & Wang (2006), Wong & Low (2008), Ke, Tang, & Jing (2006), and Luo & Tang (2009) conducted a number of studies focused on automatic image classification, where the authors resorted to a variety of technical features, including lightness, saturation, rule of thirds etc. in pursuit of the best results. Their research projects have always relied on experiments using a variety of photographs from websites and the ratings provided by the users of such sites.