Chapter 8
An Insight into Content-Based Image Retrieval Techniques, Datasets, and Evaluation Metrics

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Abstract The goal of a content-based image retrieval (CBIR) framework is to enable users to efficiently retrieve images from a large database based on the visual content of the images, rather than relying on metadata or annotations. CBIR systems are becoming more and more popular, finding their applications in a wide variety of fields like heath care, e-commerce, law enforcement, and searching digital libraries. Computing machines with CUDA architecture have powered deep learning-based techniques for efficient CBIR and, as such, CBIR systems have become fast with more accurate query results. This work is intended to provide an introduction to CBIR systems and different feature and learning-based techniques to perform CBIR. An overview of different datasets, evaluation metrics, and pros and cons of different CBIR techniques is presented. The paper concludes by discussing current research challenges and future opportunities to improve and apply CBIR to various fields.

Keywords CBIR · SIFT · SURF · Color histogram · CNN · Caltech-101 · Autoencoder · Image ranking

8.1 Introduction

Content-based image retrieval (CBIR) refers to the process of retrieving images from a database based on visual content of the images, rather than relying on metadata such as text annotations or tags. CBIR systems are used in a variety of applications where it is necessary to search for and retrieve images based on their content. For example, CBIR systems can be used to search for and retrieve specific medical images (Quellec et al. 2010) (e.g., CT scans, X-rays, MRIs) based on the content of the images. This

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