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Image Matching with Geometric Feature Comparison

Background

Image matching involves a process by which similarities between images or portions of an image are identified. Similarities between different images may range from the case where the images are exact copies of one another, to the case where images share the same or similar content. Matching algorithms have applications in document image retrieval, deduplications (detecting multiple copies of the same image), detecting copyright violations (copyrighted image is copied and manipulated in some form), visual querying (looking up images that are similar to a given image), or image stitching (constructing a composite image in which two images that overlap to some extent are seamlessly stitched together). Image matching is typically achieved by calculating local features of the images and identifying points with interesting local features. Once those points' features are identified, points in the two images with similar features can be corresponding points. Determining which points in one image correspond to points in the other image can be done using random sampling (RANSAC) under the assumption of a model of how parts of one image are mapped to parts of another image. In addition, features such as the Scale Invariant Feature Transform (SIFT), Oriented FAST and rotated BRIEF (ORB), speeded up robust features (SURF) can be used to determine which points in one image correspond to points in the other image.

Document image retrieval is concerned with finding a document in a database or collection of documents that matches some given keywords or a view (partial or complete) of the document. This can be done with the help of Optical Character Recognition (OCR) or by extracting features of words or lines of text of the query image against features of words or lines of the document database. However, many existing works are dependent on local point features.

Invention Description

Researchers at Arizona State University have developed a method for image matching that features the segmentation of an image into regions, and calculating features of these regions and how these regions relate to each other geometrically in order to compare the image (or potions of the image) with a separate image. In some embodiments, the method can determine where portions of a single image are similar to one another based on geometric relationships, or whether portions associated with different images are similar to one another or at least share certain geometric features.

This invention is covered by U.S. Pat. No. 10,846,562.

Potential Applications

- Image matching of text documents
- Image processing
- Computer vision

Faculty Profile of Professor Rida Bazzi