Chapter 5

Similarity Measure for Matching Fuzzy Object Shapes

ABSTRACT

In this chapter, the Common Bin Similarity Measure (CBSM) is introduced to estimate the degree of overlapping between the query and the database objects. All available similarity measures fail to handle the problem of Integrated Region Matching (IRM). The technical procedure followed for extracting the objects from images is well defined with an example. The performance of CBSM is compared with well-known methods and the results are given. The effect of IRM with CBSM is also proved by the experimental results. In addition, the performance of CBSM in encoded feature is compared with similar approaches. Overall, the CBSM is a novel idea and very much suitable for matching objects and ranking on their similarities.

INTRODUCTION

The strategy to estimate the fuzziness associated with the geometric and margin properties of objects in images to extract the Fuzzy Object Shape (FOS) is discussed in Chapter 3. A Fuzzy Object Level image matching algorithm is discussed for measuring the similarity between the query and database images. The working principle of similarity measure is explained in this chapter for measuring the degree of closeness of objects present in both query and database images. It is well-known fact that the similarity measure is an important component of retrieval systems. The existing similarity
measures typically define some meaning of similarity and propose algorithms for computing it. The meaning of similarity is application dependent, and should only be determined by the user. Therefore, there is a need for a generic approach where users can define the meaning of similarity. A parameterized similarity operator is proposed based on the time warped edit distance, where the meaning of similarity is generic and left for user to define (Magdy, Sakr, & El-Bahnasy, 2017).

An approach is proposed to enhance the Resource-Allocation (RA) similarity in resource transfer equations of diffusion-like models, by giving a tunable exponent to the RA similarity and traversing the value of this exponent to achieve the optimal recommendation results (An et al., 2016). The Mnemonic Similarity Task (MST), has ability to recognize an item as distinct from one that was similar, but not identical to one viewed earlier. A growing body of evidence links these behavioral changes to age-related alterations in the hippocampus. It is found that while there was an age-related impairment on lure discrimination performance for both objects and scenes, relationships to brain volumes and other measure of memory performance were stronger when using objects. In particular, lure discrimination performance for objects showed a positive relationship with the volume of the hippocampus, specifically the combined dentate gyrus (DG) and CA3 subfields, and the subiculum (Stark & Stark, 2017). Relational reasoning is sophisticated cognition in humans is discussed in Christie et al. (2016) and relational similarity is discussed without competing object matches both children and Pan Species.

**FUZZY OBJECT LEVEL (FOL) SIMILARITY MEASURE**

The procedure for obtaining the objects in images is shown in Figure 1. A similar traditional method, say, connected component detection is based on graph theory principle and the connected components are uniquely labelled for a given heuristic. Once the first pixel of a connected component is found, all the connected pixels of the connected component are labelled and the next pixel is considered. Data structures such as linked list or queue is required for processing the labelled pixels.

In this work, Canny edge detection is used along with the morphological operations, Dilation and Close with appropriate parameter using MATLAB tool. It is well-known that the Canny edge detection algorithm is an optimal
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