

Efficient Semantic Clustering Approaches using Deep Autoencoders

ABSTRACT

With the advancement of technologies, the demand for visual content in technological arena has been on the rise. The technological applications today, rely more and more on visual data to dissipate information. As more and more data are stored in the image data bases the role of retrieving the data from the image databases has become vital in several technological applications. Thus, the storage and processing of images necessitates various effective mechanisms when one has to retrieve information from image databases. Consequently, there generated a huge demand for efficient retrieval mechanisms of visual information.

Therefore, one has been witnessing a rapid increase in image data processing facilitating extraction of enormous quantity of information from images. Exploring the users' interests to retrieve information from large image databases has at present been considered a dynamic and a quick propelling task of concern. However, the task of comprehending the myriad needs of the users of image databases and describing them in semantics is quite challenging. Varieties of techniques are in vogue for the retrieval of information from image databases.

Image Clustering employs the method of grouping a given collection of unlabeled images into meaningful clusters according to the image content without any prior knowledge. There is a Semantic gap that has been formed due to the gap between the low-level representation of the machine and high-level human perception. Extracting semantic images from the large amount of heterogeneous image data is a quiet challenge in Content Based Image Retrieval (CBIR). CBIR still faces difficulty in searching the meaningful content from the large volume of image databases. Two challenging issues confront the extraction of these semantic images they are namely, search space and semantic gap reduction.

Semantic Image Clustering (SIC) has been the process of an unsupervised grouping of meaningful images from latent space. Relevance feedback, Ontology Deep learning are the prominent approaches to reduce the semantic gap. All these approaches could not yield good

results due to their limitations. The Relevance feedback approaches require human intervention and are bound by limitations such as lack of feedback samples. The problems with Ontology approaches have been with that of the coinage of terms and ambiguities pertaining to the vocabulary used. Recently deep learning approaches are more effective and successful in extracting semantics without human intervention. Nevertheless, these methodologies have not been successful in learning cluster friendly feature representations due to complexities of large-scale heterogeneous images.

The recent advancement in deep autoencoder based approaches have proven to be quite suitable for efficient image clustering by projecting high dimensional data from original space into low dimensional cluster friendly embedded space. The researcher proposes different approaches using fully connected and convolutional deep auto encoders to address challenges in formulating effective and scalable semantic clusters with large scale image repositories to meet the human perception.

By

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