Efficient Image Retrieval by Multi-view Alignment Technique with Non Negative Matrix Factorization

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***Abstract*-The biggest challenge in today's world is a searching of images in a large database. For searching of an image a technique which can be termed as Hashing is used. Already there are many hashing techniques are present for retrieval of an image in a large databank. The hashing technique can be done on images by considering the high dimensional descriptor of an image but in the existing hashing techniques single dimensional descriptor is used from this the performance of the probability of distribution of an image search will not achieve as expected. And the drawback is that giving the query input in a texture format leads to the limitations of image search that is firstly due to the limited keyword and the second is Annotation approach by human is ambiguous and incomplete.**

To overcome from these drawbacks a new technique has been proposed named as Multiview Alignment Hashing technique in which it keeps the high dimensional feature descriptor data as well probability of distribution of an images in a database. Along with the Multiview feature descriptor another technique can be used that is Nonnegetive Matrix Factorization (NMF). NMF is a popular technique used in data mining in which clustering of a data will be takes place by considering only the non- negative matrix value.

***Keywords*: Image retrieval, NMF, Feature descriptor**

I. INTRODUCTION

Hash function to embed high-dimensional data into a similarity-preserving low-dimensional Hamming space such that an approximate nearest neighbor of a given query can be found with sub-linear time complexity. Traditional method on hashing is to compute a hash function purely in randomized manner, where random projections can be achieved by rounding up of the value which is used to generate binary codes. Since it does not match with the expected performance because of shorting of a binary codes are used multiple hash tables. The hash technique in image processing is the study of similarity-preserving binary codes, which can be classified as unsupervised and semi- supervised prototypes. Example for unsupervised hashing method is Spectral hashing.

In the classic approach of the hashing technique is subjected to single-view. In their system architectures it focuses mainly on only one type of feature descriptor is used to study hashing functions. In practical, to make a more complete feature description, objects or images are always represented by several different types of features and each one of the hashing function can be defined with its own characteristics. Thus, it is necessary to assimilate heterogeneous feature descriptors into hashing functions, leading to multi-view hashing approaches.

Unlike other methods like with positive and negative values, NMF considered only nonnegative parts-based representation which provides a better visual elucidation of factoring matrices for high-dimensional data. Therefore, in many cases, NMF may be more suitable for sub- space tasks, since it provides a basis for a non-global set which subconsciously contains the localized parts of objects. In addition to this flexibility of matrix factorization can be handling by varying data distributions. It also enables more robust subspace and more importantly, NMF decomposes an original matrix into a part-based representation by this way it gives better interpretation of factoring matrices for non-negative data.

On applying NMF technique to combing of a multi view feature, a part-based representation can diminish the collision between any two views and it achieves more discriminative codes. It is worthy to highlight several contributions of the proposed method MAH with RKNMF can find a compact representation uncovering the hidden semantics from different view aspects and simultaneously respecting the joint probability distribution of data. RKNMF handles non convex objective function.

II. REVIEWS OF EXISTING SYSTEMS

In [1], the capacity of fast resemblance search in a significant dataset is of great prominence to many hypermedia applications. One of the hashing technique named as Semantic hashing is a promising way to speed up likeness search, which can be applied for designs that contains dense binary codes for a large number of images they are semantically related images are mapped to close codes. In spectral hashing images related with semantically consistent graph approach for image indexing. Rescuing like neighbour is then simply achieved by retrieving images that have codes within a small Hamming distance of the code of the query. Among various hashing approaches, spectral hashing (SH) has shown promising performance by learning the binary codes with a spectral graph partitioning method. The spectral hashing technique suffers from noise to data sensitive.

In [2], hashing method is used to generate hash function to insert high-dimensional data into a similarity-preserving low-dimensional equal space between neighbours in an image such

that an approximate nearest neighbour of a given query can be found with sub-linear time complexity. In this Multi-View Anchor Graph Hashing (MVAGH), where non-linear integrated binary codes are efficiently determined by a sub-set of eigen vectors of an averaged similarity matrix. This method suffers from the performance degradation when the high recall is required. To overcome this drawback, simple heuristic to combine MVAGH with locality sensitive hashing (LSH) has been proposed. For single-view hashing methods, multi-view data are concatenated into single representation. As a performance measure, hamming ranking is a key term hamming ranking exits between a query and data points are decided by hamming distance.

In [3], hashing process is used to seek an embedding of high-dimensional objects into a similarity-preserving low dimensional Hamming space such that similar objects are indexed by binary codes with small Hamming distances. A variety of hashing methods have been developed, but most of them resort to a single view (representation) of data. In the proposed method deep network for multi-view hashing, referred to as deep multi-view hashing, where each layer of hidden nodes is composed of view-specific and shared hidden nodes, in order to learn individual and shared hidden spaces from multiple views of data.

In [4], the process called as Nonnegative matrix factorization is a method used to find a low rank approximation of a multivariate data the main objective of the Nonnegative matrix factorization is to estimate the data matrix in a given data. There are numerous problems that involve finding similar items. These problems are often solved by finding the nearest neighbour to an object in some metric space. This is an easy problem to state, but when the database is large and the objects are complicated, the processing time grows linearly with the number of items and the complexity of the object.

In [5], semantic hashing seeks compact binary codes of data-points so that the Hamming distance between code words correlates with semantic similarity. The proposed method shows that the problem of finding a best code for a given dataset is closely related to the problem of graph partitioning and can be shown to be NP hard. By relaxing the original problem, obtain a spectral method whose solutions are simply a subset of threshold eigen- vectors of the graph Laplacian.

III. DESIGN OF THE PROPOSED SYSTEM

This section represents the workflow of Multiview Alignment Hashing approach, referred as MAH. The aim of MAH is to achieve a hash function embedding, which is used to incorporate the various configuration representations from heterogeneous sources. Preserving the high-dimensional feature joint distribution is obtained and it is on the orthogonal bases. Initially, the goal is to find the binary solution that is converting RGB model of an image into Grey format and then representing in a binary matrix form. However, is first relaxed to a real valued range so that a more suitable solution can be obtained. After applying the alternate optimization method conversion from the real-valued solutions into binary codes will be done and it can be stored in a database [6].

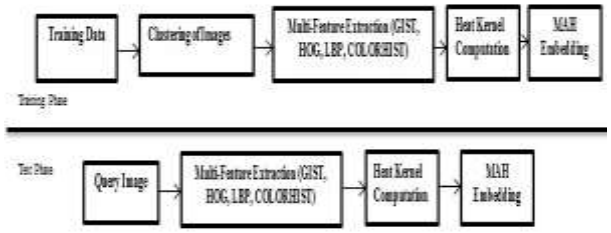

Figure.1: Architecture diagram of Multi-view Alignment Hashing

In Multiview Alignment Hashing the multi feature of an image can be extracted including the orientation and the angle of an image is inclined. The work flow of MAH can be illustrated by considering the below figure.

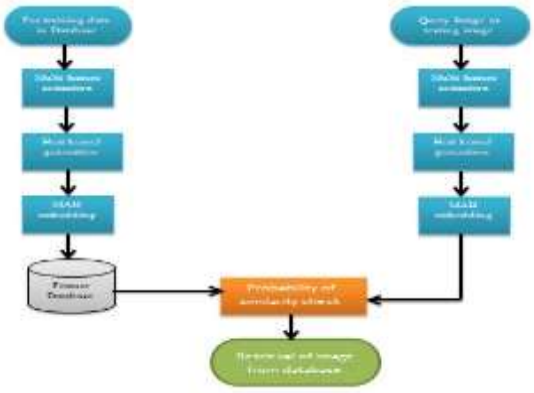

Figure. 2: System Flow Chart

A. *Training Phase*

In the training phase it contains set of images to be trained. To define this have to construct the corresponding N × N matrix using the Heat Kernel formulation by using related scalable parameter (τi). The approach is designed such that it can suitable for any genuine kernel without loss of image property. One of the most popular kernels that is Heat Kernel is used. Heat Kernel can be computed by using multiple kernel matrices from each view data are computed. To get a significant low-dimensional matrix factorization, set a constraint for the binary representation as the similarity probability regularization, which is utilized to preserve the data distribution in the intrinsic objective space.

B. *Clustering of Image*

K-means clustering is a method of vector quantization, originally from signal processing, that is popular for cluster analysis in data mining. K-means clustering aims to partition n observations into k clusters in which each observation

belongs to the cluster with the nearest mean, serving as a prototype of the cluster. This results in a partitioning of the data space into Coronoid cells.

C. Feature Extraction

Feature Extraction is a technique of transforming arbitrary data, such as text or images into numerical features usable for machine learning. The latter is a machine learning technique applied on these features. In particular in a supervised setting it can be successfully combined with fast and scalable linear models to train document classifiers. Classification of images using sparse features includes an unsupervised setting it can be used to group similar images together by applying clustering algorithms such as K-means, Clustering text documents using kmeans.

D. MultiviewAlignmet Hashing Embedding

The proposed method defines an embedding method. In practical, mapping of all the training and test data in a same way to ensure that they are in the same subspace that is they are maintaing Hamming space which are obtained via multiview RKNMF method. This procedure is similar as a handcrafted embedding scheme, without retraining.

IV. EVALUATION PHASE

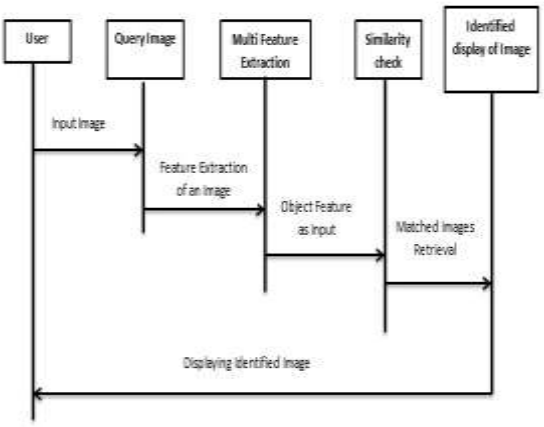

Figure. 3: Image Retrival on comparing with a database

The above figure summerises the Testing Phase of the MAH method in which user will give the Query image as a input for which the similarity check has to be done. The multifeaure extraction of a query image is takes place that is converting an image into numeric value understandable my machine with an inclined orientation. In the next section the probabiliity of similarity check is performed on comparing with a Nearest Neighbour (NN) [7] points in a trained images which is stored in a database. If Nearest Neighbour points are matched then the corresponding images will be retrived and displayed.

V. COMPLEXITY ANALYSIS

The analysis of complexity mainly contains two parts. The first part is for the constructions of Heat Kernels and similarity probability regularization items for different views. And, the updating of kernel weight has the complexity of O(n2N2) in MAH. In total, the time complexity of MAH learning is O(2(n i=1 Di)N2 + T × (N2d + n2N2)), whereT is the number of iterations. Stastitically, T is always less than 10, i.e., MAH converges within 10 rounds.

VI. ADVANTAGES

This is the first work using NMF to combine multiple views for image hashing. MAH can find a compact representation uncovering the hidden semantics from different view aspects and simultaneously respecting the joint probability distribution of data. It also solve nonconvex objective function, optimization method has been proposed to get the final solution. By using a multivariable logistic regression to generate the hashing function is achieved. And also it requires less computational complexity is less as well as the data to the noise also very less compared to the existing system methods.

VII. CONCLUSION

By using unsupervised hashing method a new novel method has been proposed is termed as Multiview Alignment Hashing (MAH), where hashing functions are generated by using kernelized Nonnegative Matrix Factorization including the preservation of a data by joint probability distribution. In MAH implantation of multiple visual features from different views together and an alternate way is introduced to optimize the weights for different views and simultaneously produce the low dimensional representation. This is addressed as a nonconvex optimization problem and it can be overtaken on applying locally optimal solution. For the out-of-sample extension, multivariable logistic regression has been successfully applied to obtain the regression matrix for fast hash encoding.

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