Frequent Pattern Based Semantic Synaptic Search Algorithm: A Technique to Search Image Content From the Real Time Datasets

[1]Mahendra K. Ahirwar, [2]Dr. Jitendra Agrawal, [3]Dr. Sanjeev Sharma
[1,2,3]School of Information Technology, Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal, India

Abstract
To search real time content from the large scale dataset is a difficult task to do. Thus techniques are required to provide better performance to extract relevant images from the large-scale dataset. Various hashing techniques like MVAGH, CHMIS etc are used to provide search mechanism to search image content from the image dataset. A regularize kernel based nonnegative matrix factorization technique used to map semantic content and provide enhanced searching mechanism. But this technique suffers performance degradation in real time datasets. Thus, a new technique called FPSSA (Frequent Pattern Based semantic and Synaptic Search algorithm) is proposed in this paper. A comparative result analysis of the results is presented. This shows that proposed technique provides enhanced functionality as compare to the existing technique.

Keywords
Hashing, Semantic Search, Synaptic Search, MVAGH (Multiview Anchor Graph Hashing)

I. Introduction

Similarity or Nearest Neighbour search is one of the techniques which used to provide semantically related results for the given query from the collection of objects. That provides solution for many problems like information retrieval, object recognition, image retrieval and some other application. In that for large scale image retrieval is required an efficient technique, because semantic features plays an vital role in such type of problems. Hashing based methods provides desirable results in large scale image retrieval problems. In similarity or nearest neighbor search similar results are provided for the query image in large scale data. Hashing based techniques like approximate nearest neighbor hashing and some other techniques are gaining popularity in large scale search due to their efficient performance. There are many technique are presented to provide solution for such large scale search problems like some tree based techniques R-tree, R+ tree and some others. But hashing based technique provides efficient and accurate solution for such problems.

There are two type of hashing technique are presented called single view hashing and multi- view hashing. In single view hashing there are techniques which uses only one descriptor to generate hash functions but heterogeneous data requires more than one descriptor to provide solution for any problem. Thus multi-view hashing is used. In multi-view hashing there are multiple descriptors are used to map multiple features of multiple information sources and provide desired search results. There are some multi-view techniques are presented in this papers like Multi-view anchor graph hashing (MVAGH) [3], Deep Multi-view Hashing (DMVH), composite hashing with multiple information sources (CHMIS) [2], spectral hashing, and some other techniques are there. But these techniques suffer noise in the results.

II. Related Work

Hashing is a technique which generally used to perform nearest neighbour search in the large scale image dataset. There are techniques like Composite Hashing With Multiple Information Sources [2],a algorithm is used to map features from various web sources into binary hash codes, is presenetd. In that technique adjusting weights are used to optimize the performance of the codes and the query. Multi View Anchor Graph Hashing[3], in that non eigenvectors are used to map nonlinear binary codes. A low rank for of the similarity graph can be formed which prove an average similarity graph for anchor hashing. LSSH has two model parameters, μ which leverages the discrimination power between images and text, and γ which controls the linear connection of latent semantic spaces [7]. CBIR (Content Based Image Retrival) a which provide enhanced functionality to bridge semantic gap between the the high level and low level semantic concepts[4]. In that various machnie learning techniques are used to mine data on the basis of the content. A multiview alignment hashing technique is presented in [1] which provides enhanced funtionality to fetch image content from large scale image dataset. That technique uses regularize kernel based technique to provide enhnaced funtionality to search nearest neighbours in large image datasets. A matrix factorization based technique is used to map data into low dimensions. But all these technique techniques are not able to provide realtime solution for the user thus a new technique called FPSSA(Frequent Pattern Based Semantic And Synaptic Search Algorithm) to provide real time search mechanism for the image data.

III. Proposed Technique

To search images from the large scale dataset is a difficult task to do, a Multi-view Alignment Hashing (MAH). Which uses Regularized Kernel Nonnegative Matrix Factorization (RKNMF) to provide [9] a mechanism to extract data from large scale multimedia datasets. A matrix factorization is conducted to reduce redundancy from the data and provide[12] an efficient feature matchning mechanism. That enhnaces the funtionality for image matching and provide relevant images as a output to the user's query. But that techique not able to map semantic features of the images and large scale image datasets. A new technique called FPSSA which provides enhnaced way to may sematic features of the images is proposed in this paper. Which provides enhnanced funtionality to search data from the large scale multimedia datasets.

FPSSA-Frequent pattern based semantic synaptic search scheme

This is the new hybrid algorithm which can further derived by looking the recent work done in the multi-view hashing image search technique.As the video or large image data set concern there a complex or similar kind of background to the images usually occurs. A further work can apply in searching with the images persist with the video and group of images, based on image background and feature a classification such as genetic

algorithm can perform to first classify the image data. Further the image data background can tag with image name such as water, river and then based on these background a frequent pattern based search , then further on the frequent obtained data semantic and then further on available different classified data , a synaptic based search can perform. Thus a number of steps involvement can give a better optimize result to enhance the existing single step multi-view hashing platform. The further comparison will perform on hashing based existing technique and our proposed FPSSA algorithm.

A. Proposed Technique Consists Following Steps:

1. Start
2. Generating Real-time Datasets: To generate real-time data set of images, snaps from the live streaming video a captured and these snaps are used as a dataset for the process.
3. Classification of the dataset: That dataset classified into various classes on the basis of features (like colour, Texture, etc.) of the images. To classify the dataset techniques like genetic algorithm is used which provides enhanced functionality classify images.
4. Insertion of the query image: A query image is inserted as an input to extract relevant image from the dataset.

Performing Search Operation Using Semantic and Synaptic Search:

Semantic and synaptic search based techniques are used to extract relevant image for the search query. Semantic search provides the mechanism to search data in hybrid query form and perform the data extraction task for structured and unstructured data. Query interpretation techniques to provide an enhanced way to extract relevant data. Synapse is biological term which a connection between the brain and different neurons, similar to the biological synaptic search scheme used to form connection between the objects. That provides an enhanced functionality to detect various types of the data. A frequent pattern based semantic and synaptic search technique is presented which provides an enhanced functionality to perform content matching operation. To extract relevant images from the dataset.

- Output: relevant image which are relevant to the search image are provided as an output with reference to the input image.
- In that way that technique provides better search performance as compare to the existing technique. That uses Semantic and synaptic search for the searching operation to perform the data extraction task.

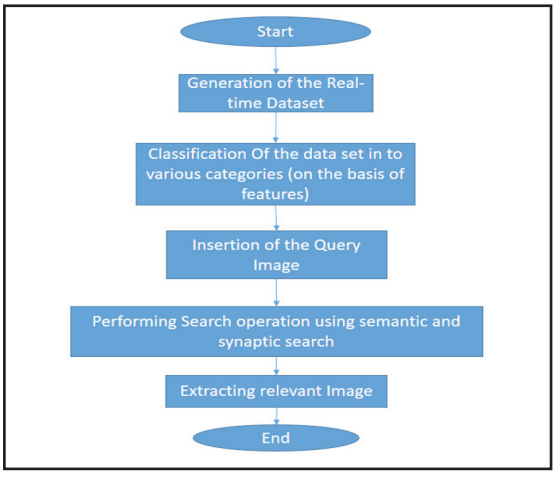

Fig. 1: Flow Diagram for the Proposed Technique

Pseudo Code:

The following FPSSA algorithm is performed over the dataset in following way to obtain better result over the large image dataset.

Input: Camera image capture, dataset image input.
Output: Matching result, performance time

```
Begin:
Initialization phase:
{
        Load multimedia capture library
        MCi-n
{
        Capture required number of images
        1-n from the captured device MCi.
}
        Load Dataset Count library DSL;
        Input selection I;
        Processing Phase:
{
        SSA
{
        Performing feature extraction(FE) for I.
        Performing FE from DSL.
        Performing other features from Synaptic
        approach;
        Obtaining Matching score Mscore.
        Performing matching operation.
        Foutput= {  true: >=Mscore
                False: <Mscore};
        Return output;
}
}
}
End;
```

IV. Result Analysis

A comparative analysis of the results is presented in this section. To evaluate the performance of the proposed technique training time and testing time are used as a parameter.

A. Evaluation Parameter

To evaluate the performance of the existing and proposed technique time taken to train the dataset and test the dataset is used.

- **Training Time:** It is the time which used to train the dataset for the process to organize it.
- **Testing Time:** Time taken to perform the test operation over the dataset.

1. Comparison of the Training Time for Existing and Proposed Technique

A comparative analysis of the training time and testing time for existing and proposed technique is presented in this section. Numerical value of the time taken to train different size dataset is presented in Table 1. This shows that proposed technique takes less time as compare to the existing technique.

Table 1: comparison of the Training Time for Existing and Proposed technique.

Dataset	Existing Technique	Proposed Technique
Image Dataset 100 set	294.4ms	198.1ms

Image Dataset 200 set	388ms	232.9ms
Image Dataset 300 set	411ms	329.4ms
Image Dataset 400 set	589ms	436ms

A graphical analysis of results for the existing and proposed technique is presented in fig. 2. That graphical analysis shows that proposed technique provides better performance as compare to the existing technique to train dataset for the search operation. Y-axis shows the size of the different datasets and the X-axis shows training time taken by the different techniques to perform training operation over the datasets.

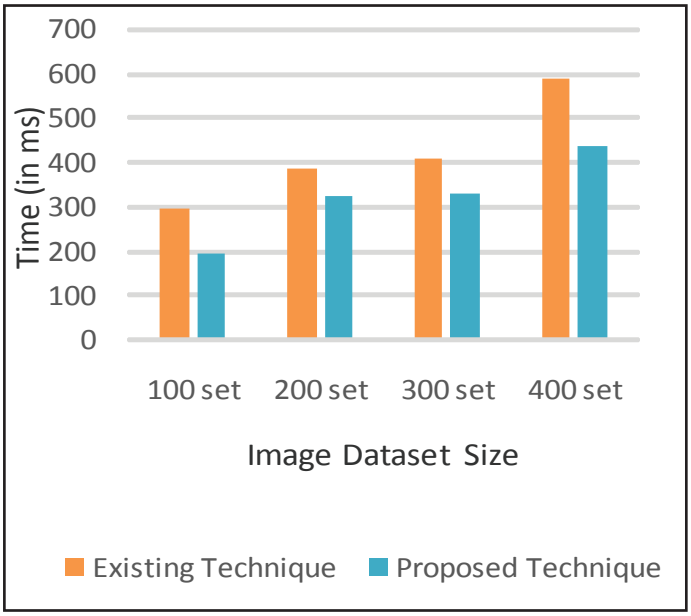

Fig. 2: Comparison of the time taken to train the Dataset

B. Comparison of the Testing Time for the Existing and Proposed Techniques

A comparative analysis for the testing time is presented in this section, which provides a comparative analysis over time for the different techniques. In time taken by the techniques to perform testing operation over the dataset is presented in this section. Table 2, contains numerical value of the time taken to perform testing operation over different datasets.

Table 2: comparison of testing time for the datasets.

Dataset	Existing Technique	Proposed Technique
Image dataset 100set	228.4ms	165.7ms
Image Dataset 200set	377ms	290.6ms
Image Dataset 300set	418ms	378.1ms
Image Dataset 400set	543ms	490ms

A graphical analysis for the existing and proposed technique is presented in Fig. 3, which shows that proposed technique takes ample amount of time to perform testing operation over the datasets. In that X-axis shows, time taken by the different technique to perform the testing operation and the Y-axis shows the size of the datasets taken to perform the operation.

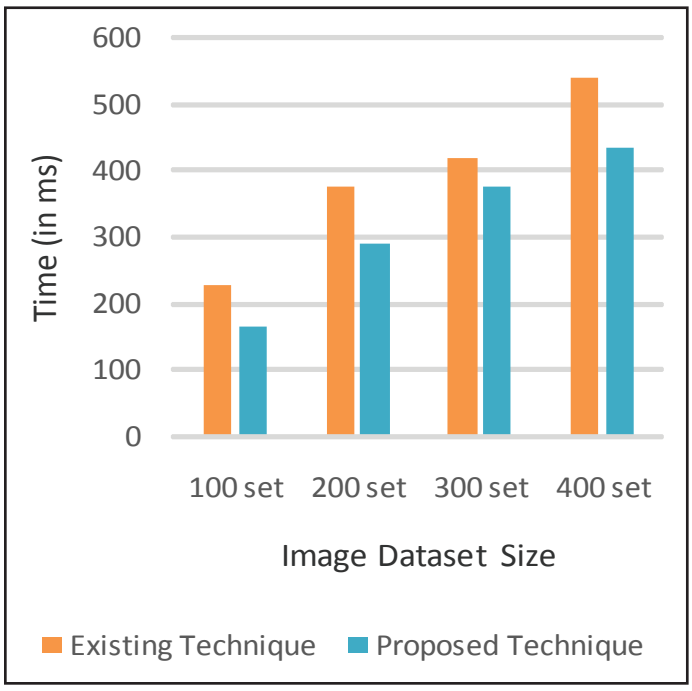

Fig. 3: comparison of the Testing time.

V. Conclusion

A new technique called FPSSA is proposed in this paper which provides enhanced functionality to map semantic features of the content to provide an enhanced mechanism to search image data from real time image dataset. This technique enhances the performance of the existing technique. A brief description over the proposed technique is presented in proposed methodology section. A comparative analysis of the results is presented in result and analysis section. That shows proposed technique provides enhanced functionality to search nearest neighbours in real time large scale dataset.

For future work which able to generate more accurate frequent pattern which can be able to map semantic features can be used to enhance the performance of the proposed technique.

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Mahendra Kumar Ahirwar received Bachelor of Engineering Degree in Computer Science From Rajiv Gandhi Proudyogiki Mahavidyalaya Bhopal. He is currently pursuing the M.Tech from School of Information technology, RGPV Bhopal (Madhya Pradesh). His research interest in Digital image processing.

Dr. Jitendra Agrawal was born in 1974, is an Assistant Professor in the Department of Computer Science & Engineering at the Rajiv Gandhi Proudyogiki Vishwavidyalaya, MP, India. He earned his Master Degree from Samrat Ashok Technology Institute, Vidisha (M.P.) in 1997 and awarded Doctor of Philosophy in Computer & Information Technology in 2012. He has published more than 50 publications in International Journals and Conferences. He has published two books named Data Structures and Advanced Database Management System. He is the recipient of the Best Professor in Information Technology award by the World Education Congress in 2013. He is a senior member of the IEEE (USA), Life member of Computer Society of India (CSI), Life member of Indian Society of Technical Education (ISTE).

Dr. Sanjeev Sharma was born in 1970, working as Associate Professor and Head of School of Information Technology at Rajiv Gandhi Proudyogiki Vishwavidyalaya Bhopal India. Dr Sharma is receipt of Best Teacher Award in Information Technology awarded by World Education Congress. He has graduated in Electrical & Electronics from Samrat Ashok Technical Institute, India and post graduated in Microwave and Millimeter from Maulana Azad College of Technology, India. He completed his Doctorate in Information Technology from Rajiv Gandhi Proudyogiki Vishwavidyalaya. He possesses teaching and research experience of more than 25 years. His areas of interest are Mobile Computing, Adhoc Network, Data Mining, Image processing and Information Security. He has edited proceedings of several national and international conferences and published more than 120 research papers in reputed journals. He is member of various professional bodies like IEEE, CSI, ISTE.