International Journal of Scientific and Technical Advancements
IJSTA
ISSN: 2454-1532

Design and Development of Distributed Image Acquisition and Recording System for Network Based Applications

Preeti Digra[1], Pawanesh Abrol[2], Parveen Lehana[3]
[1,2]Department of Computer Science and IT
[3]Department of Electronics
University of Jammu, Jammu, J&K, India-180006
Email address: [1]digrapreeti@gmail.com, [2]pawanesh.abrol@gmail.com, [3]pklehana@gmail.com

***Abstract*—**Distributed database system is physically scattered but logically centralized system which is the consolidation of distributed database management system and computer network. Distribution is vital for managing tremendous volume of data at the same time is needful to bring scalability. Different relational database management systems (RDBMS) like Oracle, PostgreSQL, IBM DB2, Sybase, MariaDB, MS SQL Server, Microsoft Azure, MySQL etc. manage the data in distributed systems. There are different ways to store data in the database. In this research paper an online portal, Sigana has been proposed, which will provide healthcare solutions to the users by storing the images and signals inputted by the user into the database, analyzing and then displaying the result to them. This paper analyses the algorithm designed to store and retrieve all the similar images from the database efficiently. The time complexity of the algorithms is found for handling image based queries. The experimental results showed that our proposed algorithm significantly reduced the time required to search the database for the similar images.

***Keywords*—** Database; Distributed system; Image based queries; Query retrieval time.

I. INTRODUCTION

Distribution plays a pivotal role in handling colossal amount of data. With the continuous amelioration in science and technology the distributed systems have become more widespread. They have become enormously complex and vital part of the computer science branch. The term 'distributed system' refers to a group of independent computing elements that seems to end-users as a sole coherent system [1].

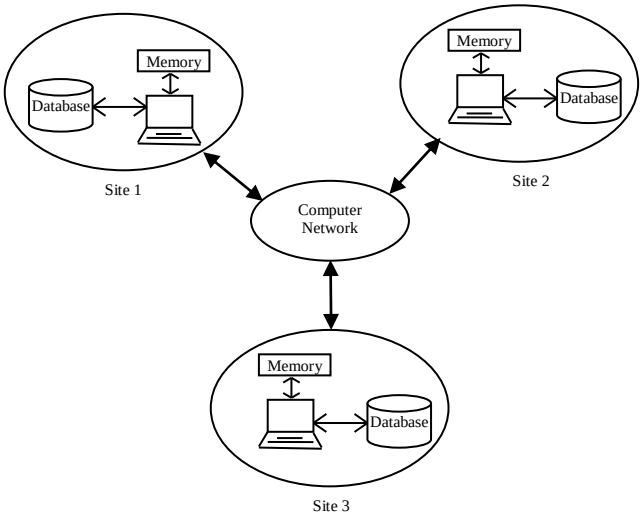

Fig. 1. Distributed Database System

The distributed database system is physically dispersed but logically centralized database system. The architectural diagram of the distributed database system is displayed in Fig.1. The figure displays different database systems which are present at different sites/geographical areas and are communicating with each other through a computer network. Database alternatively termed as data store or databank and sometimes abbreviated as DB is systematically arranged collection of a large volume of data that can be efficiently stored, manipulated, accessed and maintained by Database Management System. For e.g., Banks use the database to store data pertaining to personal information about people, their bank account no., balance, credit card no. etc. In fact, social sites also make use of the database to store the information of its users which can be audio, images, videos etc. Let's consider the Twitter it needs to store data related to users, their followers, user activities, messages, tweets and lot more. Different relational DBMS like PostgreSQL, IBM DB2, Oracle, Sybase, MySQL, MariaDB, MS SQL Server, Microsoft Azure etc. have been developed and are continuously evolving to fulfill the business requirements.

An important content of the database is the image. Digital images perform a very crucial role in many applications like CT Scan, satellite television, and MRI and also are vital in the field of research and technology such as epigraphy [2]. Digital imaging alternatively termed as digital image acquisition is the formation of the photographic image of an entity or of any physical scene. The term principally includes the processing of the image, its compression, storage and at last printing and display of the acquired image. It is categorized by the kind of EM wave captured which represents the information that the image comprises of. For e.g. X-ray imaging is due to X-rays [3]. After image acquisition when the acquired image is transformed into digital form, some kind of deterioration

Preeti Digra, Pawanesh Abrol, Parveen Lehana, "Design and Development of Distributed Image Acquisition and Recording System for Network Based Applications," *International Journal of Scientific and Technical Advancements*, Volume 4, Issue 3, pp. 1-8, 2018.

occurs in the resultant output image. So to utilize the output image for different tasks, various methods of image processing are applied to it.

The speech signal and the noise signal all together make up the audio signal which is also an important content stored in the database. The audio signal represents sound, usually as a binary number for the digital signals and as an electrical voltage for the analog signals. The frequency of audio signals ranging from 20 to 20,000 Hz is hearable to humans and may be synthesized by using a musical instrument, microphone, tape head or phonograph cartridge. Recorders provide a way to record the applied electrical signal.

Whenever data is input it takes some time to store data in the database and similarly, it also takes time to retrieve data from the database. The aggregate amount of time consumed by an algorithm for its entire execution determines the time complexity of an algorithm. Since the algorithm's performance varies with distinct inputs so usually, the worst-case time complexity of an algorithm is computed for an algorithm because that is the maximum time taken for any input size.

This research work has been done to design an image acquisition and recording model. For this, an online portal Sigana has been proposed where users can make their accounts, login and then input the signals and images into the system for analysis. After analysis, a report will be displayed to the user. Admin can access the database and can modify it whenever needed. Using this model the time complexity of handling image based queries is calculated. This research has been partitioned into six sections viz. Introduction, Literature Review, Database storage and search optimization, Methodology, Results and Conclusion.

II. Literature Review

Literature review has been divided into four subtopics concerning image processing, signal acquisition and recording, database models and network- based applications. It is detailed as follows:

C.Rasche [4] developed a multiple contour detection method which was based on extrema detection. They performed image classification on different images (Caltech-101, satellite images etc.) using multiple contour technique and canny algorithm. Results showed that multiple contour enhanced the prediction accuracy by 9% in case of the satellite image collection. Whereas the Canny algorithm improved accuracy only for the Caltech 101 images by 3%, but reduced the accuracy by 2% in case of satellite images. So for classification of image the extraction of multiple contour feature is more essential than the use of the exact detection technique. I.Noorzaie et al. [5] developed a system that supported image acquisition, online content analysis and retrieval of similar images. The system included modules like segmentation module and shape feature based module for computation of similarity. By means of web interface query image was submitted, which went through an online automated analysis procedure and produced a report containing similar images and risk analysis. S.Banuchitra et al. [6] in their paper discussed about feature extraction using various CBIR methods, texture analysis and different CBIR applications like, networking sites, archaeology, criminal investigation, forensic Labs, disease detection, image search, etc. CBIR required knowledge of both the database systems and the computer vision. N.Pavithra et al. [7] performed CBIR by using classification technique. They used K-means clustering algorithm to group the images into different clusters and found that it was suitable for image-based query retrieval. Y.F.Fathabad et al. [8] studied the application of CBIR in the examination of brain disease. CBIR retrieved images that were identical to the query image. They performed experiments and found that by using apt feature vectors the efficacy of brain image retrieval can be enhanced. D.Sharma et al. [9] in their paper proposed a SVD based technique for removing noise from digital images. The proposed model was tested on images and the experimental results proved the effectiveness of the proposed model in removing the noise from the images. H.Bali et al. [10] in their paper compared four distance measuring methods like Jaccard, Euclidean, Mahalanobis and Manhattan for checking similarity between two objects. Experimental conducted on the methods showed that Mahalanobis distance is feature based while others are not. Jaccard is simple and highly accurate but involves lot of preprocessing. Mahalanobis offered high computation time but is invariable to rotation of object but Manhattan, Jaccard and Euclidean are variant to rotation.

S.Yaqoob et al. [11] in their paper studied the consequences of body posture on the propagation of sound wave in human body. For this, they used low-frequency waves for detection of abnormalities in humans. Experimental results showed that in standing position LSD was maximum but in sitting position it was minimum. Analysis of result proved that there is an extreme effect of body posture on the sound signals. P.Wang et al. [12] developed a multichannel pulse signal acquisition system which was based on a pressure sensor. Compared to single-channel signal acquisition system their system resolved the problem of sensor positioning and also helped in capturing sub-signals under different pressures. Experimental results showed that the classification accuracy of the proposed system was more than the single-channel signal system. S.Pancholi et al. [13] developed a model for EMG data acquisition for prosthesis application which provided online visualization of the signal during EMG activity. They acquired signal from five different arm muscles. For classification purpose, they extracted 7 FDM (frequency domain) and 9 TDM (time domain). Different classifiers were analyzed on the acquired data and the experimental results showed that Random forest and k-NN gave better performance in case of smaller feature vector size, while LDA showed better performance for larger feature vector size. E.Maiorana et al. [14] in their paper analyzed the distinct traits of EEG signals taken from 45 users in both resting and active states. They compared and modeled ECG using HMMs. The analysis performed on the acquired data indicated that EEG traits are affected by age. They also designed some methods to diminish the impact of aging on the recognition efficiency of the ECG signals and evaluated the potency of the methods.

Preeti Digra, Pawanesh Abrol, Parveen Lehana, “Design and Development of Distributed Image Acquisition and Recording System for Network Based Applications,” *International Journal of Scientific and Technical Advancements*, Volume 1, Issue 1, pp. xx-xx, 2015.

S.Mahajan et al. [15] developed an online portal called Agrovaid which provided information to the farmers related to crops and insects which harm their crops. It uses Mahalanobis distance to effectively store 3D images of insects in the database and also updates the data in database automatically in decreasing or increasing order of Mahalanobis distance so that similar images get stored near to each other and thus increase the efficiency of the database. J.Letkowski [16] in his paper discussed two different cases for designing relational databases by making use of MySQL Community Server and MySQL Workbench. First case used technique of forward engineering to convert a data model into a physical database while the second used reverse engineering technique to convert existing physical database into a data model. E.Sevinç et al. [17] developed NGA which was an alternative to GA based query optimizer in DDB systems. They carried out experiments on the synthetic database with replicated relations using exhaustive and random algorithms and found that GA performed better than random search. Though proposed NGA was about bit worse than the best attainable solution achieved using ESA but its execution time was much low than ESA. Moreover even with the inflation in problem size NGA still gave good results. O.Diallo et al. [18] in their paper discussed and classified the methods used to regulate the queries and data in wireless sensor networks in the distributed databases. The queries handled in the methods were SQL-like. Experimental results showed that the techniques used reduced the energy utilization and also the generated queries retrieved apt information. F.Yuanyuan et al. [3] designed semi-connected database query algorithm, which had the data of the intermediate results generated from all sub-queries. The results of experiments showed that the proposed query optimization algorithm had higher optimization efficiency, and it also minimized the intermediate result data, thus efficiently reducing the entire cost of the network communications. R.Poljak et al. [19] in their paper compared three RDBMS viz. PostgreSQL, Oracle 11g and MySQL on the basis of different criteria. Results of the comparisons showed that Oracle is paid but it provides both efficacy and speed, while MySQL is open source database but it is comparatively slower than Oracle. M.A.Paracha et al. [20] developed a web database that helped in storage of ECG signals and was used to discover the age at which ECG differences in human began to emerge. For this they collected around 300 ECGs from human population along with information about their age and sex. The application was built in three-tier architecture. DBMS constituted the base tier for which MySQL was used. PHP was used in second tier which achieved the application logic First tier was the web browser which interacted with the application.

S.Roy et al. [21] in their paper proposed a star coloring algorithm to color an Internet graph which consequently saved bit space and also helped in identifying the attacker. The proposed algorithm reduced the color assignment conflicts by using forbidden map which kept track of colors assigned by the neighbors. The proposed algorithm was compared with the hash-based assignment and the results showed that in star coloring approach the color collision was 30% less. T.D.Ba et al. [22] in their paper investigated three heuristic algorithms namely Distributed Perturbed Greedy Search (DPGS) Distributed Simulated Annealing (DSA) and Centralized Simulated Annealing (CSA) to solve the client-server assignment problem. Results of the experiment showed that the CSA algorithm was fastest but worked only for small and static systems and depended on timely accurate global system information. While DPGS and DSA at each server used local information for the optimal assignment during the search, and thus scaled appropriately with the number of servers and users and also adapted to the system dynamics. J.Wang [23] in his paper developed a computer network routing configuration method which was based on an intelligent algorithm. The workability of the method was validated by simulation experiments. Experimental results showed that proposed algorithm didn't affect the stability of the system rather it only altered the speed of response.

III. DATABASE STORAGE AND SEARCH OPTIMIZATION

Edgar Frank Codd invented the relational model which forms the basis of the relational database management system (RDBMS). RDBMS uses tables alternatively known as relations to store data. The columns of the table are called attributes and rows are called tuples. The query language that performs all kinds of operations on data in RDBMS is Structured Query Language (SQL). Earlier, the only category of DBMS taken into account was the RDBMS, but due to the origination of big data trend, a lot of contemporary technologies and capabilities are being added to distinct DBMS, which are further convoluting the databases. One of them is NOSQL which means "Not only SQL", is an impending category of DBMS that scale out more suitably than relational models for a massive amount of data. But we might think why there is the need to study and learn SQL database after the introduction of NOSQL databases? Well, NOSQL has its own place, but the relational database (SQL) is nevertheless the finest and the sturdy choice for the most transactional workloads. The gigantic majority of people make use of relational databases and related tools in their work.

Advantages of Relational databases over NOSQL databases are:

- There is a mellowed management model and data storage in SQL (relational) databases which is important for enterprise users.
- The security models of SQL are superior as compared to NoSQL databases.
- SQL databases allow users to only see the authorized data while the unauthorized data is kept secret from them thus it backing the notion of views.
- Database developers implement the business logic into the database by using stored procedure sql which is backed by SQL databases.

The world has not aberrated from the usage of the relational databases in their work. There is a burgeoning need for experts who can operate relational databases. Thus studying SQL databases still remain worthy.

Preeti Digra, Pawanesh Abrol, Parveen Lehana, "Design and Development of Distributed Image Acquisition and Recording System for Network Based Applications," *International Journal of Scientific and Technical Advancements*, Volume 1, Issue 1, pp. xx-xx, 2015.

Database search optimization refers to a miscellany of approaches for diminishing the response time of database systems. It includes escalating the efficiency and speed with which data is retrieved. Database designers work to optimize the performance of system through different techniques. These techniques aim at optimizing and tuning the parameters, design of the database objects, particularly indexes and tables, and also the files in which the data is stored. Thoughtful design that focuses on the functional needs is the bedrock of search optimization and thus enhanced performance. A poorly framed or unorganized database cannot optimize the performance of SQL queries no matter how much system tuning or SQL tweaking may be done. So to avoid that disorganization one should model the database efficiently

The conventional method of data arrangement in the database involves the creation of a new record in the database table every time a user inputs his data. So, in this case, multiple records of the same user are created. This is depicted in Table I below.

Table I. Conventional method of data arrangement in database

Id	Img_id	File_name
siganadgla2403180066	1	siganadgla2403180066_melan_2018-05-20-08-8-54_PM.png
siganaala2303180004	2	siganaala2303180004_dyst_2018-05-22-08-9-22_PM.png
siganadmla2603180070	3	siganadmla2603180070_omy_2018-05-22-09-9-23_AM.png
siganabcla2303180050	4	siganabcla2303180050_melan_2018-05-23-10-8-57_PM.png
siganabfla2303180053	5	siganabfla2303180053_melan_2018-05-28-11-8-55_AM.png
siganabqla2303180059	6	siganabqla2303180059_dyst_2018-05-29-08-9-22_PM.png
siganaafla2303180033	7	siganaafla2303180033_melan_2018-05-1-09-9-17_AM.png
siganadgla2403180066	8	siganadgla2403180066_melan_2018-06-5-10-2-26_PM.png
siganabqla2303180059	9	siganabqla2303180059_dyst_2018-06-8-08-9-22_AM.png
siganaala2303180004	10	siganaala2303180004_dyst_2018-06-9-10-9-22_PM.png

In Table I there are 10 users with their respective nail images and their id's stored in column Id. Here Id is the foreign key and Img_id is the primary key of the table. Each user is uploading its nail image and the name of the image is getting stored in the column File_name, and the id of the uploaded image is getting stored in the column Img_id. In the table, it can be observed that user with id siganadgla2403180066 uploaded his nail image twice so his two records got created in the table. Similarly the other users also have multiple records in the table. So, in this case, there are multiple records of each user corresponding to the number of times they have uploaded their nail image. This type of data arrangement consumes more space in the database and also increases query search time. So we required a different data arrangement in the database and thus came up with the proposed method which is discussed in the next section.

IV. METHODOLOGY

This segment provides a view of the methodology of the research work where query submission and query retrieval process in the distributed database systems are discussed. The block diagram of the proposed research work is shown in Fig. 2 below.

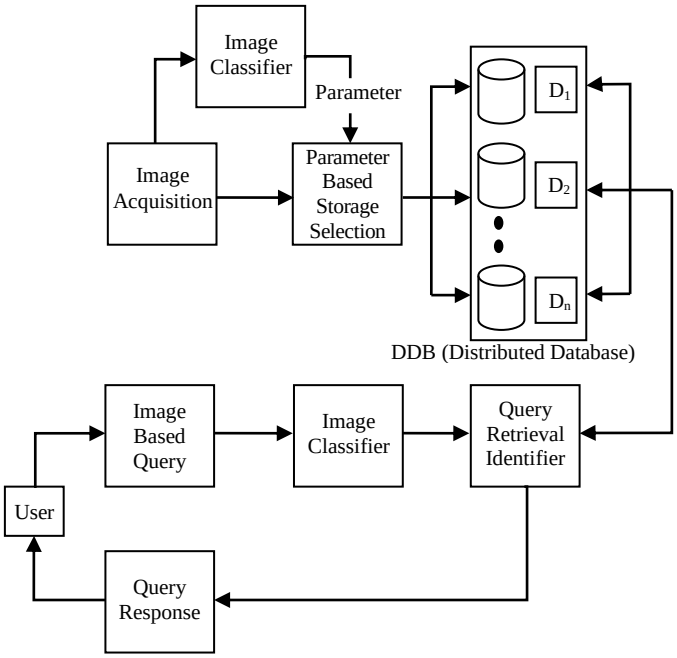

Fig. 2. Block Diagram

The different steps involved in query submission process are discussed below:

A. *Image Acquisition*

The first step to the research work is image acquisition. In order to classify images into different categories images are captured through various devices like webcam, mobile phone and digital cameras which are submitted online through a form in Sigana.

B. *Image Classifier*

Image classifier is employed to classify images into different categories based on the extracted features and other criteria. In this research work, Deep Convolutional Neural Network (CNN) [24] is used for classifying the images. CNNs works by comparing the images piece by piece and these pieces are termed as features. It carries out feature matching in two images at same positions and thus performs better for checking similarity than full image matching. Image classifier generates a value corresponding to each classified image, which can be called as a parameter.

C. *Parameter Based Storage Selection*

Parameters generated from the image classification stage helps in the storage of the classified images into specified locations

Preeti Digra, Pawanesh Abrol, Parveen Lehana, "Design and Development of Distributed Image Acquisition and Recording System for Network Based Applications," *International Journal of Scientific and Technical Advancements*, Volume 1, Issue 1, pp. xx-xx, 2015.

into the database where other similar images are also present. This is termed as the parameter based storage selection.

D. Distributed Database

Distributed databases are physically dispersed database systems which store an extensive amount of data. The approach used to store data in the database affects the response time in query retrieval process. The conventional method wasn't efficient for search optimization so another method of data arrangement in the database has been proposed that doesn't involve the creation of a new record in the table whenever a user inputs his data rather the data is entered into the same record, into a text file whose reference is stored in the database. This way multiple records of the same user are not created and the new data entry is appended to the previous one in the text file. This is depicted in Table II showed below.

Table II. Proposed method of data arrangement in database

Id	Fname	Lname	Nail_Image
siganadgla2403180066	A	B	melan.txt
siganaala2303180004	C	D	dyst.txt
siganadmla2603180070	E	F	ony.txt
siganabcla2303180050	G	H	melan.txt
siganabfla2303180053	I	J	melan.txt
siganabqla2303180059	K	L	dyst.txt
siganaafla2303180033	M	N	melan.txt

In this Table, there are seven users with their Id's as the primary key of the table. The column Id stores the Id of the users, Fname stores the first name of the users and Lname stores the last name of the users. Each user is uploading its nail image and its name is getting stored in the text file whose reference is stored in the column Nail_Image. The table shows that there are exclusive records of the users. No new record of the same user is getting created even if any user is uploading image multiple times. All the images belonging to a particular user are getting stored in one file and the images of other users having same class of image are also getting stored into same the text file shown as in Table II for User with id siganadgla2403180066.

Table III. Melan.txt

siganadgla2403180066_melan_2018-05-22-08-8-54_PM.png
siganabcla2303180050_melan_2018-05-22-08-8-57_PM.png
siganabfla2303180053_melan_2018-05-22-08-8-55_AM.png
siganaafla2303180033_melan_2018-05-22-09-9-17_AM.png
siganadgla2403180066_melan_2018-06-5-10-2-26_AM.png

Table III shows the text file melan.txt which stores the image of the user with id siganadgla2403180066 whose nails belongs to the class melan. Apart from his own nail images the nail images of other users which belong to same class melan are also getting stored in the same text file. Thus whenever a new nail image belonging to same class will be uploaded by any user its name will get appended to the last image name in the same text file. Similarly, the text files ony.txt and dyst.txt will contain respective nail image name of users whose nails belong to class onychomycosis and dystrophy.

The different steps involved in query retrieval process are discussed below:

A. Image Based Query

An image based query is generated by the user in which he might be interested in getting all possible images similar to his query image. For this, he submits a new image which may not be already present in the database.

B. Image Classifier

The image classifier again performs the function of classifying the submitted query image into one of the predefined categories by extracting its features using deep convolutional neural networks (CNN).

C. Query Retrieval Identifier

Query Retrieval Identifier performs the task of retrieving all the similar images from the distributed database system based on the image classified by the image classifier.

D. Query Response

All the similar images are displayed to the user in the form of the output of the query response.

V. RESULTS AND DISCUSSION

The conventional method of data arrangement in the database and the proposed method of data arrangement are compared based on the query retrieval time for image based queries on a database of 106 users. The comparison results are shown in Table IV below.

Table IV. Comparison of time required to retrieve the result of the queries using two different methods

Query Number	**Search using conventional method (time in µs)**	**Search using proposed method (time in µs)**
Query 1	3000.0209	2000.0934
Query 2	3999.9485	2001.0471
Query 3	6000.0419	3000.9746
Query 4	3999.9485	3000.9746
Query 5	4000.187	3000.0209
Query 6	5000.1144	5001.0682
Query 7	1999.855	1999.855
Query 8	2001.0471	3000.0209
Query 9	2000.0934	2000.0934
Query 10	3000.2594	2000.0934
Query 11	3000.021	2000.0934
Query 12	3000.0209	2000.0934
Query 13	2999.7825	3000.021
Query 14	999.9275	2000.0934
Query 15	1999.855	2001.0471
Total Time	47001.123	38005.5898
Average Time	3133.4082	2533.705987
Std. Deviation	1301.990265	834.000998

Table IV shows that the total query search time of the

Preeti Digra, Pawanesh Abrol, Parveen Lehana, "Design and Development of Distributed Image Acquisition and Recording System for Network Based Applications," *International Journal of Scientific and Technical Advancements*, Volume 1, Issue 1, pp. xx-xx, 2015.

proposed method is 38005.5898 µs and the total query search time for conventional method is 47001.123 µs. So on average, the proposed method takes 2533.705987 µs to display the result of the image based query which is comparatively less than the time required to search in the database using the conventional method which is 3133.4082 µs.

The reason behind this is that the conventional method of data arrangement in the database involves the creation of a new record in the database table every time a user inputs his data. So, in this case, multiple records of the same user are created. This, in turn, utilizes more space in the database and it takes more time to search for the data in the database. But the proposed method of data arrangement in the database doesn't involve the creation of a new record in the table rather the data is inserted into the same record, into a text file. This way multiple records of the same user are not created and the new data entry is appended to the previous one in the text file. Thus in this way, all the similar images pertaining to a particular image class will be stored in one text file while those images which belong to different class will get stored in a different text file. So it will become easy to access all images belonging to a particular class directly by accessing text file of any user having data belonging to that particular class rather than searching the whole database to access all the images belonging to that class.

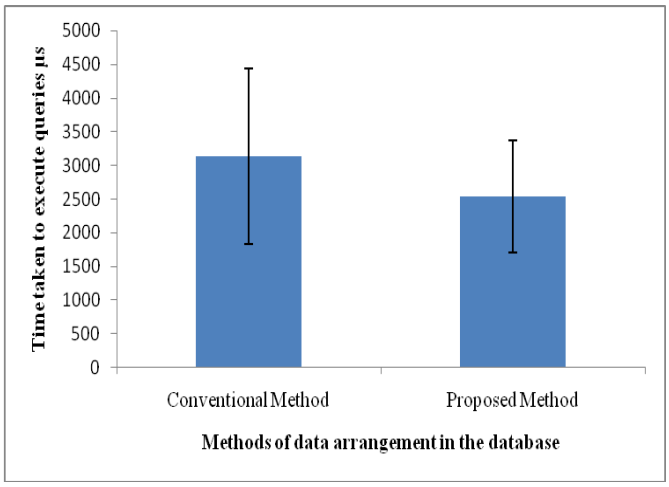

Fig.3. Error Bar

Based on the observations shown in Table IV an Error Bar is generated which is shown in Fig 3. An error bar(shown as black lines on the bars) represents the standard deviation of the dataset which is 1301.990265 in case of the conventional method and 834.000998 in the proposed method. Here in Conventional Method, the error bar is large which means that the data is more variable than the mean data value thus the data is widespread and is not reliable. Whereas, the error bar of the proposed method is low which means that the data is clustered more towards the mean and thus is reliable.

From the practical results, two things can be concluded. Firstly on an average, there is a difference of near about 599.702213 µs between the time required to search for the queries using the proposed method and conventional method of data arrangement. Secondly, if the data is arranged in the database like our proposed data arrangement then the result of image query retrieval process can be increased by 19.13%.

VI. Conclusion

In this paper, an online portal Sigana has been proposed which will provide healthcare solutions to the users by storing the images and signals inputted by the user into the database and then analyzing and displaying the result to them. The main target of this research work was to arrange data in the database in such a way so that the query retrieval time is reduced. For this, a data arrangement technique has been proposed which arranges the data in the database in such a manner that multiple records of the same user are not created again and again whenever a user inputs his data and all the data of the user get stored in a text file whose reference is stored in the database. The main advantage of using file system is that all images of different users belonging to a similar class can be stored together in one place and can be accessed easily during the search by just accessing the record of any one user having image belonging to that class. From the experimental results, it can be concluded that our proposed data arrangement method optimized the search in the database and reduced the query retrieval time by near about 599.702213 µs. This concludes that our proposed data arrangement method significantly improved the efficiency of query retrieval process by 19.13% and is better than the conventional method of data arrangement.

References

[1] M.V.Steen and A.S.Tanenbaum, "A brief introduction to distributed systems," *Computing*, vol. 98, Issue 10, pp. 967–1009, October 2016.

[2] G.Bhuvaneswari and V.S.Bharathi, "Performance Analysis on Image Acquisition Techniques in edge detection," in Proc. *International Conference on Recent Trends in Information Technology*, Chennai, India, July 2013.

[3] F.Yuanyuan and M.Xifeng, "Distributed database system query optimization algorithm research," in Proc. *3rd International Conference on Computer Science and Information Technology*, Chengdu, China, July 2010.

[4] C.Rasche, "Rapid contour detection for image classification," *IET Image Processing*, vol. 12, Issue: 4, pp. 532 – 538, March 2018.

[5] I.Noorzaie, Y.A.Aslandogan and M.E.Celebi, "A system for distributed image acquisition, content-analysis and similarity retrieval," in Proc. *International Conference on Information Reuse and Integration*, Las Vegas, USA, May 2004

[6] S.Banuchitra and K.Kungumaraj, "A Comprehensive Survey of Content Based Image Retrieval Techniques," *International Journal Of Engineering And Computer Science*, vol. 5, Issue. 8, pp. 17577-17584, August 2016.

[7] N.Pavithra and K.Sivaranjani, "Content Based Image Retrieval System Data Mining Using Classification Technique," *International Journal of Computer Science and Mobile Computing*, vol. 5, Issue. 7, pp. 519-522, July 2016.

[8] Y.F.Fathabad and M.A.Balafar, "Application of Content Based Image Retrieval in Diagnosis Brain Disease," *International Journal on Technical and Physical Problems of Engineering*, vol. 4, Issue 13, pp. 133-138, December 2012.

[9] D.Sharma and P Abrol, "SVD Based Noise Removal Technique: An Experimental Analysis," *International Journal of Advanced Research in Computer Science*, vol.3, Issue 5, pp. 214-218, September 2012.

Preeti Digra, Pawanesh Abrol, Parveen Lehana, "Design and Development of Distributed Image Acquisition and Recording System for Network Based Applications," *International Journal of Scientific and Technical Advancements*, Volume 1, Issue 1, pp. xx-xx, 2015.

[10] H.Bali and P.Abrol, "Estimating the Similarity of the Objects Using Feature Vectors," *International Journal of Modern Computer Science (IJMCS)*, vol. 4, Issue 3, pp. 123-129, June 2016.
[11] S.Yaqoob, V.Mittal and P.Lehana, "Effect of Different Body Postures on Sound Wave Propagation in Humans," *IJRIT International Journal of Research in Information Technology*, vol. 3, Issue 6, pp.1-7, June 2015.
[12] P.Wang, W.Zuo and D.Zhang, "A Compound Pressure Signal Acquisition System for Multichannel Wrist Pulse Signal Analysis," *IEEE Transactions on Instrumentation and Measurement*, vol. 63, Issue: 6, pp. 1556 – 1565, February 2014.
[13] S.Pancholi and A.M.Joshi, "Portable EMG Data Acquisition Module for Upper Limb Prosthesis Application," *IEEE Sensors Journal*, vol. 18, Issue 8, pp. 3436 – 3443, February 2018.
[14] E.Maiorana and P.Campisi, "Longitudinal Evaluation of EEG-Based Biometric Recognition," *IEEE Transactions on Information Forensics and Security*, vol. 13, Issue 5, pp. 1123 – 1138, November 2017.
[15] S.Mahajan, P.Abrol and P.K.Lehana, "Design and development of 3D insect modeling, identification, and dynamic database updation," *International Journal of Scientific and Technical Advancements*, vol. 2, Issue 2, pp. 43-46, 2016.
[16] J.Letkowski, "Doing database design with MySQL," *Journal of Technology Research*, vol. 6, 2014.
[17] E.Sevinç and A.Coşar, "An Evolutionary Genetic Algorithm for Optimization of Distributed Database Queries," *The Computer Journal*, vol. 54, Issue 5, pp. 717–725, May 2011.
[18] O.Diallo, J.J.P.C.Rodrigues, M.Sene and J.Lloret, "Distributed Database Management Techniques for Wireless Sensor Networks," *IEEE Transactions on Parallel and Distributed Systems*, vol. 26, Issue 2, pp. 604 – 620, August 2013.
[19] R.Poljak, P.Poši and D.Jakši, "Comparative analysis of the selected relational database management systems," in Proc. *40th International Convention on Information and Communication Technology*, Electronics and Microelectronics (MIPRO), Opatija, Croatia, May 2017.
[20] M.A.Paracha, S.N.Mohammad, P.W.Macfarlane and J.M.Jenkins, "Implementation of Web Database for ECG," *Computers in Cardiology*, Thessaloniki Chalkidiki, Greece, September 2003.
[21] S.Roy and A.S.Sairam, "Distributed star coloring of network for IP traceback," *International Journal of Information Security*, vol. 17, Issue 3, pp 315–326, June 2018.
[22] T.D.Ba, T.Nguyen, B.Bose and D.A.Tran, "Distributed Client-Server Assignment for Online Social Network Applications," *IEEE Transactions on Emerging Topics in Computing*, vol. 2, Issue 4, pp. 422 – 435, September 2014.
[23] J.Wang, "Computer network routing configuration based on intelligent algorithm," *in Proc. Sixth International Conference on Future Generation Communication Technologies (FGCT)*, Dublin, Ireland, August 2017.
[24] T. Guo, J. Dong, H.Li and Y.Gao, "Simple Convolutional Neural Network on Image Classification," in Proc. *2nd International Conference on Big Data Analysis (ICBDA)*, Beijing, China, pp. 721-724, March 2017.

Preeti Digra, Pawanesh Abrol, Parveen Lehana, "Design and Development of Distributed Image Acquisition and Recording System for Network Based Applications," *International Journal of Scientific and Technical Advancements*, Volume 1, Issue 1, pp. xx-xx, 2015.

ISSN: 2454-1532

Preeti Digra, Pawanesh Abrol, Parveen Lehana, "Design and Development of Distributed Image Acquisition and Recording System for Network Based Applications," *International Journal of Scientific and Technical Advancements*, Volume 1, Issue 1, pp. xx-xx, 2015.