Indian Journal of Science and Technology, *Vol 10(1), DOI: 10.17485/ijst/2017/v10i1/109388, January 2017*
ISSN (Print) : 0974-6846
ISSN (Online) : 0974-5645

A Robust Technique to Retrieve a Histopathological Images using GLCM Method

R. C. Shivamurthy[1]* and M. B. Manjunatha[2]

[1]Computer Science Engineering, Jain University, Bangalore - 560069, Karnataka, India; shivamurthyrc@gmail.com
[2]Akshaya Institute of Technology, Tumkur - 572106, Karnataka, India; manju.kari29@gmail.com

Abstract

Image retrieval is like a system of in which, we can do searching and browsing then, finally retrieving a medical image from a very huge given a database of medical images. To identify or examine the image content, there must be some desired approaches. Hence, the goal of the proposed project is to retrieval of the histopathologicl image using CBIR method using GLCM technique. Finally, the results will be calculated by analyzing the results obtained in this method. Then we will calculate the GLCM contrast as well as GLCM correlation to retrieval of an image. These sets will enable new research opportunities, and they will improve and flow benchmark reviews. Our experimental result shows that our novel proposed method achieves better performance.

Keywords: GLCM Constrast, GLCM Correlation, Histopathological Image, Image Retrieval, Method, Medical Image

1. Introduction

With an advancement of science and innovation, there has been expansions demand after of computerized medicinal information. In therapeutic field, today we utilized PCs of high calculation, and equipment's make determination simpler by giving pictures live while diagnosing the patients like ultrasound pictures. Content construct picture recovery framework situated in light of restorative pictures used to recovers the comparable kind of medicinal picture for a given info question picture vast databases. There stay numerous testing research issues that keep on attracting analysts from different controls. The fundamental objective of the substance based picture recovery is to discover pictures which are like inquiry picture visually without utilizing any literary portrayals for the picture[1].

Feature extraction is the premise of substance based image recovery. Images are spoken to by the visual components, for example, shading shape and surface. A large portion of the current strategies, for the most part, cantered around the productive extraction of shading, shape, and surface elements. Shading is the fundamental component; histograms are usually utilized for shading highlight extraction. The shading histogram technique requires basic count. Nonetheless, it is unacceptable for pictures in which there is an awesome shading variety. But it does exclude any spatial data. Shapes depend on form data in a picture which incorporates edge location and correlograms. Edge recognition drives better results just clear shape data. Wavelet change has been utilized most generally as a part of numerous parts of picture preparing, for example, noise expulsion, image compression, picture resolution and picture recovery. The surface element of a picture is extricated by mean and fluctuation of the wavelet sub bands. But wavelets lose their comprehensiveness in catching the edge discontinuities in the picture which is essential in surface representation. Curve

*Author for correspondence

let change was presented by Donoho is another multi resolution change which gives more edge data. In any case, computationally is not productive in extensive pictures.

Method plan of surface picture recovery utilizing GLCM and picture sub-piece has two phases. The principal stage is picture highlight separating and the second stage is picture recovery. Fig. 1 speaks to the main stage that is a component vector is removed from every picture in the database, and the arrangement of all element vectors is composed as a database file. As shown in fig 1, while a picture question is chosen, the RGB shading space is changed over to dark. The following stride is the picture is isolated into three segments and three columns in equivalent size. Surface element for every sub square is removed given GLCM (Gray Level Co-event Matrix).

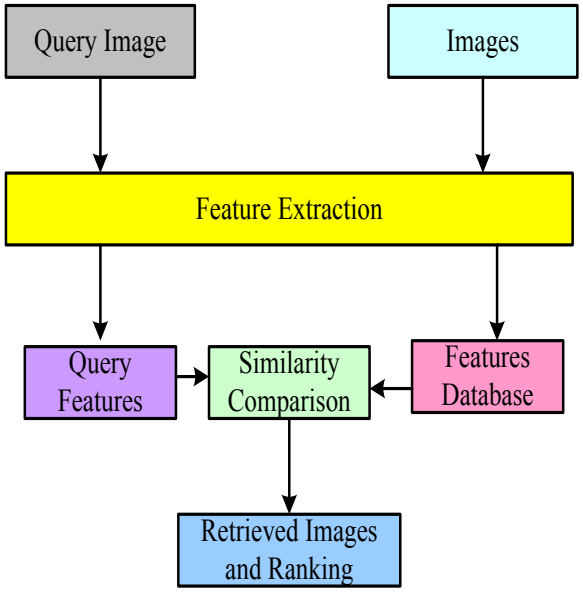

Figure 1. General Block Diagram of Image Retrieval.

The fundamental goal of the study is to recover the pictures from the huge volume of medicinal databases with high precision by performing highlight extraction, characterization process. This paper proposes a restorative picture recovery utilizing GLCM strategy method. This paper has sorted out into different segments; Section-II depicts a different writing identified with therapeutic picture recovery utilizing GLCM strategy. Segment III portrays the execution of the proposed strategy with framework plan design, stream outline and so forth. Segment IV exhibited the outcomes and investigation; discourse lastly took after by Section-V for the conclusion and future examination course.

2. Literature Review

Zhang et al.[2] proposed a vigorous and adaptable solution for accomplishing picture recovery. In particular, a powerful division strategy is created to depict locale of-interest precisely, utilizing progressive voting and horrible dynamic form. A hashing-based huge scale recovery methodology is likewise intended to look at and order them by contrasting and a gigantic preparing database. Creator is done a separation of two sorts of lung tumors (the adenocarcinoma and the squamous carcinoma), utilizing a huge number of histopathological pictures removed from several patients.

Hatipoglu et al.[3] concentrated on the planned to expand the grouping precision aftereffects of histopathological pictures by assessing spatial relations. As an initial step, Convolution Neural Network (CNN) based components are separated in the first RGB shading space of computerized histopathological pictures. Preparing information sets are shaped by selecting rise to a number of various cell and additional phone structures in the spatial area from the pictures. Order models of every preparation information set are acquired by using CNN (as a regulated classifier), Support Vector Machine (SVM) and Random Forest (RF) strategies.

Bug et al.[4] examined conceivable arrangements of classifiers and components to characterize whole tissue slides. Highlight applicants are initially assessed separately and after that joined to frame a solid classifier. For assessment of this nine-class issue, we utilize one scantily, and one thickly extricated information set to acquire a preservationist and a hopeful appraisal of the execution.

Cao et al.[5] displayed a programmed bosom growth evaluating strategy in histopathological pictures in the vision of the PC, a half-breed level set based division technique was utilized to portion cores from the pictures. A quintile standardization methodology was used to enhance picture shading consistency.

Spanhol et al.[6] presented a dataset of 7909 bosom disease histopathology pictures procured on 82 patients. The dataset incorporates both amiable and dangerous pictures. The errand an important PC supported determination apparatus for the clinician. So as to evaluate the trouble of this undertaking, we demonstrate some preparatory results got with cutting edge picture order frameworks.

Zhang et al.[7] novel techniques for histopathological picture highlight representation given profound learning.

The strategy removes abnormal state representation of crude pixels of a neighborhood area through a system model with a few shrouded layers, which can learn potential elements consequently. The proposed technique is assessed on a genuine information set from an expansive neighborhood doctor's facility with correlation with two current best in class strategies. The outcome is promising to show that it accomplishes a noteworthy change of the model execution. Also, our study proposes that components learned through profound models can accomplish preferred execution over human composed elements.

Vu et al.[8] proposed a programmed highlight revelation structure through learning class-particular word creative, the educated word reference permit speaking to another picture test close-fisted using the lexicon comparing to the class character of the specimen. Also, creator shows that DFDL displays a more elegant rot in grouping exactness against the quantity of preparing pictures which are very attractive by and by where liberal preparing is frequently not accessible.

Sharma et al.[9] depict a novel appearance-based technique to recognize tumor corruption in histopathological entire slide pictures. Studies are performed on heterogeneous minute pictures of gastric tumor containing tissue locales with variety in danger level and stain power. Textural picture components are separated from picture patches to speak effectively to a necrotic appearance in the tissue and machine learning is performed utilizing bolster vector machines took after by discriminative thresholding for our complex datasets. The proposed technique is a promising apparatus to distinguish corruption in heterogeneous entire slide pictures, demonstrating its vigor to shifting visual appearances.

Ghosh et al.[10] present a proficient system for recovery of jungle fever positive pictures from clinical picture databases that match an inquiry condition specified in content or as another intestinal sickness positive picture. The proposed technique recognizes the nearness of jungle fever by distinguishing the nearness of chromatin specks inside RBCs. The calculation uses 4-associated named area maps to break down and alter the picture. These are likewise used to check RBCs. Elective strategies for recognizing chromatin specks inside the RBCs are likewise introduced. Accuracy and review effectiveness of the calculation was likewise contemplated.

Zhang et al.[11] concentrate on creating versatile picture recovery strategies to adapt cleverly to enormous histopathological pictures. In particular, creator introduced a regulated portion hashing system which influences a little measure of managed data in figure out how to bunch a 10 thinspace000-dimensional picture highlight vector into just several paired bits with the educational marks saved. We construct a versatile picture recovery system in light of the administered hashing strategy and accept its execution on a few thousand histopathological pictures gained from minuscule bosom tissues.

Chen et al.[12] writer contrasted the exactness of SIFT with GLCM highlights for acknowledgment of 4 distinct classifications of sustenance's (apples, burgers, bread and arranged dishes). GLCM highlights perform superior to anything SIFT by and large, and for single-thing or homogeneous sustenance's (e.g. Apple) while SIFT performs well for complex dishes.

Sompong et al.[13] plans to extricate the surface element of MRI cerebrum tumor being utilized for mind tumor division. The condition of-workmanship division strategies, to be specific, Tumor-Cut (TC) and dynamic shapes are driven by nearby Gaussian dispersion fitting vitality (LGD), are analyzed the outcomes between force picture and the proposed surface based picture. In such manner, TC and LGD calculations utilizing the proposed surface element give the better results.

Ashu et al.[14] creator has utilized three distinctive Steganographic techniques, NsF5, JP Hide and Seek and PQ for concealing the mystery data inside pictures. We have utilized four installing rates: 10%, 25%, half and 100%. In the development of the picture database, we have utilized 2300 pictures of same size (640 × 480). From the developed database, 80 for every penny is utilized for preparing the classifier and remaining 20 for each penny database is utilized for testing order calculation. At that point analyzed the execution of proposed elements set with the condition of workmanship utilizing these three grouping calculations.

Preethi et al.[15] proposed work exhibits a sorting strategy for characterizing Magnetic Resonance pictures to recognize the Brain Tumor in its initial stages and to break down anatomical structures. The probabilistic neural system with outspread premise capacity (PNN-RBF) will be locked in to actualize a robotized Brain Tumor characterization and to direct the phases of Brain Tumor that are amiable, dangerous or typical. Choice forming was performed in two phases: highlight extraction utilizing FDCT, dim level co-event grid (GLCM) and the grouping utilizing PNN-RBF system. The delineation of this classifier was assessed as far as preparing execution and grouping exactnesses. The reenacted results will demonstrate that PNN classifier gives preferred exactness over the current techniques.

Maurya et al.[16] proposed a robotized framework for identification and arrangement of one of the skin four sorts of skin malignancies. There are sure components of these sorts of skin malignancies, which can be separated utilizing appropriate element extraction calculation. The elements of skin sores are extricated standardized symmetrical Gray Level Co-event Matrices (GLCM). GLCM based surface components are separated from each of the four classes and given as contribution, which is utilized for classification reason.

Mirzapour et al.[17] proposed a quick GLCM calculation to overcome the specified shortcoming of conventional GLCM. The quick GLCM is equipped for separating roughly the same elements as the conventional GLCM does, however in a truly a great deal less time. As Gabor channels are all the more capable in fringe locales, we have attempted to consolidate Gabor highlights with GLCM highlights. Exploratory results demonstrate great capacities of the proposed quick GLCM and the component combination strategy in order of PAN pictures.

3. Proposed System and Implementation

The framework design highlighted in Fig.4 demonstrates the proposed strategy. The Software System Document intends to give a description with respect to system design. The part gives a novel system model of the proposed system, which involves different blocks associated with the overall image feature extraction as well as image retrieval system.

The second section illustrates the flow of the data by using the data flow diagrams which shows the procedures involved in the process concerning the proposed system. The third section explains about the process flow on flow charts which illustrate the entire process followed by the data of concern.

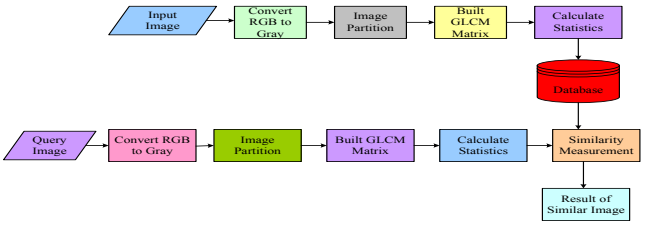

Figure 2. Proposed Block Diagram Image Retrieval system.

The framework design highlighted in Fig.3 demonstrates the proposed strategy. In this proposed method the input is taken as input query image. Then training is done for all database images after this training; the GLCM features will be extracted. K-means clustering algorithm is utilized here, to classify the image data then each and every image feature will be extracted in the database. Then, the processes are continued to search the matched query image by using the score of the each image. Here, the image is selected based on GLCM algorithm. Then selected the best-matched image to the query image.

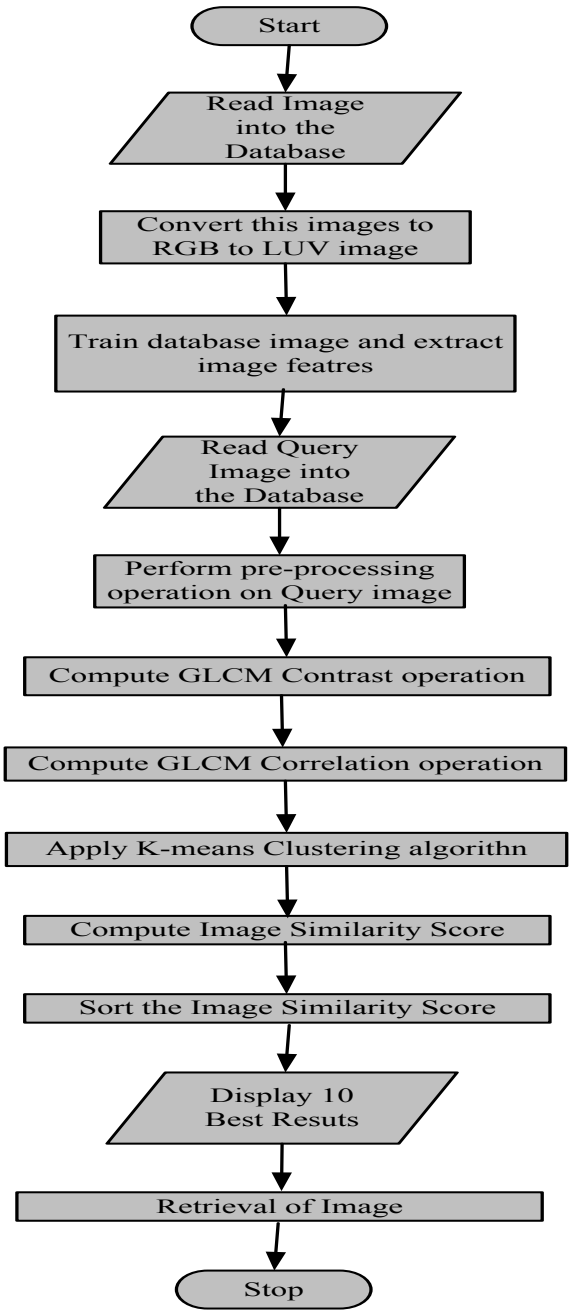

Figure 3. Process Flow of Proposed System.

4. Results and Discussion

This section explains the results obtained for an efficient framework for feature extraction using GLCM and CBIR techniques. It contains the accumulation of histopathological pictures has been kept up into the database envelope. The arrangement of the pictures has been finished on the base of the uniqueness of pictures. The results show how to classify the images as well as how to retrieve the histopathological images using Matlab tools. In this proposed method the input is taken as a medical query image. Then form the LUV converted medical image is utilized to compute the GLCM contrast and GLCM correlation. Then training is done for all database images after this training; the GLCM features will be extracted.

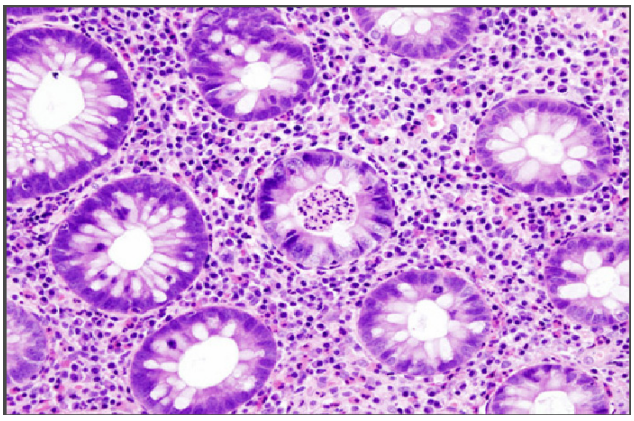

Figure 4. Input Query Image.

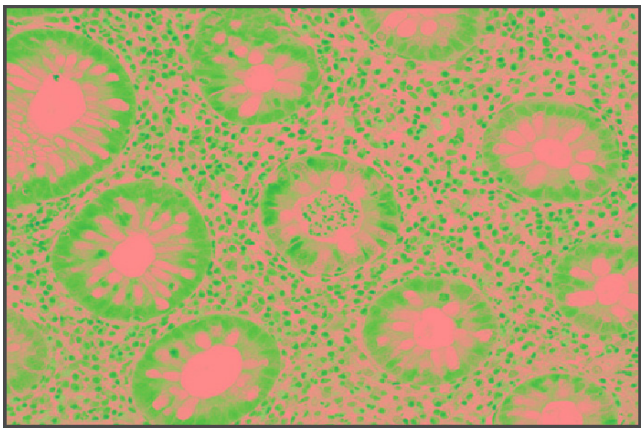

Figure 5. converting input. RGB to LUV Color Space.

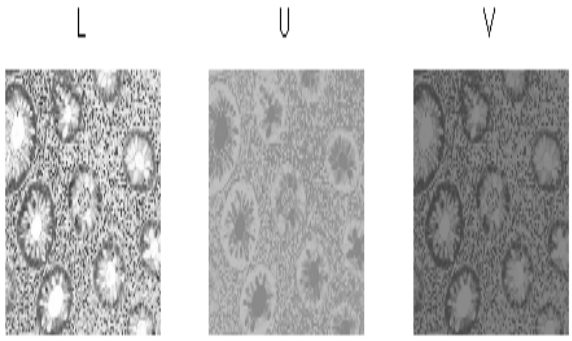

Figure 6. LUV Color Space of input image.

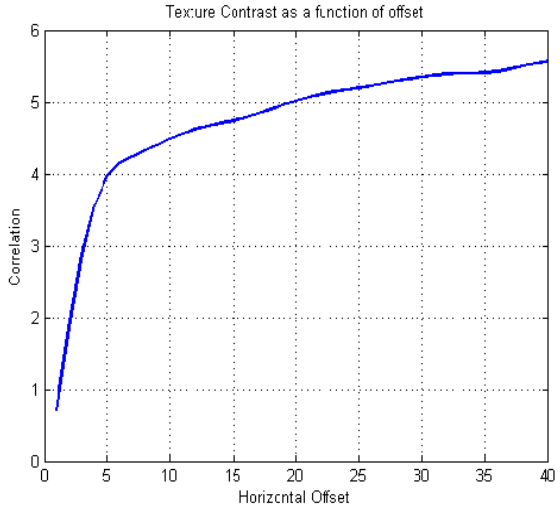

Figure 7. Texture contrast of input image using GLCM method.

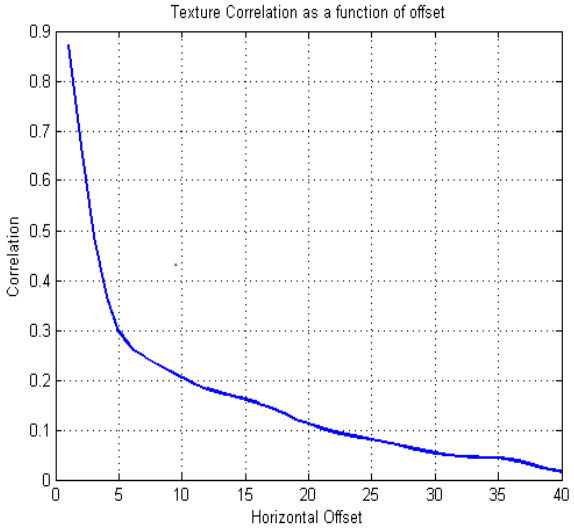

Figure 8. Texture correlation of image using GLCM method.

Figure 9. After training of images to the system database is updated.

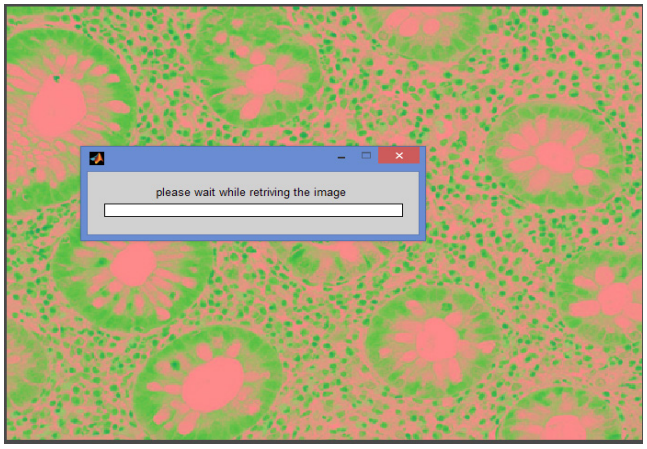

Figure 10. Retrieval of image.

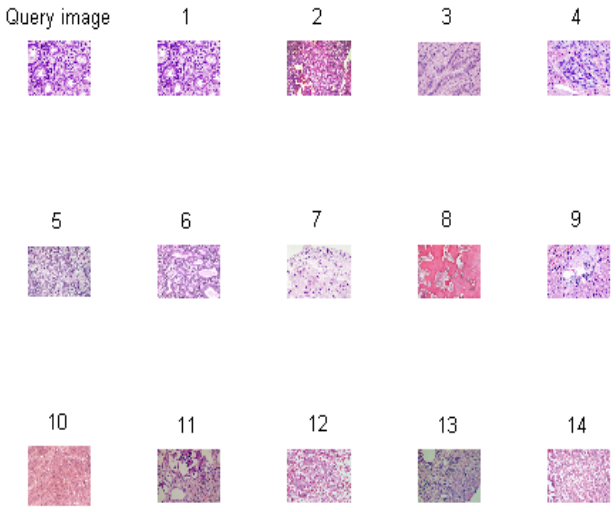

Figure 11. Retrieval of suitable 14 images to given Query image.

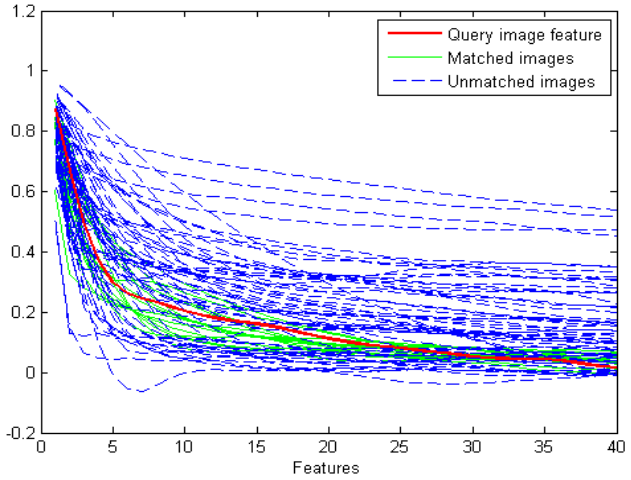

Figure 12. matched and unmatched features of an system database with Query image.

5. Conclusion and Future Work

The proposed techniques successfully, retrieve the histopathological image using GLCM method. In this technique, firstly converts the RGC colored image to LUV image then for this image we applied our proposed method called as GLCM technique. Our approach gives better image retrieval compared to other conventional methods. It uses the GLCM contract as well as GLCM correlation technique to retrieve an image. This proposed framework trains an image database also done and extracted the attribute of a medical image. In addition to the similarity score, the best image will be detected and retrieved successfully.

6. References

1. Mohanapriya S, Vadivel M. Automatic retrival of MRI brain image using multiqueries system. 2013 International Conference on Information Communication and Embedded Systems (ICICES), Chennai. 2013. p. 1099–103.
2. Zhang X, Su H, Yang L, Zhang S. Fine-grained histopathological image analysis via robust segmentation and large-scale retrieval. 2015 IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Boston, MA. 2015. p. 5361–8.
3. Hatipoglu N, Bilgin G. Feature extraction for histopathological images using Convolutional Neural Network. 2016 24th Signal Processing and Communication Application Conference (SIU), Zonguldak. 2016. p. 645–8.

4. Bug D, Schuler J, Feuerhake F, Merhof D. Multi-class single-label classification of histopathological whole-slide images. 2016 IEEE 13th International Symposium on Biomedical Imaging (ISBI), Prague, Czech Republic. 2016; 1392–6.
5. Cao J, Qin Z, Jing J, Chen J, Wan T. An automatic breast cancer grading method in histopathological images based on pixel-, object-, and semantic-level features. 2016 IEEE 13th International Symposium on Biomedical Imaging (ISBI), Prague, Czech Republic. 2016; 1151–4.
6. Spanhol FA, Oliveira LS, Petitjean C, Heutte L. A Dataset for Breast Cancer Histopathological Image Classification. IEEE Transactions on Biomedical Engineering. 2016 Jul; 63(7):1455–62.
7. Zhang G, Zhong L, Huang Y, Zhang Y. A Histopathological Image Feature Representation Method Based on Deep Learning. 2015 7th International Conference on Information Technology in Medicine and Education (ITME), Huangshan. 2015. p. 13–7.
8. Vu TH, Mousavi HS, Monga V, Rao G, Rao UKA. Histopathological Image Classification using Discriminative Feature-Oriented Dictionary Learning. IEEE Transactions on Medical Imaging. 2016 Mar; 35(3):738–51.
9. Sharma H et al. Appearance-based necrosis detection using textural features and SVM with discriminative thresholding in histopathological whole slide images. 2015 IEEE 15th International Conference on Bioinformatics and Bioengineering (BIBE), Belgrade. 2015. p. 1–6.
10. Ghosh S, Ghosh A. Content based retrival of malaria positive images from a clinical database. 2013 IEEE Second International Conference on Image Information Processing (ICIIP), Shimla. 2013. p. 313–8.
11. Zhang X, Liu W, Dundar M, Badve S, Zhang S. Towards Large-Scale Histopathological Image Analysis: Hashing-Based Image Retrieval. IEEE Transactions on Medical Imaging. 2015 Feb; 34(2):496–506.
12. Chen Q, Agu E. Exploring Statistical GLCM Texture Features for Classifying Food Images. 2015 International Conference on Healthcare Informatics (ICHI), Dallas, TX. 2015. p. 453–3.
13. Sompong C, Wongthanavasu S. MRI brain tumor segmentation using GLCM cellular automata-based texture feature. Computer Science and Engineering Conference (ICSEC), 2014 International, Khon Kaen. 2014. p. 192–7.
14. Ashu, Chhikara RR, Bansal D. GLCM based features for steganalysis. Confluence The Next Generation Information Technology Summit (Confluence), 2014 5th International Conference – Noida. 2014. p. 385–90.
15. Preethi G, Sornagopal V. MRI image classification using GLCM texture features. 2014 International Conference on Green Computing Communication and Electrical Engineering (ICGCCEE), Coimbatore. 2014. p. 1–6.
16. Maurya R, Singh SK, Maurya AK, Kumar A. GLCM and Multi Class Support vector machine based automated skin cancer classification. Computing for Sustainable Global Development (INDIACom). 2014 International Conference on, New Delhi, 2014, pp. 444–447.
17. Mirzapour F, Ghassemian H. Using GLCM and Gabor filters for classification of PAN images. 2013 21st Iranian Conference on Electrical Engineering (ICEE), Mashhad. 2013. p. 1–6.