International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

COPY RIGHT

ELSEVIER SSRN

IJIEMR Transactions, online available on 17th Nov 2018. Link :http://www.ijiemr.org/downloads.php?vol=Volume-07&issue=ISSUE-12

Title: A SURVEY ON IMAGE CLASSIFICATION TECHNIQUES FOR MEDICAL IMAGE DATA

Volume 07, Issue 12, Pages: 297–304.

Paper Authors

M. DOORVASULU NAIDU, DR. K. RAJAKUMAR

VIT University,Vellore,Tamil Nadu,India

USE THIS BARCODE TO ACCESS YOUR ONLINE PAPER

To Secure Your Paper As Per UGC Guidelines We Are Providing A Electronic Bar Code

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

A SURVEY ON IMAGE CLASSIFICATION TECHNIQUES FOR MEDICAL IMAGE DATA

[1]M. DOORVASULU NAIDU, [2]DR. K. RAJAKUMAR
[1]Research Scholar ,School of Computer Science and Engineering, VIT University,Vellore,Tamil Nadu,India
[2]Associate Professor,School of Computer Science and Engineering, VIT University,Vellore,Tamil Nadu,India
[1]mdoorvasulu.naidu@vitstudent.ac.in,[2]rajakumar.krishnan@vit.ac.in

Abstract— Image classification assumes a critical part in PC supported analysis and is a major experiment on image examination tasks. This examination identified with the utilization of strategies and procedures in abusing image handling result and classification techniques and in this manner approving the image arrangement result into therapeutic master data. The primary guideline of medicinal images order isn't just to achieve high exactness yet in addition to recognize which parts of human body are debilitated by the disorder .This paper revised the cutting edge of image classification methods to investigate human body illness. The survey secured recognizable proof of therapeutic picture arrangement methods, picture modalities utilized, the dataset and tradeoff for every procedure. Toward the end, the surveys demonstrated the change of image order systems, for example, to expand exactness and affectability esteem and to be possible utilized for PC helped determination are a big experiment and an open research.

Keywords— Image Classification,disease diagnosis, classification techniques, Support Vector Machine

I. Introduction

Image processing is a procedure to change over a image into modernized casing and play out a couple of exercises on it, to get an enhanced image or to expel some significant information from it. Classification between the articles is simple undertaking for people however it has ended up being a mind boggling issue for machines. An essential classification structure involves a camera settled tall completed the intrigued sector, where pictures are along these lines administered [1]. Characterization wires picture beams, pictures preprocessing, dissent recognizable proof, question division, incorporate extraction and challenge portrayal [2]. Classification system includes database that contains predefined outlines that differentiations and recognized inquiry arrange into fitting classification [3]. Picture arrangement is a principal and testing undertaking in different solicitation areas, including biomedical imaging, filmed observation, automobile course, mechanical pictorial audit, automaton course, and far-off distinguishing. Medical pictures have assumed a critical part in the decisive workup of patients. Mechanized grouping of therapeutic pictures is an attractive device to allocate the elucidation of images, and after that would help the master in determination of disorder. Compared with general picture acknowledgment, therapeutic pictures affirmation is all the more troublesome because of the higher unclearness and flightiness; by far most

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

of the therapeutic pictures substance are fundamentally the same as, yet in like manner phenomenal in their accentuation [4].With respect to highlights used for therapeutic images acknowledgment, it can be for the most part ordered into three gatherings: appearance, hue, surface highlights. For instance, in [5], appearance highlights, for instance minute unvarying and forger progresser are used to mastermind helpful X-beam pictures. A shading trajectory arena is deliberated in [6] for upgrading the execution of hysteroscopy picture gathering. The nearby twofold cases, plan by [7], are generally deliberate as a best in class picture include descriptor among surface descriptors, since it would more be able to viably portray surface data. It has been adequately associated to numerous applications, for example, confront acknowledgment, texture classification, scene acknowledgment, human acknowledgment and others.

A. Image Processing Steps

The high frequency of breast cancer in women, particularly in created nations, has expanded essentially over the most recent one decade. Despite the reality essentially less ordinary, breast growth additionally happens in women. Mammography is considered as the most tried and true technique in premature acknowledgment of bosom illness. Because of the great dimensions of roentgenograms to be scrutinized by specialists, the precision rate watches out for decrease, and modified examining of automated mammograms ends up being significantly appealing. It has been shown that twofold investigating of roentgenograms (consistent examining by twofold specialists or radiologists) extended the precision, yet at great expenses. Because of these PC supported analysis frameworks are vital to help the remedial staff to achieve high capability and sufficiency [8].

An unmistakable roentgenograms picture taking care of framework generally contains roentgenograms picture acquisition, pre-processing, division, highlight extraction, highlight assortment and classification. These procedures are executed and examinations the highlights. Figure 1 demonstrates Image processing steps.

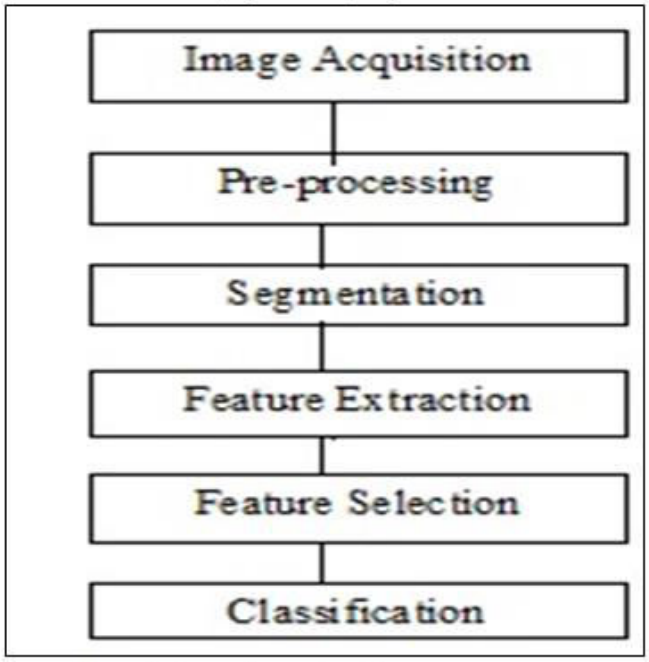


Figure 1 Image Processing Steps

B. Segmentation

Image segmentation(Picture division) is one of the fundamental issues in picture examination. The significance and utility of picture division has realized wide research and different proposed strategies, for instance, drive, shading, surface, et cetera, both modified and insightful. Albeit numerous division strategies have been appeared in legitimate composition, they can be disconnected into picture zone based, material science based and highlight cosmos built methods [9]. The unconfirmed procedure frizzy C-Means is the popular strategy used to membrane swelling edge in therapeutic picture [10]. It is ordinarily used to barrier pictures into areas that are in several wisdom

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

identical, or ensure specific substance criticalness, therefore giving resulting preparing stage abnormal state information about scene structure. Particular gathering estimations, for example, K-Means, in [11], and the mean move figuring are gotten to allocate picture addicted to K locales.

II. Classification Techniques

Picture classification is one of established issues of worry in picture preparing. The chose highlights of picture portrayal that are produced from include determination, are utilized order The objective of picture grouping is to foresee the classifications of the info picture utilizing its highlights. There are different methodologies for tackling this issue, for example KNN, Decision Trees, Baye's Classifier, SVM ,etc. and so forth. The accompanying are exhibits picture classification algorithms.

A. K-closest neighbor

K-closest neighbor classifier is a multicomponent reckonable classifier to describe planning and experiment information. In classification K is a client characterized consistent. The essential burden is fragile to the territory erection of information. K-NN be backslide reason [12,13] for bosom cytology classification.

B. Choice Trees

A choice tree is frequently utilized as a choice help instrument. It is a schema grid. Choice trees are comprises of three hubs resembling choice hubs, gamble hubs, culmination hubs [13].Can deal with nonparametric getting ready information .Does not required a broad plan and training. Gives dynamic connection between input elements to assess class enlistment and gives a course of action of standards are definitely not hard to disentangle.

C. Bayes Classifier

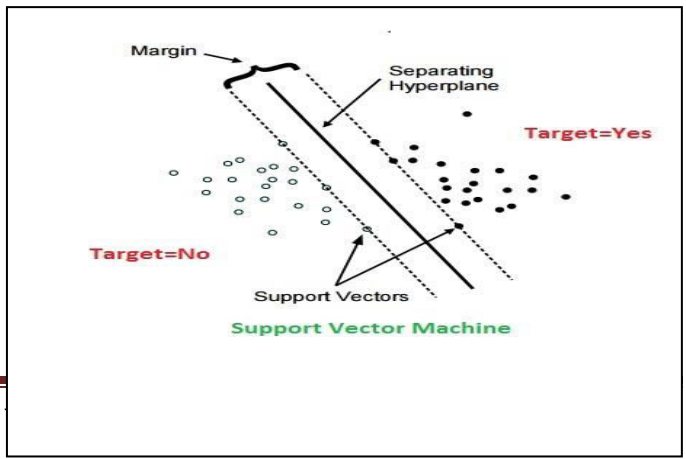
Baye's classifier is a direct randomness model. This model wears down Bay's hypothesis. It is a controlled machine system. In innumerable permits this model used for requesting hurtful and harmless core [13,14].

D. Artificial Neural Network (ANN)

ANN is a kind of computerized reasoning that mirrors a couple of components of the individual identity. An ANN contains a gathering of tiers, every tiers includes a plan of neurosis. Wholly neurons of every tiers are associated by weighted relationship with wholly neurosis on the previous and ensuing tiers. It customs nonparametric methodology. Execution and exactness be contingent on the framework arrangement and numeral of wellsprings of information. It is a information driven nature adaptable Method, viably handgrips uproarious sources of info. Calculation proportion is great. The planning of ANN is stretch charming.

E. Support Vector Machine(SVM)

In restorative SVMs are a course of action of allied regulated wisdom methodologies that inspect information and see plans, used for order and relapse examination [14]. The regular SVM is a non-randomness twofold straight model, i.e., it forecasts, for every specified information, which of two probable lessons the information is a person from. An arrangement undertaking customarily incorporates with preparing and testing data which involves a couple of data illustrations. Every event in the preparation set contains one "target regard" (class marks) and a couple of "qualities" (highlights) [15,16]. SVM has an extra favored stance of modified show decision as in both the



perfect number and zones of the basic limits is thusly gained in the midst of preparing. The execution of SVM to a great extent relies upon the kernel. Figure 2 demonstrates the SVM method example.

Figure 2 SVM method example

It picks up adaptability in the decision of the kind of the limit. Contains a nonlinear renovation. It gives a decent speculation proficiency[17]. The issue of outfitting is disposed of. Lessening in computational many-sided quality. Unassuming to oversee choice govern many-sided quality and Error recurrence.

III. Review of Literature

Basem O. Alijla et al. [18] has recommended a technique Fuzzy harsh set approach for choosing the most critical surface highlights in mammogram pictures. The outcomes demonstrate that the arrangement exactness were enhanced with the chosen includes likewise informational index measure is decreased. Promote examinations are required to confirm the value of other factual surface highlights to accomplish better the precision of arrangement.

Azhar Quddus et al. [19] has presented a method for extracting 2-D pictures in 3-D brain volumes. In this investigation, SVM is utilized for distinguishing 3-D MR measurements and for performing substance characterization of the hominoid cerebrum keen on different substance locales[20].The test outcomes uncover better heartiness execution with deference than precision, speediness, and multimodality.

Xingzheng Wang et al. [21] has described a novel shading range descriptor utilizing single-label SVM remained wished-for numerically displaying the patois shading array. Experiment outcomes demonstrated that near to 99.9% of patois hues and an extensive proportion of these hues are thickly appropriated in a substantially littler patois shading extent. In feature to promote the expansion of PC tongue picture experiment ,algorithms need to be developed.

Dong Liu et al. [22]given a strategy for Medical picture order utilizing spatial neighboring histogram in light of versatile nearby double examples. In this spatial adjoining histogram procedure to encode the small scale structures for picture portrayal is proposed. In this SVM is connected with various part works with default parameters esteems for getting more execution. To additionally enhance the execution actualize the swarm knowledge upgraded calculation is require.

Monjoy Saha, et al. [23] has suggested a technique for Computer-helped determination of bosom malignancy utilizing cytological pictures. Technique address a few disputes in bosom experiment-based PC including slide readiness, recoloring, tiny picturing, pre-preparing, division, highlight evocation and symptomatic grouping.

Bo Liu et al. [24] has described a method to enhance the execution of multi-class order, proposes multi-state-mapping (MSM) with SVM in light of progressive engineering, which maps the informational index with all classes into various element spaces at the distinctive conditions of the decay of a multi-class grouping issue as far as a parallel tree design [25]. In future different kernels are used for detailed province problems on each node of the twofold tree.

Xiaoming Liu et al. [26] has presented a method SVM-based highlight selection using designated geometry and surface highlights for mammogram arrangement. This strategy coordinate a SVM-based recursive element end (SVM-RFE) system with a standardized common data highlight determination (NMIFS) to dodge their solitary weaknesses while holding their focal points, and propose another

element choice technique, which is known as the SVM-RFE with a NMIFS channel (SRN).

Yasmeen Mourice George et al. [27] has recommended a method for Remote PC Bosam Cancer uncovering and analysis system based on Cytological pictures. In this an astute bosom tumor characterization framework was produced by utilizing four order techniques. In that precision of SVM and PNN is more grounded than the others.

M. S. Neofytou, et al. [28] has exhorted a strategy for PC analysis in Hysteroscopic Imaging. This technique utilizes factual highlights and dark level distinction measurements as contributions to SVM and PNN classifiers.This framework accomplished over 81% order exactness.

Fabian Lecron et al. [29] has described a method, 3-D Spine Classical reproduction Using One-Class SVM Regularization. This method uses a one-class SVM to compute similarities for statistical shape models. New show had connected to 3-D spine reproduction was assessed to genuine patient information for accomplishing more exactness.

Pedro P. Rebouças Filho et al.[30] are gave a strategy for exploration of hominid muscle massiveness: another way to deal with extricate highlights from restorative pictures. The qualities were separated from the bronchi pictures in ms and acquired an exactness of 1 less than 100% for the discovery and order of bronchi maladies, while the characteristics from the cerebrum pictures were removed and got a precision of 0.2 lesser than 100% for the recognition and grouping of blow.

Ruijie Zhang et al. [31] are exhibited a Medical picture grouping in light of multi-scale non-negative meager coding. The technique use multi-scale and relevant spatial data of restorative pictures to diminish the semantic hole in a huge degree and enhances arrangement exactness by utilizing SVM.

Gwenolé Quellec et al. [32] has exhibited a Multiple-Instance Wisdom for Abnormality Uncovering in Digital Mammography. In emphatically managed structure, typical SVM is utilized to outline include vector to a neighborhood name, and afterward to worldwide name with manual division of injuries on DDSM dataset.

Pol Cirujeda et al. [33] has described A 3-D Rises-variance Surface archetypal for forecast of knob relapse in Lung CT. It introduces a innovative picturing boot maker of bronchi malignancy backslide from 3-D surface investigation of CT pictures. The kernel-based SVM gives better performance in the account of Riemannian geometry of descriptor space.

Sinan Onal, et al. [34] are gave a consequently limit numerous genital mandible edifices on MRI[31]. The preeminent genital mandible locale is chosen utilizing a SVM classifier in light of surface and Haar-like highlights. The limitation issue of multiple bone is resolved through nonlinear regression approach.

Xiabi Liu et al. [35] are suggested another element determination technique in light of Fisher paradigm and Genetic optimization(FIG) for Communal CT picturing indications of bronchi maladies. The experiment is performed utilizing 5 classifiers among SVM is smarter to group the areas of comforts in bronchi CT pictures hooked on the CISL classifications.

Markus Harmsen et al. [36] has displayed a strategy for programmed Chin Age Impost utilizing SVM. A precise assessment is exhibited contrasting ostensible and genuine esteemed SVM and k closest neighbor grouping with the exactness of 91.57% and 96.16% separately.

IV. Conclusion

Medical image classification is an intriguing exploration territory, it combines the diagnosis

problem and examination purposes in the medical field. This paper has given the point by point audit of picture order strategies for determination of human body ailment incorporate pros and cons for every method. For the future work, the change of picture characterization systems will build precision esteem and hence possible to be utilized for PC helped finding, and more powerful strategies are being created.

Acknowledgment

We would like to precise our thankfulness to the university in given that a raised area for our research. We would also like to direct our gratitude to all the earlier researchers for their publications which helped a lot in our research.

References

[1] Xiao hongYu, and Hong Liu Huangshan, "Image Semantic Classification Using SVM In Image Retrieval" P. R.China, 26-28,Dec. 2009.

[2] Jianxin Wu ,"Efficient hik SVM learning for image classification", IEEE transactions on image processing, vol. 21, no. 10, october 2012.

[3] Bohyung Han, Member, IEEE, and Larry S. Davis, Fellow, IEEE, "Density-Based Multifeature Background Subtraction With Support Vector Machine" IEEE Transactions On Pattern Analysis And Machine Intelligence, Vol. 34,No. 5, May 2012

[4] Aha, D.W., Kibler, D., Albert, M.K., 1991. Instance-based learning algorithms. Mach.learn. 6, 37–66..

[5] H.Pourghassem,H.Ghassemian,Content-based medical image classification using a new hierarchical merging scheme,Comput.Med.ImagingGraph.32 (2008)651–661.

[6] M.Häfnera,M.Liedlgruber,A.Uhl,A.Vécsei,F.Wrba,Color treatment in endoscopic image classification using multi-scale local color vector patterns, Medical ImageAnalysis,16,pp.75–86.

[7] T.Ojala,M.Pietikainen,T.Mäenpaa,Multi resolution gray-scale and rotation invariant texture classification with local binary pattern, IEEE Trans.Pattern Anal. Mach.Intell.24(7)(2002)971–987

[8] K.RajaKumar, D. Sudheer, "A Review of Visual Information Retrieval On Massive Image Data Using Hadoop", International Journal of Control Theory and Applications, SCOPUS Indexed, 2016.

[9] Martin D., Fowlkes C., Tal D., Malik J. (2001)."A database of human segmented natural images and its application to evaluating algorithms and measuring ecological statistics". ICCV, 416–423.

[10] Wang P., Wang H, (2008). "A Modified FCM Algorithm for MRI Brain Image Segmentation". Future Biomedical Information Engineering.

[11] Ruan S., Moretti B., Fadili J., Bloyet D. (2002)."Fuzzy Markovian Segmentation in Application of Magnetic Resonance Images". Computer Vision and Image Understanding, 85, 54–69.

[12] Automatic breast cancer diagnostics based on k-means clustering and adaptive thresholding hybrid segmentation, in R.S. Choras (Ed.), Advances in Intelligent and Soft Computing, Vol. 102, Springer-Verlag, pp. 295– 303.

[13] Kowal, M., Filipczuk, P. and Korbicz, J. (2011a). Hybrid cytological image segmentation method based on competitive neural network and adaptive thresholding, Pomiary, Automatyka, Kontrola 57(11): 1448–1451.

[14] Marciniak, A., Obuchowicz, A., Monczak, A. and Kołodzinski, ´ M. (2005). Cytomorphometry of fine Needle biopsy

material from the breast cancer, Advances in Soft Computing, Vol. 30, Springer-Verlag, Berlin/Heidelberg, pp. 603–609.

[15] Y.Ireaneus Anna Rejani, Dr.S.Thamarai Selvi," Early Detection Of Breast Cancer Using Svm Classifier Technique", International Journal on Computer Science and Engineering Vol.1(3), 2009, 127-130

[16] Pelin GORGEL1 Ahmet SERTBAŞ 1 Niyazi KILIC2, Mammographic mass classification using wavelet based support vector machine, Researchgate(2009).

[17] Dr.K.Rajakumar, Deepa.G, Revathi. S, Shanmugapriya.S, "A Novel approach for content based image retrieval system based on wavelet with PCA using Haralic Texture", International Journal of Applied Engineering Research, SCOPUS Indexed, 2015.

[18] Basem O. Alijla ,Ahamad Tajudin Khader, Lim Chee Peng, Mohammed and Wong Li Pei "Fuzzy rough set approach for selecting the most significant texture features in mammogram images",IEEE 2013.

[19] Azhar Quddus, Senior Member, IEEE, and Otman Basir, Senior Member, IEEE "Semantic Image Retrieval in Magnetic Resonance Brain Volumes" IEEE transactions on information technology in biomedicine, vol. 16, no. 3, may 2012.

[20] K. Rajakumar, and Muttan "A framework for MRI image retrieval using curvelet transform and euclidean distance." Journal of Computer Science 9.3 (2013).

[21] Xingzheng Wang, Bob Zhang, Zhimin Yang, Haoqian Wang, and David Zhang, Fellow, IEEE "Statistical Analysis of Tongue Images for Feature Extraction and Diagnostics" IEEE transactions on image processing, vol. 22, no. 12, december 2013.

[22] Dong Liu ,Shengsheng Wang ,DezhiHuang Gang Deng , Fantao Zeng , Huiling Chen "Medical image classification using spatial adjacent histogram based on adaptive local binary patterns",Computers in Biology and Medicine 72(2016)185–200,Elsevier.

[23] Monjoy Saha, Rashmi Mukherjee, Chandan Chakraborty "Computer-aided diagnosis of breast cancer using cytological images:A systematic review", Tissue and Cell 48 (2016) 461–474 ,Elsevier.

[24] Bo Liu a , Yanshan Xiao b , Longbing Cao" SVM-based multi-state-mapping approach for multi-class classification" Knowledge-Based Systems 129 (2017) 79–96 Elsevier.

[25] Dr.K.Rajakumar, B.Shanmugapriya, "Medical Image Retrieval Using Rotated Complex Wavelet Filters With Haralick Texture Features", ARPN Journal of Engineering and Applied SCOPUS Indexed. 2015

[26] Xiaoming Liu and Jinshan Tang "Mass Classification in Mammograms Using Selected Geometry and Texture Features, and a New SVM-Based Feature Selection Method", IEEE systems journal, vol. 8, no. 3, september 2014.

[27] Yasmeen Mourice George, Hala Helmy Zayed, Mohamed Ismail Roushdy "Remote Computer-Aided Breast Cancer Detection and Diagnosis System Based on Cytological Images", IEEE systems journal, vol. 8, no. 3, september 2014.

[28] M. S. Neofytou, V. Tanos, I. Constantinou, E. C. Kyriacou, M. S. Pattichis ," Computer-Aided Diagnosis in Hysteroscopic Imaging", IEEE journal of biomedical and health informatics, vol. 19, no. 3, may 2015.

[29] Fabian Lecron∗, Jonathan Boisvert, Sa¨ıd Mahmoudi, Hubert Labelle, and Mohammed Benjelloun," Three-Dimensional Spine Model Reconstruction Using One-Class SVM

Regularization", IEEE transactions on biomedical engineering, vol. 60, no. 11, november 2013.

[30] Pedro P. Rebouças Filho a , Elizângela de S. Rebouças a , Leandro B. Marinho" Analysis of human tissue densities: A new approach to extract features from medical images", Pattern Recognition Letters 0 0 0 (2017) 1–8,Elsevier.

[31] Ruijie Zhang, Jian Shen, Fushan Wei, Xiong Lic,, Arun Kumar Sangaia "Medical image classification based on multi-scale non-negative sparse coding", Artificial Intelligence in Medicine(2017),Elsevier.

[32] Gwenolé Quellec, Mathieu Lamard, Michel Cozic, Gouenou Coatrieux, and Guy Cazuguel," Multiple-Instance Learning for Anomaly Detection in Digital Mammography", IEEE transactions on medical imaging, vol. 35, no. 7, july 2016.

[33] Pol Cirujeda, Yashin Dicente Cid, Henning Müller, Daniel Rubin, Todd A. Aguilera," A 3-D Riesz-Covariance Texture Model for Prediction of Nodule Recurrence in Lung CT", IEEE transactions on medical imaging, vol. 35, no. 12, december 2016.

[34] Sinan Onal, Susana Lai-Yuen, Paul Bao, Alfredo Weitzenfeld, and Stuart Hart, "Automated Localization of Multiple Pelvic Bone Structures on MRI", IEEE journal of biomedical and health informatics, vol. 20, no. 1, january 2016.

[35] Xiabi Liu, Ling Ma, Li Song, Yanfeng Zhao, Xinming Zhao, and Chunwu Zhou," Recognizing Common CT Imaging Signs of Lung Diseases Through a New Feature Selection Method Based on Fisher Criterion and Genetic Optimization", IEEE journal of biomedical and health informatics, vol. 19, no. 2, march 2015.

[36] Markus Harmsen, Benedikt Fischer, Hauke Schramm, Thomas Seidl,and Thomas M. Deserno, "Support Vector Machine Classification Based on Correlation Prototypes Applied to Bone Age Assessment", IEEE journal of biomedical and health informatics, vol. 17, no. 1, january 2013.