Industrial Engineering Journal
ISSN: 0970-2555
Volume : 49, Issue 7, No. 1, July : 2020

A PREPROCESSING ALGORITHM-BASED EXPERIMENTAL INVESTIGATION OF IMAGE PROCESSING FOR BONE CANCER RECOGNITION AND IDENTIFICATION

Modem. Jeevan Kumar, N. Harish, I. Shalini, Dept of Computer Science and Engineering, Sree Venkateswara College Of Engineering, Nellore (Dt), Andhra Pradesh, India.
V.Praveen Kumar, Dept of Electronics and Communication Engineering, Sree Venkateswara College Of Engineering, Nellore (Dt), Andhra Pradesh, India.

ABSTRACT
People communicate their emotions through speech and facial expressions, whether they are aware of doing so or not, making the study of emotions a significant area of study that may help with a variety of goals. Voice, writing, and pictures are only a few of the informative mediums that may be used to understand emotions. In order to improve prediction accuracy and decrease loss, this article developed a deep CNN model for emotion prediction from speech and facial expression. Additionally, MFCC was used to remove features from the provided speech samples for the speech CNN model. In humans, fractures, tumours, and cancer are the most frequent causes of bone deterioration. Since manual bone cancer forecast and recognition requires more time and correctness, it is challenging to identify these. This study processes images of malignant and non-cancerous bones using image processing techniques to identify bone cancer. A preprocessed MRI picture has been cleaned of noise. The preprocessing for the picture is done with a median filtering method. The thresholding procedure was then used to enhance the picture. Following feature extraction, the photos are then categorised using the extracted features.

Keywords: bone, cancer, image, tumour, classification

1. INTRODUCTION
The four types of tissue which make up the body of a person are connective tissue, sensory tissue, epithelial tissue, and muscle tissue [1,2]. The two distinct kinds of tissue which make up connective tissue are fitting connective tissues and specialised connective tissues. These vascularized, rigid, and stiff bone structures serve as the basis for these connective tissue structures. [3]. Numerous collagen fibres and mineral ions in an extracellular network reinforce bone tissue. These three different cell types—osteocytes, osteoblasts, and osteoclasts—combine to form this tissue. [4] The 206 bones that make up the skeleton are mostly made up of trabecular bone, which makes up 20% of the mass, and cortical bone, which makes up around 80% of the bulk. A biological bone structure called an osteon looks like a harbour harvesian canal because it is surrounded by concentric layers of bone. In the osteon regions, their intensity varies according on the level of mineralization [5,6]. Any fractures or abnormalities (such as malignancy) in the bone must be expected to heal as quickly as feasible [7]. The malignant basic bone tumour osteosarcoma is one kind of human bone cancer. The illness might deteriorate and metastatically spread to other regions or organs at this point. At this point, the spread of cancer cells eventually leads to patient death. Bone cancer must be diagnosed in order to be treated, much like other carcinomas of the prostate, lungs, thyroid, and liver [15].

2. LITERATURE REVIEW
The most common reason for cancer deaths worldwide is the projected level before the stage of metastases. Eighty percent of all bone metastases are caused by cancers of the breast, lung, prostate, and

kidney. In 1990, there were Predictions estimate the number of new cases of lung cancer at 1.04 million. It was suggested that bone examining via 99m monophosphate identified early bone metastasis within a few cases of bronchogenic carcinoma prior to these tumours got in medicine or radiographically apparent and it had been suggested that bone examining with 99m monophosphate identified early bone metastasis in an a few instances of bronchogenic carcinoma prior to these lesions became clinically or radiographically obvious. In previous therapies, CT and MRI scan findings were used to guide tracking, treatment, and evaluation following radiation therapy.

These methods, which are sometimes referred to as anatomical imaging, have the advantage of making it feasible to provide a high-resolution picture of the anatomy while also promoting the use of exceedingly difficult RT procedures.

The de-noising approach using wavelet thresholding Discrete wavelet transform (DWT), created by Donoho and Johnstone, is frequently used with ECG data. In order to reduce the extra material noise, Sayadi O and Brittain J. S. employed Wiener and Kalman filtering techniques in 2008. A wavelet decomposition-based method for ECG signal de-noising edge detection has been suggested by Harishchandra T. Patil et al. (2013) [8] by using the most severe and least wavelet coefficients that exist at each level. Wavelet's depiction of images is incredibly subpar and insufficient. A few wavelet-based theories for the analysis of bone tumours were recently introduced.

The many uses of wavelet-based image processing were discussed in this section. Wavelet represents pictures ineffectively but effectively. Recently, a number of wavelet-based mammography examination techniques have been developed. They used a doubletree classifier in their analytical framework and several quantifiable elements of their mammography examination inquiry. As Ferreira and Borges showed in 2003[9], the largest wavelet coefficients in low recurrence (near estimation) wavelet changes may be employed as a mark vector for mammography comparisons. Essamet et al. (2007) concentrated a portion of the top coefficients of the estimate in multilevel disintegration using a multidetermination mammography examination. [10]Nisthula et al. (2013) use a number of image processing techniques, such as contrast enhancement, edge detection, and picture combining, to quickly and accurately identify malignant tissue in bone.

3. METHODOLOGY

The four crucial operations of the suggested system for diagnosing brain cancer are preprocessing, segmentation, feature extraction, and classification. Preprocessing is performed on the obtained MRI scan picture, as previously mentioned [11,18]. After the image has been preprocessed, it is segmented. After segmenting the picture, the features are subsequently extracted. The image is classified using the area and the extracted features at the end [12].

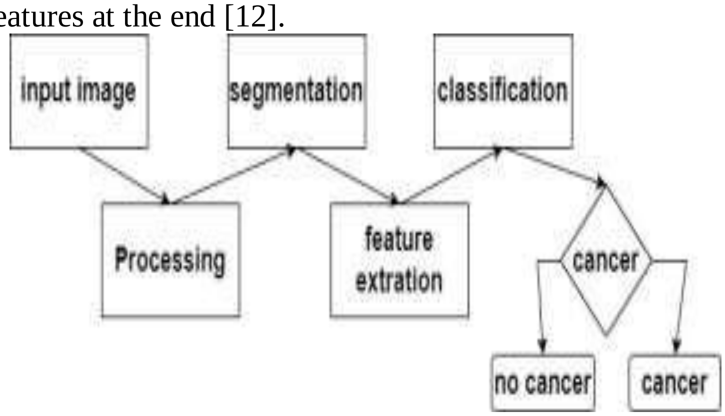

Fig1. System workflow

Image Preprocessing

At this point, the main focus is on photo improvement. Improving the overall look of the data in the image is the primary goal of image enhancement [13]. Therefore, the outcomes are better suited for additional image processing. We convert the colour image to a binary image to get a better result. There are several separate phases in this level [14].

Image Segmentation

This phase of the picture processing process is crucial. Segmentation separates the image into several segments, as the name implies. By segmenting the image according to the properties of the pixels, the tumour region may be found. The preprocessed photo is converted into a binary image to extract the tumour area. These four stages are involved in segmentation.

Feature Extraction

A technique for cutting down on the number of resources obligatory to clarify a large quantity of data is feature extraction. The vast number of factors that must be taken into account while undertaking complex data analysis is one of the main challenges. If a classification method has a high number of variables, which uses a lot of memory and processing resources, it may overfit the training data and be unable to generalise to new samples[16,17,19,20].

The phrase "feature extraction," which covers a wide range of techniques, refers to ways to create combinations of variables that avoid these issues while still properly representing the data[21]. Area and perimeter are the two properties that our algorithm extracts. These characteristics are used to categorise a tumour in an image.

CLASSIFICATION

A computer vision approach called image classification uses the visual information of the images to categorise them. A human figure might be detected in a picture using an image classification method, for example. While it is simple for humans to recognise an object, computer vision applications still struggle with effective image categorization. Among the acquired characteristics, we assess the feature area to define the tumour. We have two target classes here: 0 and 1. Class 0 indicates the nonexistence of cancer, but class 1 indicates its existence. After determining the size of the tumour, we classified the picture. The relevant areas of all the MRI images in the collection were carefully examined. We then came up with threshold values for each level.

Fig2. Proposed process flow

4. RESULTS

The cancerous image's outcome is as follows:

Fig3.MRI Input image

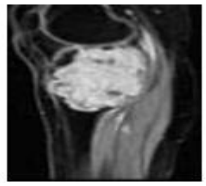

Fig 3. MRI Input image

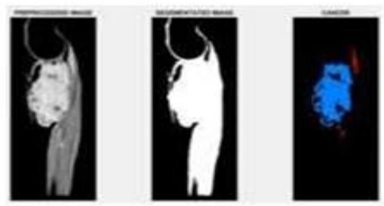

Fig4.Output for each module

4.2 Non-cancerous imaging result

Fig.5. MRI Input image

Fig6. Output for each module

CONCLUSION

In this paper, we provide an algorithm capable of detecting and producing results for bone cancer when compared to other widely used algorithms. This method may make it simple to locate the tumour. If the submitted image does not show a tumour, the consequence is No Cancer.

If a tumour is seen in the image that was complete, malignancy is indicated. Medical experts could use the recommended method to identify whether or not a photograph is cancerous. Thus, patients can receive early rehabilitation.

REFERENCES

1. Ghantasala, G. P., Reddy, A. R., & Arvindhan, M. Prediction of Coronavirus (COVID-19)DiseaseHealthMonitoringwithClinicalSupportSystemandItsObjectives.InMachineLearning andAnalyticsin HealthcareSystems(pp. 237-260). CRC Press.
2. Reddy,A.R.,Ghantasala,G.P.,Patan,R.,Manikandan,R.,&Kallam,S.SmartAssistance of Elderly Individuals in Emergency Situations at Home. Internet of MedicalThings:RemoteHealthcareSystems and Applications, 95.
3. Krishna,N.M.,Sekaran,K.,Vamsi,A.V.N.,Ghantasala,G.P.,Chandana,P.,Kadry,S., ... & Damaševičius, R. (2019). An efficient mixture model approach in brain-machineinterface systems for extracting the psychological status of mentally impaired personsusingEEGsignals.IEEEAccess, 7, 77905-77914.
4. Ghantasala,G.P.,Kallam,S.,Kumari,N.V.,&Patan,R.(2020,March).TextureRecognizationandImage SmoothingforMicrocalcificationandMassDetectioninAbnormal Region. In 2020 International Conference on Computer Science, EngineeringandApplications (ICCSEA) (pp. 1-6).IEEE.
5. Chandana, P., Ghantasala, G. P., Jeny, J. R. V., Sekaran, K., Deepika, N., Nam, Y., &Kadry, S. (2020). An effective identification of crop diseases using faster region basedconvolutional neural network and expert systems. International Journal of Electrical andComputerEngineering(IJECE), 10(6), 6531-6540.
6. Kumari, N. V., & Ghantasala, G. P. (2020). Support Vector Machine Based SupervisedMachine Learning Algorithm for Finding ROC and LDA Region. Journal of OperatingSystemsDevelopment&Trends, 7(1), 26-33.
7. Ghantasala, G. P., & Kumari, N. V. (2021).Identification of Normal and AbnormalMammographic Images Using Deep Neural Network. Asian Journal For Convergence InTechnology (AJCT), 7(1), 71-74.
8. Sujatha, K. Pappa, N. Senthil, K. Kumar, SiddharthNambi, U. and Raja Dinakaran, C. R.(2013)IntelligenParallelNetworksforCombustionQualityMonitoringinPowerStation Boilers, Trans Tech Publications, Switzerland, Advanced Materials Research, Vol.699,pp.893-899.
9. C.B.R Ferreira, D.L. Borges [2003], Analysesof mammogram classification using awavelettransform decomposition, PatternRecognitionLetters,2003,24,973–982.
10. Nisthula P, Mr.Yadhu.R.B,. "A Novel Methodto Detect Bone Cancer Using ImageFusion and Edge Detection", International Journal of Engineering and Computer ScienceISSN:2319-7242Volume2Issue6June
11. Ghantasala, G. P., & Kumari, N. V. (2021). Breast Cancer Treatment Using AutomatedRobot Support Technology For Mri Breast Biopsy. INTERNATIONAL JOURNAL OFEDUCATION,SOCIAL SCIENCES AND LINGUISTICS,1(2), 235-242.
12. Ghantasala, G. P., Tanuja, B., Teja, G. S., & Abhilash, A. S. (2020). Feature Extractionand Evaluation of Colon Cancer using PCA, LDA and Gene Expression. Forest, 10(98),99.
13. Kishore, D. R., Syeda,N., Suneetha, D., Kumari, C. S., & Ghantasala, G. P. (2021).Multi Scale Image Fusion through Laplacian Pyramid and Deep Learning on ThermalImages.Annals of the Romanian Societyfor Cell Biology, 3728-3734.
14. Patan, R., Ghantasala, G. P., Sekaran, R., Gupta, D., & Ramachandran, M. (2020). Smarthealthcare andqualityof service inIoTusinggrey filterconvolutionalbasedcyberphysicalsystem. Sustainable Cities and Society, 59, 102141.

15. Ghantasala, G. P., Kumari, N. V., & Patan, R. (2021). Cancer prediction and diagnosishingedonHCMLinIOMTenvironment.In MachineLearningandtheInternetofMedicalThings in Healthcare (pp. 179-207). AcademicPress.
16. MANDAL,K.,GHANTASALA,G.P.,KHAN,F.,SATHIYARAJ,R.,&BALAMURUGAN, B. (2020). Futurity of Translation Algorithms for Neural MachineTranslation(NMT)andItsVision. NaturalLanguageProcessinginArtificialIntelligence,53.
17. G. S. Pradeep Ghantasala, Nalli Vinaya Kumari. Mammographic CADe and CADx forIdentifyingMicrocalcificationUsingSupportVectorMachine.JournalofCommunicationEngineering&Systems. 2020; 10(2): 9–16p.
18. G. S. Pradeep Ghantasala, Nalli Vinaya Kumari. Mammographic CADe and CADx forIdentifyingMicrocalcificationUsingSupportVectorMachine.JournalofCommunicationEngineering&Systems. 2020; 10(2): 9–16p.
19. Ghantasala, G. P., Reddy, A., Peyyala, S., & Rao, D. N. (2021). Breast Cancer PredictionInVirtueOfBigDataAnalytics. INTERNATIONALJOURNALOFEDUCATION,SOCIALSCIENCES AND LINGUISTICS, 1(1), 130-136
20. Bhowmik, C., Ghantasala, G. P., & AnuRadha, R. (2021). A Comparison of Various DataMining Algorithms to Distinguish Mammogram Calcification Using Computer-AidedTesting Tools. In Proceedings of the Second International Conference on InformationManagementand MachineIntelligence(pp. 537-546).Springer,Singapore.
21. Sreehari, E., & Ghantasala, P. G. (2019). Climate Changes Prediction Using SimpleLinear Regression. Journal of Computational and Theoretical Nanoscience, 16(2), 655-658.