



# OPEN ACCESS INTERNATIONAL JOURNAL OF SCIENCE & ENGINEERING

## REVIEW OF AUTOMATIC QUALITY ASSESSMENT OF ECHOCARDIOGRAPHY IN APICAL FOUR CHAMBERS USING CONVOLUTIONAL NEURAL NETWORK

Ms. Apurva Rajaram Randive

P.G Student, Computer Science and Engineering, VPKBIET, Baramati, India  
apurvarandive26@gmail.com

**Abstract:** Now-a- day's main cause of premature death is due to heart disease. People are taking less care of heart. This paper proposes to study Convolutional Neural Networks in medical science. It focuses on echocardiography. 2D echocardiogram is the test in which pictures of heart and various parts of heart are taken with the help of probe. The motive of this work is to decrease the overhead of the cardiologist. This approach will result in pointing the abnormality in the heart. Since, cardiologist and less experienced surgeons may take a while to figure out the defect or may miss the defect in the heart, this is a powerful approach which can detect even a little defect in heart which human eye tends to ignore.

**Keywords:** Convolutional neural network, Deep learning, Echocardiography, Quality assessment.

### I INTRODUCTION

In recent years tremendous people are died due to heart disease. It is a leading cause of death. The most common cause of heart disease is narrowing or blockage of the coronary arteries, the blood vessels that supply blood to the heart itself. Early sign of heart disease will help you to choose the best treatment based on doctor recommendations to you. In an echocardiogram of heart, these echoes are turned into moving picture of your heart. Echocardiogram is a common test using sound wave map out shape and size of heart. This paper has focused on echocardiography where the decision is to detect the defect in the four chambers of heart quick. This paper proposes to study Convolutional Neural Networks in medical science. It focuses on echocardiography .The term echocardiography means that the internal structure of a patient's heart is studied through the images. The ultrasound waves create these images. The abnormalities in these images are found through echo.

In machine Learning System deep neural nets and large number of parameter are very powerful. Neural network is facing serious problem with over fitting. In prediction of test time large neural nets are slow due to over

fitting problem. The solution of this problem is to develop a technique of Dropout. In Neural network during training randomly drop unit is basic idea of this technique [6].

In [4], Author proposed method Real time Scan Assistant. This help to non -expert user to capture apical four chambers views in echocardiography. This algorithm used two techniques 1) parametric multi chamber-model 2) kalman Filter framework.

In [9] M. Grossgasteiger et al described how image quality influences different echocardiography methods. In a cardiac surgery evaluating left ventricular function Transesophageal echocardiography has become a standard tool. It is necessary to obtain the good quality of an image to find the defect in chambers of the heart. Quality of image differs from examinations and patients.

The operator skill is very important for the successful collection of ultrasound data. In echocardiography, the heart is bounded by ribs and lungs issues. They have some problem with naïve user to obtain correct position of probe so it is the need to provide the standard tool that can guide and train naïve users to obtain a position of the probe. They proposed B-mode images that provide user guidelines naïve user, improve their skill and

Suitable acoustic windows for image quality [11].

The various reasons for loss of quality of echocardiogram image also contain some distractions. So the result affect in further diagnosis of patients. Because of this quality of image is degrading. To overcome this problem developed method, Real time feedback of acoustic contact along phased array transducer is helpful to obtain good image quality. K-space formulation is used for ultrasound imaging system. The proposed method cause problem is reverberations from obstructing structure close to transducer [3].

In [5] the author described nonlocal (NL)-means useful for speckle reduction in ultrasound (US) images. Bayesian framework is proposed. As compared to other state of art method has given better performance. It has obtained accurate information of edge and structure details of image and preserves its image data. This method is needed for image registration or image segmentation for

Optimized Bayesian Nonlocal Means (OBNLM) filter.

Author in [2] proposed a system which exploits motion in echocardiogram videos as well as cues from both cardiac structures for automatic view classification. They represented set of novel feature. Every image is classified in independently in testing time. This system gives good result.

They proposed a fully automatic system for cardiac view classification of echocardiogram [7]. The echo study has given different pre-defined standard views. Development of this system used machine learning technique. They extract knowledge from annotated database. They classify four standard cardiac views. This method is helpful to achieve accuracy of train and test dataset.

In[12]proposed technique update normal values for cardiac chambers .It may assume that lot of parameter in convolutional layer is missing. Over fitting is not a problem and therefore dropout would not have much effect.

**II ANALYSIS OF STUDY**

<b>Paper</b>	<b>Technique/Objective</b>	<b>Limitation</b>
S.Snare, H.Torp, “Real-Time Scan Assistant for Echocardiography”2012	This system is useful to non-expert user to capture apical four chamber views.	They need improvement of detection of foreshortening/oblique cuts.
Ciampi and B. Villari “Role of echocardiography in diagnosis and risk stratification in heart failure with left ventricular systolic Dysfunction.” 2007	They Provide useful information related to patient disease.	This system required relative inferior image quality. It is compare with 2D echocardiography images.
Matthew D. Zeiler and Rob Fergus. “Visualizing and Understanding Convolutional Networks Resonance Imaging”,2014.	They Provide only limited prediction for each image.	It is the Need to improve different loss functions. It is used only single object per image. They need to use multiple objects per image.
Sheng-Wen Huang, Emil Radulescu, Shougang Wang” Detection and display of acoustic window for guiding and training cardiac ultrasound users”,2014.	This system provides users information about acoustic Window quality	This system needs to provide less experienced user tools and guideline
J. H. Park, S. K. Zhou,” Automatic Cardiac View Classification of Echocardiogram”,2007.	They developed a technique fully automatic system cardiac view classification.	This system deals with only four views.
Ritwik Kumar, Fei Wang, “Echocardiogram View Classification using Edge Filtered Scale-invariant Motion Features”,2009.	They exploit cues in motion in echocardiogram video and cardiac structure.	It is the need of hierarchical classification technique to improve recognition rate.

### III CONCLUSION

The proposed approach provides framework for automatic quality assessment of echo data using deep neural network model. In this survey, it is observed that there are various echocardiography methods. This method is very useful capturing various positions of Probe. It is necessary to obtain good quality of images for analysis of defects.

### REFERENCES

[1] Amir H. Abdi, Christina Luong” Automatic Quality Assessment of Echocardiograms using Convolutional Neural Networks: Feasibility on the Apical Four-chamber View”, DOI 10.1109/TMI.2690836, IEEE Transactions on Medical Imaging, 2017.

[2] R. Kumar, F. Wang, D. Beymer, and T. Syeda- Mahmood, “Echocardiogram view classification using edge filtered scale-invariant motion features,” in 2009 IEEE Conference on Computer Vision and Pattern Recognition, June 2009, pp. 723–730.

[3] L. Løvstakken, F. Ordernd, and H. Torp, “Real-time indication of acoustic window for phased-array transducers in ultrasound imaging,” Proceedings of IEEE Ultrasonic Symposium, pp. 1549–1552, 2007.

[4] S. R. Snare, H. Torp, F. Orderud, and B. O. Haugen, “Real-time scan assistant for echocardiography,” IEEE Trans. Ultrasonic, Ferroelectrics, and Frequency Control, vol. 59, no. 3, pp. 583–589, 2012.

[5] P. Coup’e, P. Hellier, C. Kervrann, and C. Barillot, “Nonlocal means based speckle filtering for ultrasound images,” IEEE Transactions on Image Processing, vol. 18, no. 10, pp. 2221–2229, 2009.

[6] N. Srivastava, G. Hinton, A. Krizhevsky, I. Sutskever, and R. Salakhutdinov, “Dropout: A simple way to prevent neural networks from overfitting,” Journal of Machine Learning Research, vol. 15, pp. 1929–1958, 2014.

[7] “Automatic cardiac view classification of echocardiogram,” Proceedings of the IEEE International Conference on Computer Vision, pp. 0–7, 2007

[8] Q. Ciampi and B. Villari, “Role of echocardiography in diagnosis and risk stratification in heart failure with left ventricular systolic dysfunction.” Cardio vascular ultrasound, vol. 5, no. 34, 2007.

[9] M. Grossgasteiger et al., “Image Quality Influences the Assessment of Left Ventricular Function: An Intraoperative Comparison of Five 2-Dimensional Echocardiographic Methods With Real-time 3-Dimensional Echocardiography as a Reference,” Journal of Ultrasound in Medicine, vol. 33, no. 2, pp. 297–306, 2014.

[10] M. D. Zeiler and R. Fergus, “Visualizing and understanding convolutional networks,” Lecture Notes in

Computer Science, vol. 8689 LNCS, no. PART 1, pp. 818–833, 2014.

[11] “Detection and display of acoustic window for guiding and training cardiac ultrasound users,” Progress in Biomedical Optics and Imaging- Proceedings of SPIE, vol. 9040, 2014.

[12] R. M. Lang et al., “Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging,” Journal of the American Society of Echo cardiography, vol. 28, no. 1, pp. 1–39, Aug 2016.