Case Report

BIOMEDICAL Journal of Scientific & Technical Research

ISSN: 2574 -1241

DOI: 10.26717/BJSTR.2023.50.007939

Fetal Brain Abnormality Classification from 2D Ultrasound Images

Sridharan K[1]*, Gokul N[2], Giridharan L[2] and Akash deep V[2]

[1]*Professor, Department of Information Technology, Panimalar Engineering College, India*

[2]*Student, Department of Information Technology, Panimalar Engineering College, India*

***Corresponding author:** Sridharan K, Professor, Department of Information Technology, Panimalar Engineering College, Chennai, India

ARTICLE INFO

Received: May 01, 2023

Published: May 11, 2023

Citation: Sridharan K, Gokul N2, Giridharan L and Akash deep V. Fetal Brain Abnormality Classification from 2D Ultrasound Images. Biomed J Sci & Tech Res 50(2)-2023. BJSTR. MS.ID.007939.

Introduction

Fetal brain abnormalities are a significant concern in prenatal diagnosis, and their early detection and classification are crucial for proper management and intervention. Ultrasound imaging is the most widely used modality for prenatal diagnosis, but the accurate identification and classification of fetal brain abnormalities from 2D ultrasound images require specialized training and expertise. Deep learning-based classification can potentially address this challenge and improve the efficiency and accuracy of prenatal diagnosis. In this case report, we present a case of fetal brain abnormality classification using machine learning techniques applied to 2D ultrasound images.

Case Presentation

A 30-year-old pregnant woman presented for a routine prenatal ultrasound scan at 22 weeks of gestation. The ultrasound scan revealed an abnormality in the fetal brain. Specifically, the ultrasound images showed ventriculomegaly, which is the dilation of the lateral ventricles of the brain. The maximum diameter of the lateral ventricles was measured at 11mm, which is above the normal range for gestational age. Additionally, there was an abnormality in the shape of the fetal brain, which was identified as a mild form of posterior fossa anomaly.

Methods

To classify fetal brain abnormality, we used a machine learning approach. We collected a dataset of 2D ultrasound images from 50 cases of fetal brain abnormalities and 50 normal cases. The images were pre-processed to remove noise and artifacts. We then applied a deep learning algorithm to the images to classify them as normal or abnormal. The deep learning algorithm was trained on the dataset using transfer learning, which leverages pre-trained models on large datasets to improve the accuracy of the model. The accuracy of the algorithm was evaluated using a holdout dataset of 20% of the images. The deep learning algorithm used in this study was a convolutional neural network (CNN), which is a type of deep learning algorithm that is particularly suited for image classification. The CNN consisted of multiple layers, including convolutional layers, pooling layers, and fully connected layers. The convolutional layers extracted features from the ultrasound images, while the pooling layers reduced the dimensionality of the features. The fully connected layers then used the features to classify the images as normal or abnormal.

Results

The deep learning algorithm achieved an accuracy of 92% in classifying the fetal brain abnormalities from 2D ultrasound images. The algorithm was able to correctly identify the ventriculomegaly and the mild posterior fossa anomaly in the case presented in this report.

Discussion

The use of machine learning algorithms for the classification of fetal brain abnormalities from 2D ultrasound images can improve the accuracy and efficiency of prenatal diagnosis. The high accuracy achieved in this case report suggests the potential of this approach for clinical use. However, further validation and testing are needed before the algorithm can be used as a diagnostic tool.

Conclusion

Fetal brain abnormality classification using machine learning techniques applied to 2D ultrasound images is a promising approach for early detection and management of these conditions. Further studies are needed to validate the accuracy of the algorithm and to explore its potential for clinical use.

ISSN: 2574-1241

DOI: 10.26717/BJSTR.2023.50.007939

Sridharan K. Biomed J Sci & Tech Res