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Detection of Fetal CNN anomalies using Deep Learning Approach

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Objective

This study focuses on reviewing the use of deep learning to Detect Fetal CNN anomalies.

Methods

This study is a systematic review study. In this study search was performed of the following databases: Google scholar, PubMed, Cochrane Register of Controlled Trials, EMBASE, and MEDLINE. Relevant articles were reviewed. Key components were elicited: (CNS) anomalies, prenatal ultrasonography, Deep convolutional neural networks (CNNs), deep Learning….

Results

RESULT CNSM is a main factor leading to fetal stillbirth or death after delivery, and it has been studied by medical experts Early screening of CNSM is very important. main inspection method is ultrasound, which can provide a reasonable basis for the prenatal diagnosis of CNSM. it is found that ultrasound misdiagnosis and missed diagnosis sometimes occur during the process due to the interference of factors. There are 3 major challenges in fetal MR imaging that affect image quality and reliable anatomic delineation First, fetal brain anatomy changes rapidly with advancing gestational age (GA), resulting in dramatic morphologic changes in brain tissues. Cortical maturation during the second and third trimesters transforms the smooth fetal surface into a highly convoluted structure. Second, changes in water content accompanying active myelination introduce high variations in MR imaging signal intensity and contrast across GAs. Third, at times, artifacts corrupt fetal images. For example, maternal respiration and irregular fetal movements often result in motion artifacts. Differences in conductivity between amniotic fluid and tissues can cause standing wave artifacts. In addition, the large for the maternal abdomen and limited scan time result in reduced image resolution and partial volume effects, in which a single image voxel may contain mixed tissues. These artifacts are more severe in fetal brains than in adult brains. Altogether, these 3 issues hamper fetal brain segmentation the ultrasound diagnosis in the second trimester is more accurate than the first trimester. The studies shown that the most feasible period for the examination of the fetal shape and fetal structure is the second trimester, which could display the fetal central nervous system and its growth and development more clearly, showing the significance of ultrasound in clinical scan of fetal CNSM. it was found that compared with the conventional ultrasound that the ultrasound image based on deep learning had higher application value in CNS examination. DL algorithms successfully split the fetal brain skull Used with more than 90% accuracy and sensitivity to help diagnose prenatal ultrasound be. also Reduce the number of false negative findings on nervous system defects and help Reducing the shortage of available sonologists for prenatal ultrasound examination is another benefit of DL algorithms. principle of deep learning is mainly to use the deep neural network models to analyze and study the data and to improve the efficiency through feature extraction and feature classification so that more important application value can be reflected in the processing of medical images. Moreover, the public medical image database and the medical image challenge data set have enabled the deep learning methods to be well trained and verified in medicine, and the results obtained are more and more effective, so they have been widely recognized and researched. ultrasonography will one day be freely available, using machines equipped with authorized AI techniques. It is well known that training a qualified sonologist is expensive and takes a long time (for doctors in China this takes at least 3–5 years after graduation). Training appropriate DL algorithms is neither easy nor inexpensive but, considering the replicability and the expected improvement in accuracy of this method, as well as the increasing complexity of tasks of which we expect it to be proved capable in the near future, we believe this method to be worthwhile.

Conclusion

Quality assessment of prenatal ultrasonography is essential for the screening of fetal central nervous system (CNS) anomalies and the prenatal ultrasonography (USG) examination of the fetal brain at the level of the trans ventricular (TV) and trans cerebellar (TC) planes the 2nd trimester has been clinically recommended for the screening of central nervous system (CNS) anomalies. and It offers scope for timely specialist referrals, necessary intervention and appropriate pregnancy management. The central nervous system (CNS) anomalies are among the most common types of fetal anomalies per 1000 live births. With 3-6% stillbirths, low 5-year survival rates, life-long physical and mental disabilities, CNS anomalies take a very expensive toll on families, community, and the healthcare system at large. With the progress of science and technology, the deep learning in the category of artificial intelligence has been greatly developed and extensively used. In the medical field, imaging technology is used to process medical images and achieves good results. At this stage, the neural network algorithm of deep learning is one of the most practical learning algorithms depth learning methods has been widely used in medical image identification, detection, and segmentation. it has been pointed out that diagnostic systems using deep learning may detect abnormalities and diseases more quickly and accurately than humans can; however, this requires the availability of enough datasets on both normal and abnormal subjects for different diseases. One of the most powerful DL approaches related to images involves convolutional neural networks (CNN). These are designed to extract highly representative image features in a fully automated way, which makes them applicable to diagnostic decision-making. In the field of medical-image analysis, over 80% of published studies have been based on a CNN approach.