

Computer-implemented method for determining the fetus ventricular volume from Diffusion-Weighted magnetic resonance Imaging, and related method for Ventriculomegaly diagnosis.

KEYWORDS

- ❑ DIFFUSION SEQUENCES
- ❑ VENTRICULOMEGALY
- ❑ VOLUMETRY
- ❑ FETAL MAGNETIC RESONANCE
- ❑ NMR

AREA

- ❑ BIOMEDICAL

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Patent Type

Patent for invention.

Co-Ownership

Sapienza 70%, CNR 30%.

Inventors

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Industrial & Commercial Reference

Among the industrial sectors of potential interest there is certainly the public and private medical-health sector, but also the image analysis and automatic recognition industry. In general, it could also be of interest to multinationals involved in the development of MRI technology.

Time to Market

VM detector has been successfully developed and tested to analyze a statistic of 49 patients with excellent results in terms of efficiency and speed of use (among those 49 patients, only 15 outcomes have been obtained to date).

The prototype (TRL 4) currently available exists in a version that has been laboratory tested for compatibility with MATLAB®(2017) and MATLAB®(2018).

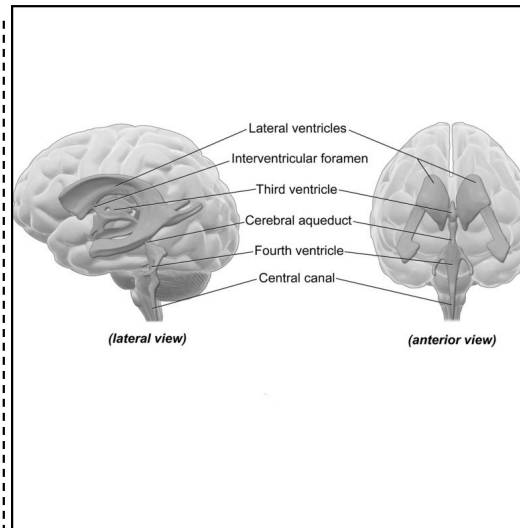
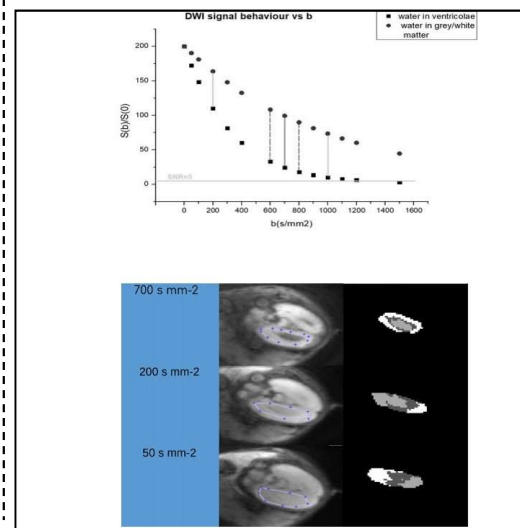


Fig. 1 Shows an anatomical sketch of the fetus cerebral ventricles dealt with by the present invention.



Abstract

The invention concerns to a computer-implemented method for determining the ventricular volume of fetuses from diffusion-weighted magnetic resonance images, defined as DWI, through:

- Acquiring DWI images, with a pre-set voxel height, of a fetus ventricle, wherein the acquisition is made with a single b-value selected in the range between 200 and 1000 s/mm²;
- Selecting a ROI on each of the DWI images around the ventricle; Automatically clustering pixels in ROIs;
- Calculating the ventricular volume based on the number of pixels in the ROIs.

The method concerns NMR diagnostic system and NMR diagnostic method that uses the invention.

Availability

Cession, Licensing, Research, Development, Experimentation, Collaboration and Spin-Off.

Fig. 2 Shows a graph highlighting the DWI signal behavior as a function of the b-value for water in ventricle and cerebral matter and DWI images obtained at b-value = 50, 200 and 700 s/mm² by using the method according to the invention (k=4 with the k-means tool).



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Technical Description

VM Detector is a software that performs post-processing analysis of DWI images (Diffusion Weighted Imaging) and is able to calculate the volume of the ventricles of the fetal brain. On the other hand, VM Detector, through the exploitation of diffusion-weighted images (DWI) with higher contrast between brain tissue and water in the ventricles compared to a T2-weighted image and an open-source automatic learning algorithm for the classification of groups of data, provides extremely precise segmentation of the images, with a clear and accurate separation of the pixels related to the ventricular areas from the rest of the brain. In conclusion, the future exportation VM Detector from the native MATLAB® environment will let us to have usage and royalties without the purchase of MATLAB®

Technologies & Advantages

There are many advantages provided by the invention that, as mentioned in the previous sections, can be summarized in terms of efficiency, precision, speed and enhancement of the diagnosis as well as on an easy use of the program. Particularly, the better agreement of the volumetric analysis with the outcomes compared to the analysis of the ventricular diameter make VM Detector a very strong tool for both the prenatal diagnosis and the postnatal treatment.

Applications

Improvement of prenatal diagnosis e development of Ventricular volume growth curves as a function of GA.

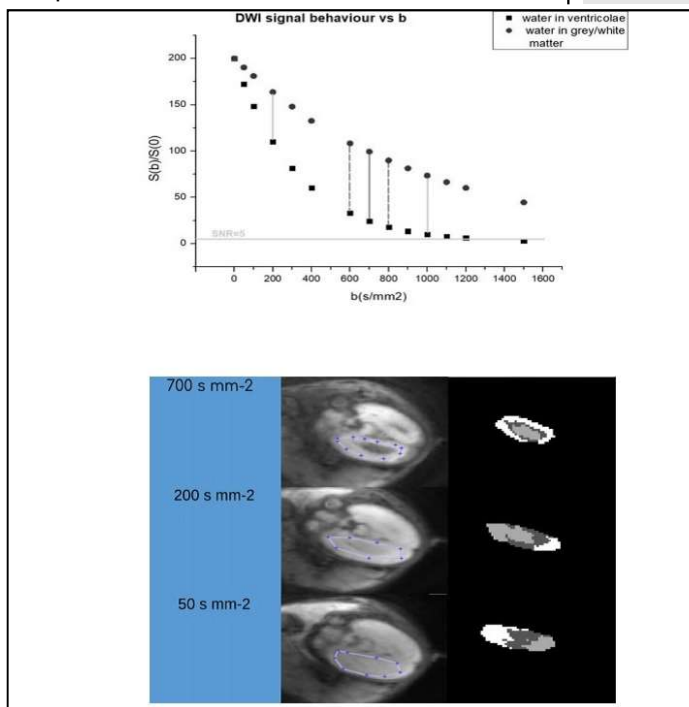


Fig. 3 shows a flow-chart for an embodiment of the method according to the invention.

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