

volBrain, a new, free online platform that allows fast, detailed automatic analysis of magnetic resonance imaging (MRI) of the brain

DESCRIPCIÓN DE LA INVENCION

Researchers at the Universitat Politècnica de València and the National Centre for Scientific Research (CNRS) in France have worked together to develop volBrain (<http://volbrain.upv.es>), a new, free online platform that allows fast, detailed automatic analysis of magnetic resonance imaging (MRI) of the brain.

In this way, volBrain enables scientists from around the world to obtain information on the human brain that is essential for the advancement of research into neurological pathologies. The system has the capacity to process up to 500 cases daily.

VolBrain offers information on the volume of tissue in the intracranial cavity (cerebrospinal fluid, grey matter and white matter), as well as certain macroscopic areas, such as cerebral hemispheres, the cerebellum and the brainstem. It also provides the volumes and indices of asymmetry of subcortical structures, all of which are of great importance to neurological research.

The system incorporates a series of IT tools developed by researchers at the UPV and the CNRS that allow for an in-depth, precise analysis of cerebral volume, comparing each new case that arrives in the system with a database of 50 manually labeled brains.

VolBrain can measure structures such as the hippocampus or the amygdala, which are influential in the development of diseases, such as Alzheimer's.

One of the effects of this pathology is the reduction in the volume of the hippocampus, which can be measured automatically and precisely, using this system. volBrain provides extremely important information for measuring cerebral atrophies which can help in diagnosing and monitoring neurological illnesses where morphological alterations appear, such as in the case of Alzheimer's disease

One of the main advantages of volBrain is that it is fundamentally easy to use and its speed of analysis in comparison with similar systems on the market. Users do not need to install any software, but instead merely send a zipfile through the website

The information arrives to local researchers at the UPV and, within 15 minutes, the system sends a detailed report with results on segmentation and processing of the cerebral volumes by e-mail. Similar systems currently take up to 15 hours to provide this information.

VolBrain uses the similarities in cerebral patterns to label and measure the volumes of each new case. In addition, if data on the age and sex of the subject is provided, the system allows us to verify whether the case in hand is within the normal parameters associated with these variables or not.

volBrain sends a screenshot in the report of the measurement process so that the user can visualize the segmentation of the cerebral structures (figure in appendix)

SECTORS OF BUSINESS APPLICATION

volBrain is particularly useful for research into neuronal pathologies and for clinical practice.

TECHNICAL ADVANTAGES AND BUSINESS BENEFITS

The advantages offered by volBrain are:

- Obtaining detailed information on cerebral structures
- Ease of use
- High speed of analysis: results in 15 minutes

STATE OF DEVELOPMENT OF THE TECHNOLOGY

volBrain is a free online platform. Any user can process MR images from the website volbrain.com

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INDUSTRIAL PROPERTY RIGHTS

The rights to volBrain belong to the Universitat Politècnica de València and the Centre National de la Recherche Scientifique in France (CNRS)

COLLABORATION NEEDED

The use of volBrain is open to anyone and usage of the system is free. For processing large quantities of data, individual agreements will be reached between the parties concerned

RELATED IMAGES

volBrain Volumetry Report version 1.0 release 01-12-2014

Patient ID	Sex	Age	Report Date
job567	UNKNOWN	UNKNOWN	03-Dec-2014

Image Information	
Orientation	radiological
Scale factor	0.87
SNR	52.84

Tissue type	Volume (cm ³ %)
White Matter (WM)	572.10 (36.50%)
Grey Matter (GM)	783.55 (49.99%)
Cerebro Spinal Fluid (CSF)	211.72 (13.51%)
Brain (WM + GM)	1355.65 (86.49%)
Intracranial Cavity (IC)	1567.37 (100.00%)

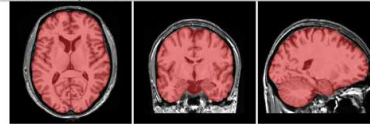
Structure	Total (cm ³ %)	Right (cm ³ %)	Left (cm ³ %)	Asym.(%)		
Cerebrum	1179.97 (75.28%)	587.76 (37.50%)	592.21 (37.78%)	-0.7550		
	GM	WM	GM	WM	GM	WM
	658.93	521.04	327.86	259.90	331.07	261.14
	(42.04%)	(33.24%)	(20.92%)	(16.58%)	(21.12%)	(16.66%)
Cerebellum	148.21 (9.46%)	74.44 (4.75%)	73.77 (4.71%)	0.8994		
	GM	WM	GM	WM	GM	WM
	119.35	28.85	59.64	14.80	59.71	14.06
	(7.61%)	(1.84%)	(3.80%)	(0.94%)	(3.81%)	(0.90%)
Brainstem	27.51 (1.75%)					

Structure	Total (cm ³ %)	Right (cm ³ %)	Left (cm ³ %)	Asymmetry (%)
Lateral ventricles	13.81 (0.88%)	4.89 (0.31%)	8.92 (0.57%)	-58.4002
Caudate	6.27 (0.40%)	3.28 (0.21%)	2.99 (0.19%)	9.1794
Putamen	8.72 (0.56%)	4.33 (0.28%)	4.39 (0.28%)	-1.4412
Thalamus	12.87 (0.82%)	5.97 (0.38%)	6.90 (0.44%)	-14.3690
Globus Pallidus	2.90 (0.19%)	1.51 (0.10%)	1.40 (0.09%)	7.6923
Hippocampus	10.33 (0.66%)	5.18 (0.33%)	5.15 (0.33%)	0.5069
Amigdalala	1.89 (0.12%)	0.92 (0.06%)	0.97 (0.06%)	-4.8825
Accumbens	0.89 (0.06%)	0.32 (0.02%)	0.57 (0.04%)	-56.4405

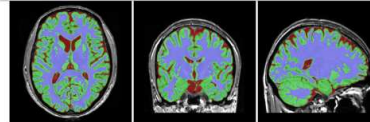
*All the volumes are presented in absolute value (measured in cm³) and in relative value (measured in relation to the ICV).

*The Asymmetry index is calculated as the difference between right and left volumes divided by their mean (in percent).

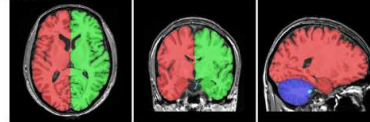
Intracranial cavity extraction



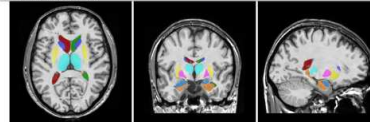
Tissue classification



Macrostructures



Subcortical structures



*All the result images are located in the MNI space (neurological orientation).

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