

Researchers develop method that automatically delimits areas of the brain in medical images

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A piece of research submitted by the Artificial Intelligence and Approximate Reasoning Group (GIARA) of the NUP/UPNA-Public University of Navarre received an award from the European Association of Fuzzy Logic and Soft Computing (EUSFLAT) during its biennial meeting (EUSFLAT 2013) held in Milan last week. The researchers have developed a method that improves the delimitation of tumours in medical images. As they explained, "when the doctor decides where tumour tissue should be separated from healthy tissue, our algorithm ensures that he/she is never going choose the worst option because the best solution is automatically offered."

The work has focussed on the study of [brain images](#) obtained by means of [magnetic resonance](#). Specifically, they have developed an algorithm to improve the process to segment the images. "By means of segmentation," explained Aránzazu Jurío, "each of the objects that make up the image is separated. Each pixel is analysed so that all the ones sharing the same features are considered to form part of the same object." In the case of medical images, this process is crucial for delimiting tumours where, if we're thinking about areas like those in the brain, three millimetres of difference can mean the difference between a cure or affecting areas controlling speech or vision.

To understand how the algorithm developed by the researchers works, Humberto Bustince drew the following parallel: "Imagine we have the

image of a brain by means of magnetic resonance and seven doctors who have to decide how to delimit the [tumour](#). From experience we know that each one of them will separate the tumour differently. Now, with the proposed method, they will automatically be presented with a set of options which, in any case, are always going to improve the choice that the worst of the seven may make. We've succeeded in improving on the worst, we've managed to ensure that even though they may go for the worst option, they will be wrong to the least extent possible."

In real time

Another of the factors that experts in [artificial intelligence](#) have to contend with is that of time variations, because [medical images](#) vary in time and on occasions within a short space of time. "All these algorithms allow application in real time, because what may be useful for an image at a given moment may not be useful after some time," explained Prof Bustince.

In this respect, Aránzazu Jurío stressed that "the algorithm we have developed produces a kind of consensus among the various functions that seek to obtain the best solution. We could say that it takes the process of choosing away from the expert because it is the [algorithm](#) that automatically selects the function."

"The problem," Daniel Paternain elaborated further, "is that for a specific image there are a number of functions that the expert may use, but if he or she gets the function wrong when doing the segmenting, the result could be devastating. What we tried to solve is this: if he/she gets the function wrong, the result may not be devastating."

Provided by Universidad Publica de Navarra

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