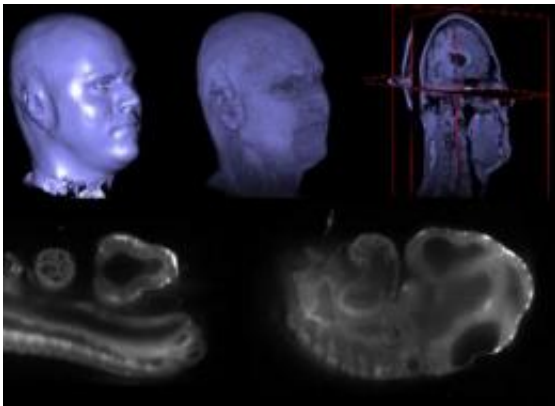# An open platform revolutionizes biomedical-image processing

August 31 2012

An open platform revolutionizes biomedical-image processing. Credit: MIT.

Ignacio Arganda, a young researcher from San Sebastián de los Reyes (Madrid) working for the Massachusetts Institute of Technology (MIT) is one of the driving forces behind Fiji, an open source platform that allows for application sharing as a way of improving biomedical-image processing. Arganda explains to SINC that Fiji, which has enjoyed the voluntary collaboration of some 20 developers from all over the world, has become a de facto standard that assists laboratories and microscope companies in their development of more precise products.

Ignacio Arganda is a postdoctoral researcher at the Laboratory of Computational Neuroscience of the Massachusetts Institute of Technology (MIT). Along with a group of researchers he implemented

Fiji, a platform that allows for applications to be shared in order to improve and advance in the processing and analysis of [biomedical imaging](). "All of this in open source," outlines Arganda.

The platform was built from a previous one, ImageJ, which was well known in the industry at the time. ImageJ was not an [open source platform]() but it was publicly accessible. According to Arganda, it had the advantage that any person working in [medical imaging]() could easily create small software applications to resolve their particular problems and then incorporate it into the platform by means of a plug-in (an application which is linked to another providing a new or specific function).

Nonetheless, the researcher adds that this platform became too chaotic with applications of all kinds, some of which were not related to biomedical-imaging. It also began being used to handle [astronomical images](), in video tracking, etc. "There was a significant lack of control and structure," he says.

Therefore, "in a spontaneous manner and without any help" this group of researchers decided to create the new open source platform that could put order to that already in place, reusing what was of interest and useful in their work.

"We created a webpage organised like Wikipedia where people could contribute and use their knowledge to help others. To our surprise, it became very popular," he ensures. According to Ignacio Aranda, Fiji currently has 127,000 unique visits (20,000 each month).

The de facto standard

"The users of the platform with their contributions are a great attribute and this drives others to share their source code. Therefore, Fiji has

become a de facto standard in the biomedical-imaging sector" outlines Arganda.

"This was our objective because the majority of those that participate in this project have been working for years in the field of medical imaging and we found ourselves too frequently faced with articles making reference to a fantastic method for processing images. In the end though, it was not possible to verify whether or not it was true because the technique was associated with software that was not provided and some images were not even accessible."

At the moment there are 20 developers across the whole world who are working voluntarily on improving the platform. "All of them are scientists who are working on their own projects and use the platform because it is more comfortable and they find it more interesting," adds Arganda.

The scientists behind Fiji got in contact with Arganda because of his doctoral thesis. "I was working on a project involving the study of mammary gland development and breast cancer in mice and I had a few tissue samples. I began to develop a programme for elastic image alignment that would allow me to create a 3D reconstruction. They expressed their interest and called asking me to collaborate in the platform."

In the eyes of the researcher, this is an example of what lies within Fiji. Arganda now works on automatic learning systems aimed at recognising the edges of neurons from electronic microscope images in the MIT Laboratory of Computational Neuroscience. The developed applications have also been introduced into the platform.

A success amongst companies

The researcher believes that the success of Fiji is also changing the way that biomedical-imaging companies are behaving. These include microscope firms with large laboratories. "These companies recognise the platform as a high quality standard and they are aware of their two options: either compete or collaborate with Fiji. They can create and maintain their own plug-in that works in the platform and they can then sell them if they become very specific.

"In my case for example, I was contacted by a microscope company because they were using my elastic image alignment programme to correct deformations in their microscopes. They asked me for a specific version of the programme, but I had developed it during my thesis so it could not be sold easily. In the end we reached an agreement for its use under the one condition that they would communicate any improvement made so that it could be introduced as open-source and uploaded onto the platform.

Ignacio Arganda explains that, like him, there are other researchers that have also been contacted by companies and contracted as consultants on a day-to-day basis to maintain the code necessary to develop their products.

"The platform makes you highly visible," concludes the researcher. "They offered me the chance to complete a postdoctoral fellowship at the University of Stanford and the MIT because they had access to my code for the elastic alignment software and knew what it was capable of."

In the Connectome Project with Sebastian Seung

Ignacio Arganda is currently completing his postdoctoral fellowship in the MIT Laboratory of Computational Neuroscience under the supervision of the well known scientist Sebastian Seung, one of the

leaders of the Connectome Project. This initiative aims to create a map of all the brain's neuron connections using an online application called eyewire.org, which is open to public participation.

Arganda is in charge of developing artificial intelligence programmes that automatically recognise neuron's edges and are then able to reconstruct wiring in the brain.

More information: Schindelin J, Arganda-Carreras I, Frise E, Kaynig V, Longair M, Pietzsch T, Preibisch S, Rueden C, Saalfeld S, Schmid B, Tinevez JY, White DJ, Hartenstein V, Eliceiri K, Tomancak P, Cardona A. "Fiji: an open-source platform for biological-image analysis". *Nat Methods.* 2012 Jun 28;9(7):676-82. doi: 10.1038/nmeth.2019

Provided by Spanish Foundation for Science and Technology (FECYT)