# EXPLORING DIGITAL TOOLS FOR THE VIRTUAL RECONSTRUCTION OF FINDINGS, EXCAVATION SURFACES AND OTHER ARCHAEOLOGICAL RECORDS

My name's *Daniela,* I'm 29 and I live in **Virrey del Pino**, a suburban neighbourhood in Buenos Aires Province, **Argentina**. I work in the public sector as a technician in the Historical Museum of La Matanza (HMLM). My job consists in taking up excavations and planning outreach activities, sometimes it includes speaking in public events. I've dug some areas in the Museum backyard ("El Pino" site) and also in another site near it ("La Elvira" site) , so if you want to see pictures of them check out our**Archaeology Lab** Facebook Page and its Blog (both in Spanish).

Well, the title preaches "Exploring digital tools…", and that means that what I'm going to write about is the use of photographs for reconstructing objects and surfaces, which is what we've been doing recently (let's call it "a project"). It should be mention that exploring this technique was Marcelo Vitores' idea. I wasn't sure it would worth it, but he insisted. And he was right! The results we obtained were really good.
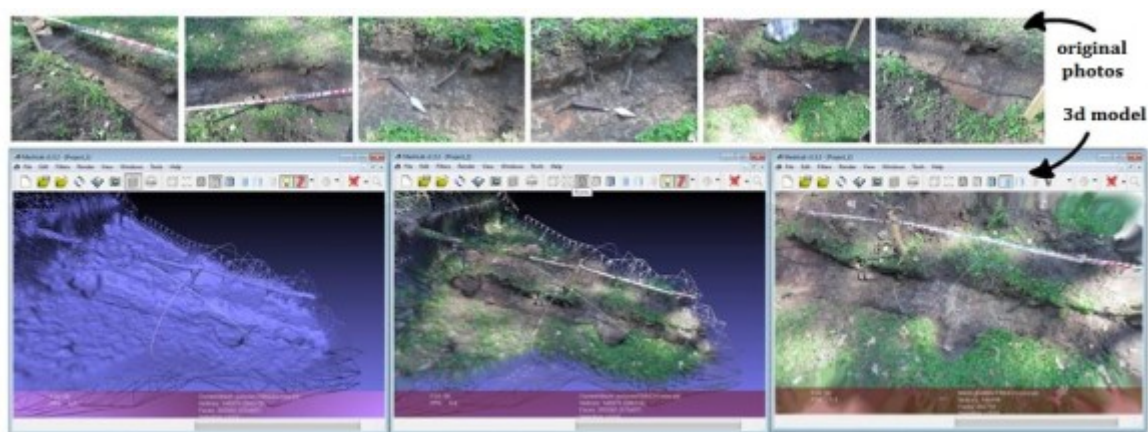
From photos to 3d model

Budget and curiosity were the motivation for exploring this "tool". As almost any archaeologist in the Third World, we couldn't buy a laser scanner because of the limited budget, but we thought we should find a way to make the most out of our existing equipment. Then curiosity made its part, by leading us through the exciting road of *image-base modelling* (IBM). There are different options within IBM, but the one we used is *structure-from-motion* (SFM). In simple words, it's a method for obtaining a 3D cloudpoint, which consist of a **.ply** file where the recognized features (points) from the photos are displayed in 3D. The resulting pointcloud can be used to create a 3D model. This means that with only a digital camera and a computer/laptop we could get similar results to those of laser scanning. For processing the photos we used Phyton Photogrammetry Toolbox and for editing the pointcloud we used Meshlab. See more pictures in this Facebook album and also in these Blog posts, or browse the models in 3D in Sketchfab.

Many archaeologists and cultural heritage professionals are including SFM in their activities. Besides the uses for public outreach, having the 3D models allows you to measure, section, compare, etc. If you take the time to record every level excavated (and I'm sure it's something you already do), you can build a sequence of surfaces, like the layers in a cake. Here's a sample of our models. In this case, I used archived photos of an excavation and I obtained the model shown in the link (since I couldn't embed the model here's a picture of it; visit the link to navigate the model in 3D).
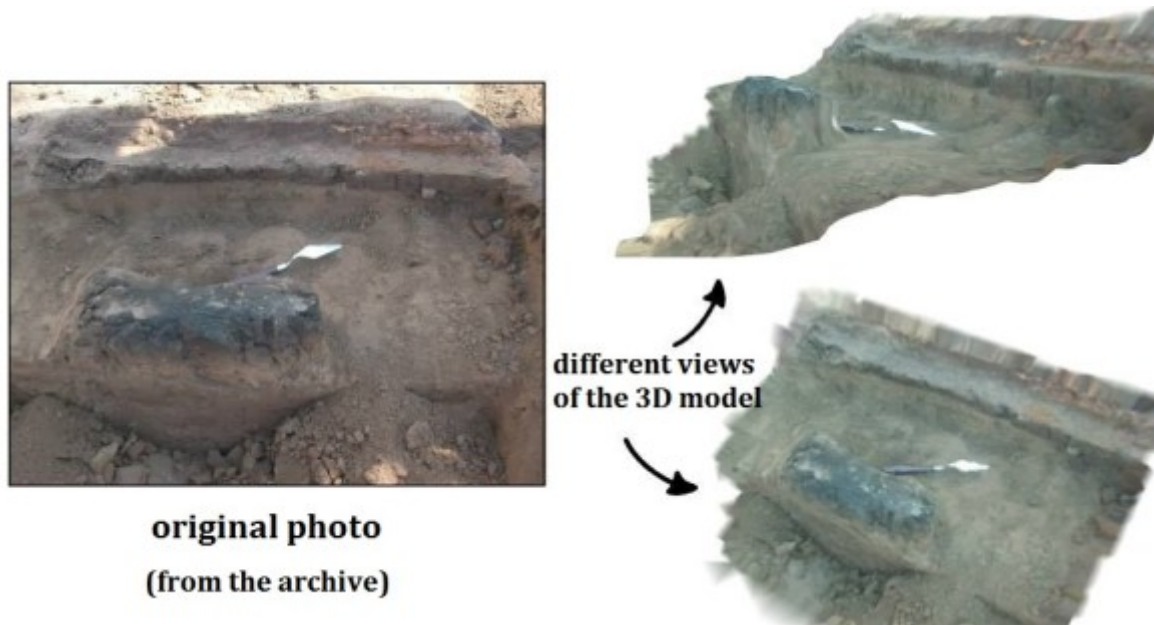
3D model out of archived photos (from the regular excavation recordings)

This was my contribution to the Day of Archaeology 2014. I tried to keep it short, but if you want to **read more** about IBM and SFM here are some **links**:

"Comparison of laser scanning, photogrammetry and SfM-MVS pipeline applied in structures and artificial surfaces" by Skarlatos and Kiparissi

"How to make 3d scan with pictures and the PPT GUI"by ATOR (Arc-Team Open Research)

"Python Photogrammetry Toolbox: A free solution for Three-Dimensional Documentation" by Moulon and Bezzi

"Modelado tridimensional de hallazgos mediante software fotogramétrico" by Vitores and Ávido (in Spanish)

"El archivo fotográfico como fuente para la reconstrucción tridimensional" by Ávido and Vitores (in Spanish)

"Fotogrametría + Imágenes de internet. Nuevas posibilidades" by P. A. R. Tecnologías de Representación Gráfica del Patrimonio (in Spanish)

"the Virtual Curation Laboratory" of the Virginia Commonwealth University

Happy Day of Archaeology!

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