Chapter 48

Photo Based Volunteered Geographic Information Initiatives:
A Comparative Study of Their Suitability for Helping Quality Control of Corine Land Cover

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ABSTRACT

Volunteered Geographic Information has become exponentially available over the Web in the last years. This availability can hide a vast geographical richness and provides us with both a great opportunity to explore new ways to use it and also big challenges related with its unstructured nature. This paper conducts a preliminary analysis of the adequacy of photos from the Flickr and Panoramio initiatives in order to use them as a source of field data in the quality control of the Land Use/Cover databases production. It evaluates its temporal and spatial distributions over Continental Portugal and also its distribution over Land Use/Cover classes using as a reference the European Corine Land Cover database. It concludes that this source is very valuable but needs to be combined with other sources due to its uneven spatial distribution.

INTRODUCTION

The task of producing Geographic Information (GI) has been carried out by mapping agencies and corporations (Goodchild & Glennon, 2010) using highly trained and skilled people as well as expensive precision equipment and procedures. This is a very expensive approach resulting in the selection of the most important and unchanging geographic themes and those with multiple applications as a priority,

leaving behind those considered less important (Goodchild, 2008). Land Use/Cover (LULC) databases that play a very important role in a vast number of research fields are a very good example of that (Caetano, Mata, & Freire, 2006; Fritz et al., 2009; Herold, 2009).Their production relies on highly trained and skilled people carrying out interpretation and classification tasks (Herold, 2009) through a phase process since the planning and data acquisition to the final product and documentation. One of the most critical phases is related with the validation of interpreted and classified data to provide fundamental quality indicators to those who want to use it. In this validation process, the produced cartography is confronted with reference information assumed as true, including, among other sources, "ground truth" collected directly from the filed in pre-selected sites (Caetano et al., 2006) increasing significantly the production costs (Strahler et al., 2006).

Since 2005 we have been observing a new unparalleled phenomenon. With the introduction of the Web 2.0 and the increasing availability of positioning equipment at a lower cost, better and free imagery of the world, among other improvements as well as the willingness of private citizens to contribute for various reasons the spatial data produced and shared by these volunteers has been increasing exponentially (Elwood, Goodchild, & Sui, 2012; Heipke, 2010), where the most important characteristic is their natural local knowledge (Heipke, 2010). The interest of the scientific community has also been increasing as the availability of this quantity of data provides great opportunities to explore their potential to be used and help solving real world problems. Therefore we believe in the possibility of using it in the production of LULC databases. Temporal coverage and size seem to be two of the major advantages (Leung & Newsam, 2010) but some challenges need to be addressed, particularly those related with their heterogeneity, quality control and metadata absence, among other issues.

The aim of this research is to conduct an analysis of the adequacy of photos from Flickr and Panoramio initiatives, in terms of their temporal and spatial distribution over different LULC classes, in order to use them as a source of field data in the quality control of the LULC databases. Their representativeness over time, study area and LULC classes is therefore evaluated. The study is made for the Continental Portugal area and uses the European Corine Land Cover (CLC) (CEC, 1994) as the reference LULC database.

The paper is structured as follows. First we present some background about Volunteered Geographic Information including Flickr and Panoramio initiatives, LULC databases production and some previous studies on using use Geographic Information produced by volunteers in LULC production. We then describe the data and methods used followed by the results obtained and discussion. Finally some conclusions and future research directions are drawn.

BACKGROUND

Volunteered Geographic Information

Volunteered Geographic Information (VGI) (Goodchild, 2007) is part of a collection of terms such as Neogeography (Turner, 2006) and Crowdsourcing geospatial data (Hudson-Smith, Batty, Crooks, & Milton, 2009) that, despite some differences (Elwood et al., 2012), are all related with a type of User Generated Content (UGC) that deals with spatial substance and refers to volunteers and large groups of people, sometimes acting like a crowd, often without expertise or formal qualifications, contributing with spatial data to the "community" (Goodchild, 2007). Citizens have been contributing with spatial related content since a long time ago. Records of teachers and school children contributed to land use

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