Draft abstract for article intended for submission to the Population Association of America Journal Demography

Turner A.G.D. (2010 In preparation) Global and Regional Scale Social Simulation: Contemporary, Historical and Pre-historical Demography at the Resolution of Individuals and Days. Draft abstract for article intended for submission to the Population Association of America Journal Demography.

Title

Global and Regional Scale Social Simulation: Contemporary, Historical and Pre-historical Demography at the Resolution of Individuals and Days

Author

Andy Turner, CCG, School of Geography, University of Leeds

Abstract

The current population of humans on the planet Earth is estimated at 6872 Million [1]. Imagine a family tree for this population stretching back in time and consider also enriched information about each individual giving their place of birth and death and other details about their life. Consider how we can map this out geographically and what may be needed computationally in order to store and access the data for particular uses such as describing the genealogical relationships or calculating genealogical metrics between population subsets. It is a genealogical dream that can only be partially realised because too much detail of what happened in the past and what happens in the present is lost. Being proven wrong about this being a dream would mean things have become very interesting indeed!

Many people die young and infant mortality in particular makes it difficult to put a figure on the number of people that were alive or have lived since any date in the past. Suppose it was possible to track back in time and estimate the number of births (deaths) going back generations, then a figure could be arrived at as to the number of people who have lived since a given date. What is the best estimate of the number of people that have lived since the birth of Aristotle in around 384BC [2]?

In general, the further back in time we go, the less complete and reliable historical records are. However, the records of some societies are better preserved than others. We only have to go back a couple of centuries in the UK to a date when births and deaths were not systematically recorded, indeed this practice was only mandated in 1874 [3]. Prior to this date information is relatively incomplete especially prior to the establishment of the General Register Office under the Births and Deaths Registration Act of Parliament 1836.

Many historical records have been or are in the process of being digitised along with metadata which aids their discovery and use. Previously lost historical records and archaeological evidence is still being found and in the process of being digitally curated and preserved for future use.

Ethnographic archaeological research allows for the estimation of some demographic variables that are key for social simulation modelling. Detailing demographic variables such as population, fertility and mortality by age and gender from archaeological evidence is not an easy task. These

variables do not stay constant over time and it is likely that many societies that flourished also interbred with neighbouring people that in some way become part of it. Some societies have collapsed dramatically due to disease or environmental change and during these times of stress population change tends to be dramatic. Something that complicated the picture further is that societies have tended to competed for resources and wage war. War can result in dramatic evolution of society and whatever its drivers, it has played a very significant part in the formation of the global society we see today connected in a collective consciousness with a brain like Internet.

This article aims to scope out the computational demands in creating a searchable database capable of storing all the individuals that have lived since the birth of the great Ancient Greek Aristotle in 384BC. The scoping is done in a practical manner with an attempt which falls short of giving an estimate for that population. It introduces a basic demographic model that ticks at a daily temporal resolution and can be used as a basis for social simulation of societies and genealogical work. The model is implemented in a package as part of a social simulation library in the Java language[4] available under the LGPL open source license [5] and has a web service interface, a portal interface, an associated Taverna [6] workflow and some examples of use shared on myExperiment [7]. The model is a product of the GENESIS project [8]. The e-Infrastructure developments which support it as a service are in part products of the NeISS project [9].

1. Wikipedia World Population Page (http://en.wikipedia.org/wiki/World_population). Accessed on 2010-09-27.

2. Wikipedia Aristotle Page (http://en.wikipedia.org/wiki/Aristotle). Accessed on 2010-09-27.
This work is currently resourced via the UK Economic and Social Research Council through the National Centre for e-Social Science research node program in the GENESIS project[4].

3. National Archives : Department code RG Web Page (http://www.nationalarchives.gov.uk/catalogue/DisplayCatalogueDetails.asp?CATID=244&CATLN=1&FullDetails=True). Accessed on 2010-09-27.

4. Wikipedia Java (programming language) Page (http://en.wikipedia.org/wiki/Java_(programming_language) ). Accessed on 2010-09-27.

5. GNU Lesser General Public License Web Page (http://www.gnu.org/licenses/lgpl.html). Accessed on 2010-09-27.

6. myExperiment Web Site (http://www.myexperiment.org/). Accessed on 2010-09-27.

7. Taverna Workflow Management (http://www.taverna.org.uk/). Accessed on 2010-09-27.

8. Andy Turner's GENESIS Project Web Page (http://www.geog.leeds.ac.uk/people/a.turner/projects/GENESIS/). Accessed on 2010-09-27.

9. Andy Turner's e-ISS Project Web Page (http://www.geog.leeds.ac.uk/people/a.turner/projects/e-ISS/). Accessed on 2010-09-27.