A111 A New Complex Investigation Model for Searching, Mapping, and Identifying Disappeared Persons in Argentina

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After attending this presentation, attendees will better understand the problems related to the identification of human remains of disappeared persons and, in particular, the importance of applying innovative frameworks of research such as, in this case, the combination of complex networks, Bayesian inference, and statistical evaluation tests in the systematization and analysis of the data.

This presentation will impact the forensic science community by providing a framework of complex networks and Bayesian inference to be applied to the identification of human remains belonging to disappeared persons during the last military dictatorship in Argentina (1976-1983).

During the past 32 years, the Argentine forensic anthropology team, Equipo Argentino de Antropología Forense (EAAF), has been using a multidisciplinary approach (archaeology, anthropology, dentistry, pathology, and genetics) to recover and identify the remains of thousands of disappeared in the country.[1] Typically, after their kidnapping, people were taken to illegal detention centers, tortured, and killed. Their unidentified bodies were buried in individual or common graves in official cemeteries or clandestine mass graves at military/police compounds.

The need to generate hypotheses of identity for the recovered remains triggered interest in applying an alternative model for the analysis of the information.

This new model has mathematically systematized non-genetic variables, resulting from information obtained by already solved identifications in specific events, in such a way that they can be used in the search, GIS mapping, and a generation of new hypotheses of identity for unsolved related cases. In other words, this dynamic model based on complex networks and Bayesian inference is able to "learn" from identified cases by generating a probabilistic ranking of candidates for unidentified related cases. The geographical and temporal systematized variables, using georeferenced data and image processing techniques, from the identified skeletal remains are analyzed within a Bayesian framework.[2] In a second stage, the data are included on a complex network, where connections are established between related cases by using rules based on the individuals' attributes.[3,4] Previous to this, the most effective rules in defining the network are evaluated. Once the network has been formalized, a ranking of candidates for unsolved cases (recovered skeletal remains) is produced.

The advantage of this complex model is, among others, to minimize bias in the investigation of related cases, providing probabilistic values to connected cases. This model has a high applicability in the mapping and search of burial sites, identification of human remains, and systematization of information, essential in the investigation of massive numbers of victims, as in crimes again humanity, conflict, or migration cases.

The developed software, which includes processing of raw data, calculations, and visualization, uses R language, a free software and open source environment for statistical computing and graphics.[5-7]

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