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MAPEAMENTO GEORREFERENCIADO DE CURSOS DE BIBLIOTECONOMIA E CIÊNCIA DA INFORMAÇÃO: UMA ABORDAGEM INTERNACIONAL

GIS MAPPING OF LIBRARY AND INFORMATION SCIENCE SCHOOLS: AN INTERNATIONAL APPROACH

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Modalidade: Resumo Expandido

Resumo: Oferece uma análise de um projeto de código livre em andamento que busca mapear os programas de Biblioteconomia e Ciência da Informação (BCI) em nível mundial. Um questionário foi utilizado para identificar as faculdades de BCI. Diversos visualizadores georreferenciados foram examinados e validados de acordo com os benefícios oferecidos. Os dados disponibilizados com o mapa escolhido são uma fonte de informação. Informações sobre faculdades e programas de BCI, requisitos para aplicação, tipo de graduação, dentre outras, pode contribuir para aumentar a visibilidade e reconhecimento de abordagens na Educação de BCI e habilitar estudantes a entender a distribuição dos programas espacialmente.

Palavras-Chave: sistemas de informação geográfica; cursos de BCI; BSLISE; visão; ciência aberta.

Abstract: The purpose of this paper is to present preliminary findings of an ongoing Geographic Information Systems (GIS) project to map the Library and Information Science (LIS) schools and programs around the world and discuss future directions for using GIS tools in such international advocacy projects. A questionnaire was used to identify LIS schools and programs. Several Geographic Information Systems (GIS) are examined, and benefits and shortcomings are reviewed. The data provided with the chosen map is a source of information. Information about LIS schools and programs to graduation requirements can help increase the visibility and recognition of the diversity of approaches to LIS education and enable prospective students and researchers to view and examine the programs spatially.

Keywords: geographic information systems; LIS schools; BSLISE; visão; open science.

1 INTRODUCTION

Library and Information Science (LIS) schools are often challenging to locate as there are no global databases currently in existence that allow one to do a comprehensive search for specific data and characteristics (CHU; RAJU, 2018). The impetus behind this project was to begin to build a global database of LIS schools and programs using data gathered from an international survey that requested information on contact details, degrees available, certifications offered as well as languages available within the program (OGUZ, 2020, p. 15). Geographic Information System (GIS) is a tool for organizing data so that it can combine multiple data sets. The paper provides an overview an ongoing GIS project to map LIS schools and programs around the world and preliminary findings of the study.

Since John Snow's map of the cholera outbreak in 1854 (BRODY; RIP; VINTEN-JOHANSEN; PANETH; RACHMAN, 2000) and coining of the term GIS in early 1960s (CHRISMAN, 1999), GIS has become an increasingly important tool in data visualization. Though early definitions of GIS placed more emphasis on the use of hardware and software in capturing, storing, managing, analyzing, and presenting spatially referenced data (e.g., MAGUIRE, 1991), there is no agreement on the definition of GIS. For the purposes of this research, the following definition is adopted: organized activity by which people measure and represent geographic phenomena, then transform these representations into other forms while interacting with social structures (CHRISMAN, 1999) as the definition addresses the social and cultural contexts that informed measurement and representation of the data. Within the LIS domain, GIS has been primarily used to analyze service areas and manage library facilities and collections (MANDEL; BISHOP; OREHEK, 2020) in addition to advocacy projects such as the Library Map of the World (https://librarymap.ifla.org/) by the International Federation of Library Associations and Institutions (IFLA) and the Libraries of the World (http://www.abf.asso.fr/pages/carte_bib/carte_bib.php) by the French Library Association (ABF). Especially in academic institutions, the LIS community has also focused on providing access to GIS data in addition to access to traditional geographic resources (MARCH; SCARLETTO, 2017; WEIMER; REEHLING, 2006). GIS presents a myriad of opportunities for the LIS community to leverage its use from increasing access to information and services to advocacy and policy development (MANDEL; BISHOP; OREHEK, 2020; ROSICHAN, 2020).

2 METHODS

The study used an online questionnaire to collect information about LIS schools and programs around the world as part the IFLA Building Strong Library and Information Science Education (BSLISE) Working Group activities. The online questionnaire is developed by an international team of researchers and included questions about schools and programs and local structures, organizations, and procedures that address the issues of professional qualifications, accreditation, certification, and registration for professional practice.

A non-probability sampling strategy was used due to a lack of a sampling frame to disseminate the questionnaire. The questionnaire was distributed via regional, national, and international mailing lists as well as personal contacts by the members of the BSLISE Working Group. The questionnaire included eight questions about schools and programs and 16 questions (e.g., admission and graduation requirements, program modality, and accreditation) for each program offered by the LIS academic unit. The questionnaire was made available and promoted for about two months in late 2019. Multilingual information contacts were provided in the invitation message to increase access, who were available to address question in 6 languages: Arabic, Chinese, French, Russian, Spanish, and Turkish. A total of 159 schools and programs with 28 languages of instruction are represented in the dataset from 66 different countries.

3 SOFTWARE SELECTION

The study has followed the Open Science principles by fostering sharing and collaboration since its inception as an international collaborative project. Open Science constitutes a radical transformation in the way of doing scientific research. The origin of the concept can be traced back to 2002 with the Budapest Open Access Initiative (BOAI) that raises the scope and use of Open Access. It is a new model and a cultural change in the way researchers, educators and other stakeholders create, store, share and deliver the results of their activity (AYRIS; LÓPEZ DE SAN ROMÁN; MAES; LABASTIDA, 2018). Considering that we live in complex socio-environmental systems, which are better understood from the integration of different perspectives and forms of knowledge, science is moving to new participatory ways of generating knowledge (MONZÓN ALVARADO; ZAMORA RENDON; VÁZQUEZ PÉREZ, 2020). Within the open science umbrella, initiatives such as participatory research, and citizen science have gained relevance. As the use of open source software and open interfaces is a critical part of open science, the choice an open source GIS software was straight forward in addition to other reasons including greater accessibility and equity, initial cost of investment, long-term sustainability of the project by allowing for future contributors to work on the project or host it without having to have access to specific commercial packages or specific institutional affiliations.

Table 1 - Differences between the software selection

Typology	Software	Advantages	Disadvantages
Web servers	Geoserver	-Ease of operation (configuration through a Web application). -Has a powerful community configuration files	- Difficult to learn and configure at the beginning
	Mapserver	- Multiplatform - Speed of access to data - A multitude of raster and vector formats supported - Very active and developed community.	- Download speed and file sizes in comparison with other software
'Thin clients' web	OpenLayers	- Simplicity of use (without dependency on specific map servers) - Tiles and cache support and access to Google or Bing maps	- Requires more time for learning - OpenLayers community is smaller
GIS service at the cloud	CARTO	- Open, powerful and intuitive platform - Simplicity of Builder - Support	- Hard to use (when you have no knowledge). - Lack of editing capabilities
	QGIS Cloud	- Free to use - User-Friendly GUI - Usable features - Extend functionality	- It is less Beginner Friendly - Tools can be outdated sometimes - Lack of tutorial
	Visão	- Multiplatform - Speed of access to data - Online tool - Easy configuration - Modular infrastructure - Allow citizen participation	- Beta version

Fonte: Elaborado pelos autores

A comparison table where various GIS applications that were considered by their typologies (i.e., Web Server, Thin Clients Web, and Cloud-based) was used to facilitate the decision making process in identifying the most suitable open source GIS software for the project. Though Geoserver was initially adopted because mainly of existing skillset BSLISE group, the difficulties experienced when configuring the software led the research team to consider alternatives. In this regard, Visão emerged as a better option for the long-term sustainability of the project. Visão's features such as its multi-platform support, increased speed of access to data, modular infrastructure, and ease of use as a cloud-based based GIS software let the research team to choose it over other alternatives including GeoServer, MapServer, Open Layers, CARTO, and QGIS Cloud. It also offers the option for more direct community participation, also referred to as citizen science. The term citizen science can be described as a public engagement in scientific research activities where citizens actively contribute to science either with their intellectual effort, or surrounding knowledge, or their tools and resources (SERRANO SANZ; HOLOCHER-ERTL; KIESLINGER, SANZ GARCIA; SILVA, 2014). Above all, long term sustainability of the project in terms of ability to customize the interface, cost (e.g., hosting, licensing), and access to technical expertise, for example, is critical for its success. The Brazilian Institute of Information Science and Technology (IBICT), the developer of Visão, agreed to host the software and maintain for free of charge and joined the BSLISE initiative as a partner organization.

4. IMPLEMENTATION

This section describes the implementation of the survey data to generate the GIS map.

4.1 Data Cleanup

The first action was to clean the data by standardizing certain responses such as country names and eliminating duplicate responses. The dataset had more information than Visão could present as the chosen software works essentially with quantitative and georeferenced data. Hence, after cleaning the data the group had to identify what pieces of information (i.e., id, Nam of the Institution, Name of the Academic Unit, Web Address, and Program Specification) could be exported to the interactive interface. A new file in CSV (comma-separated values) format was generated and delivered to the working group responsible for the transformation of the text data to the SQL (structured query language) format which is the format that Visão can process. During this process no other aspect related to data quality was proposed, which can be done during the next phase.

4.2 Indicators, Geographic Filters, & Layers

Currently Visão (SHINTAKU, 2019) works with four types of data structures to present data and information: indicators, geographical filters, layers, and metadata. The software is hosted by the Brazilian Institute of Information Science and Technology (IBICT) which is a partner organization with IFLA’s BSLISE initiative (https://bslise.org/).

An indicator is a field that uses quantitative data to define a numerical value to a concept. To define the indicators, an understanding was needed of what data could be quantified as the main fields. The main objective was to have an international understanding of how LIS programs were distributed into the world, so the fields "type of program" and "qualification required" were transformed into numerical values as they were summed per country and per type of program and qualification required. As a result, twelve indicators were identified from the dataset and organized in two categories.

- Category: LIS programs
  - Indicators: Undergraduate, Master's, Doctorate, Non-degree, Specialist or Professional, Post-Master's, LIS programs
- Category: Qualification required
  - Indicators: Accredited Degree (National), Accredited Degree (International), Certification, None, Other

Related indicators from external data sources were also added in the interactive interface in addition to these categories and indicators from the questionnaire.

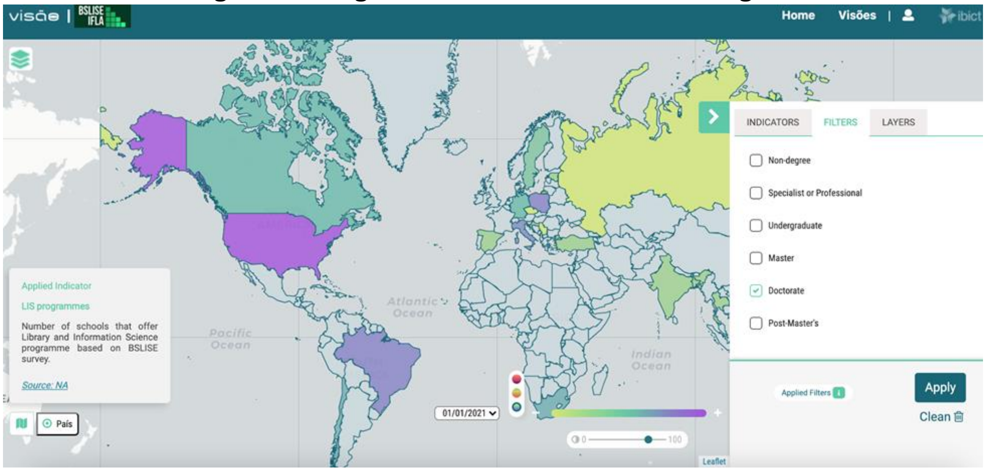
- Category: Human development
  - Indicator: Human Development Index
- Category: Pisa performance
  - Indicators: Mathematics performance, Science performance, Reading performance
- Category: Economy
  - Indicator: GDP (current millions of US$)

These last indicators were included to allow users to understand how factors such as human development as it situates LIS education schools/program in socioeconomic context, which allows one to determine how LIS as a field is maturing or thriving. Overall, a total of 19 pertinent indicators were identified.

Regarding the geographical filters, they are used to limit the countries presented to a certain region or to countries that have certain requirements. The geographical filters defined by the group were: continent, LIS programs (Non-degree, Specialist or Professional, Undergraduate, Master, Doctorate and Post-Master's) and Qualification required

(Certification, Accredited Degree/National, Accredited Degree/International, Other and None). After a filter is selected, the platform presents the countries that have those values. For example, if a geographical filter of "Doctorate" is chosen, countries that offer a doctorate degree are presented on the map as shown in Figure 1.

Figure 1 - Programs that offer a Doctorate degree



Fonte: Sistema Visão (2021).

The diversity of realities depending on continents, countries, and LIS programs can be easily viewed when the geographical filters are applied.

Figure 2 - A Visão screenshot with indicator, filter, layer and metadata applied

Fonte: Sistema Visão (2021).

The data structure named layers is the exact location of an address presented in the map. As the dataset has latitude and longitude of all LIS Schools, the group opted to present them. This was the only layer identified during the data analysis. Finally, the other fields were defined as metadata related to the indicators, geographical filters, and layers.

4.3 Importing Data into Visão

The data were transformed to SQL format to import it into Visão, but the platform also supports CSV automatic conversion. As this was the first time an international georeferenced dataset was imported into Visão, it was necessary to make certain changes to the code.

This project aligns with the conference theme of equity and inclusion as the project focused on open source solutions in order to allow greater access over using a commercial package. In addition, the project was an international endeavor of individuals and technologies from the Global North and South and will be made freely available online as a resource (https://bslise.org/map/) for educators, students, practitioners, policy makers and researchers in order to allow greater dissemination of the findings and understand and compare the state of LIS education programs internationally.

5 FUTURE DIRECTIONS & CONCLUSION

The project is still a work-in-progress. The researchers plan to finalize their edits and share the map with the BSLISE community for feedback. After this initial feedback period, the interface may be revisited. Since the dataset is limited in its coverage and data were collected in late 2019, the research team intends to disseminate the survey with a working model to further encourage participation and refresh the data. The team also plans to add additional functionalities to the user interface to let LIS community members to include and update their data by themselves, for example. Lastly, the research team is investigating various alternatives to release the data to the wider LIS community for research purposes. As the participation rate improves, additional data such as funding sources may be collected, which can be used as an indicator of the progress of those schools. Also, collaboration with other organizations to enrich the work is being considered.

The purpose of this paper was to show the preliminary findings of how LIS schools could be integrated into an open-source GIS project to map their distribution worldwide. Such visualization of LIS schools and programs around the world could help (a) students who are interested in pursuing an LIS degree to make more informed decisions, (b) the LIS community to establish relationships at institutional and individual levels, (c) researchers access more up-to-date data about LIS schools and programs as well as professional requirements, and (d) serve as a source of information to identify the recent news and the evolution of LIS schools over time.

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