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Intellectual Property and Static and Dynamic Proximity in Colombian Museum Networks: A Representation by Iconography of Correlations

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Abstract

This paper analyzes the relationship between intellectual property and the different types of proximity in networks of geographic museums in Colombia. For this, we applied a survey to nine territorial networks that are made up of 237 museums. The analyze include the use of different kind of visualization of correlations between variables and agents (in this case, museum networks), the iconography of correlations and the weighted graphs. Among the main findings are that (i) IP protection is independent of the types of proximity that museums and museum networks face; (ii) museum networks do not have the culture of registration of new creations or distinctive signs.

Keywords: museum; weighted graphs; museums networks; iconography of correlations; proximity; intellectual property; intellectual property management.

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1. Introduction

This paper analyzes the relationship between intellectual property [1, 2, 3, 4] and the different types of proximity [5, 6, 7, 8] in networks of geographic museums in Colombia [9, 10]. For this, we use different kind of visualization of correlations between variables [11, 12, 13, 14] and agents (in this case, museum networks), the iconography of correlations [15, 16, 17], and the weighted graphs. With regard to network analysis to address the dynamic dimensions of proximity, these have been little used [9]. In spite of this, their use is frequent for other themes [18, 19, 20, 21]. For this reason, the novelty of the paper lies in the design of qualitative and quantitative indicators that allow the study of proximity relations in the museum sector.

2. Method

In this section, we present the data, variables and method used for the analysis.

2.1. The data

The fieldwork was conducted to gather information on 9 geographic networks between November 11, 2016 and August 6, 2017 [22]. The networks that answered were: Santander Network of Museums, Bogotá Table of Museums, Córdoba Network of Museums, Bolívar Network of Museums, Antioquia Network of Museums, Atlántico Network of Museums, Cauca Network of Museums, Valle del Cauca Network of Museums, and Nariño Network of Museums. These nine networks integrate 237 Colombian museums (Table 1).

Table 1. Information about museum networks in Colombia.

Network	Year of creation	Age in 2019	Number of museums
Cauca Network of Museums	2010	9	7
Bogotá Table of Museums	2010	9	10
Valle del Cauca Network of Museums	2011	8	37
Nariño Network of Museums	2012	7	30
Antioquia Network of Museums	2001	18	88
Bolívar Network of Museums	2012	7	6
Córdoba Network of Museums	2014	5	9
Santander Network of Museums	2010	9	32
Atlantic Network of Museums	2012	7	18

The instrument consisted of 32 questions and 59 items (Table 2), of which 20 sought to measure different types of proximity (4 items for each type), and 9 items the strategies about intellectual property management.

Table 2. Items by instrument section

Section	Number of items
Characterization information	9
Interaction and proximity	41
Intellectual property	9
Total	59

2.2. Weighted graphs

According to [23], and [24], a non-directed graph H is defined as a pair of sets (V(H), E (H)), where V(H) are the vertices, and E (H) the edges. Two vertices u and v are adjacent if they are joined by an edge. If each edge $(u,v) \in L$ is associated to a value w(u,v), it is considered a weighted graph. w(u,v) corresponds to the weight of the edge (u,v).

Therefore, the network that is intended to be characterized corresponds to $H=\{V,E\}$, where $V=\{u_1,u_2,\ldots,u_{(|V|)}\}$ are the agents, and $E\subset V\cdot V$ denotes the non-targeted interactions between users. The adjacency matrix $M_{(|V||V|)}=e_{ij}$ represents the connections or links in H. $e_{ij}=1$ when the users u_i and u^j have a weak relationship, $e_{ij}=2$ when the users u_i and u_j have a moderate relationship, $e_{ij}=3$ when the users u_i and u_j have a strong relationship, and $e_{ij}=0$ otherwise.

2.3. Variables used

The variables that were analyzed in the document are presented in Table 3.

Table 3. Variables

Network abbreviation	Network abbreviation I R	Description	Subject
PG	PPG	Geographical proximity	Proximity
PCt	PCT	Cognitive proximity	Proximity
PR	PrR	Relational proximity	Proximity
PO	PrO	Organizational proximity	Proximity
PI	PrI	Institutional proximity	Proximity
Pcu	PrC	Cultural proximity	Proximity
PIC	PPIC	Copyright protection	Intellectual Property
PIM	PPIM	Trademarks	Intellectual Property
Pat	PrP	Patents	Intellectual Property
PID	PrPID	Domain name protection	Intellectual Property
PIO	PPIDI	Industrial designs	Intellectual Property
Cau	Cau	Cauca Network of Museums	Museum network
Bog	Bog	Bogotá Table of Museums	Museum network
Val	Val	Valle del Cauca Network of Museums	Museum network
Nar	Nar	Nariño Network of Museums	Museum network
Ant	Ant	Antioquia Network of Museums	Museum network
Bol	Bol	Bolívar Network of Museums	Museum network
Cor	Cor	Córdoba Network of Museums	Museum network
San	San	Santander Network of Museums	Museum network
Atl	Atl	Atlantic Network of Museums	Museum network

3. Results

Figure 1 shows the generalized matrix of correlations between the average of proximity items (6), use of intellectual property (5 items) and museum networks (9 items). The latter following [25, 26, 27], where in addition to the variables, the agents (called instants by [25, 26,] are included in the matrix. The inclusion of networks allows the identification of two types of correlation, in the upper left part the variables vs variables, and in the lower left rectangle the table of correlations variables vs agents (instants). In the latter case, the profile of the data is shown, without considering the units of measurement. Figure 1 shows the correlation matrix display, the color scale starts with blue for values of -1, going to white for values of 0 and red for values of 1. Of the 30 possible interactions between proximity and intellectual property in museum networks, 19 had a negative sign, i.e. 63.3%. This is true in all cases for geographic, cognitive and relational proximity. In Figures 2 to 4 the positive correlations are shown in green and the negative correlations in red. The thickness shows the closeness to 1 or -1.

We also employ network representation at 25%, 50%, 75% and 100% of interactions. In figures 5 a scale adjustment was made in the correlation matrix as follows: (i) less than 0.5 in absolute value, 0; (ii) between 0.5 and 0.66 in absolute value, 1; (iii) between 0.66 and 0.83 in absolute value, 2; greater than 0.83 in absolute value, 3. Figure 5 shows 55% of the network interactions of the correlations between proximity, use of intellectual property and museum networks.

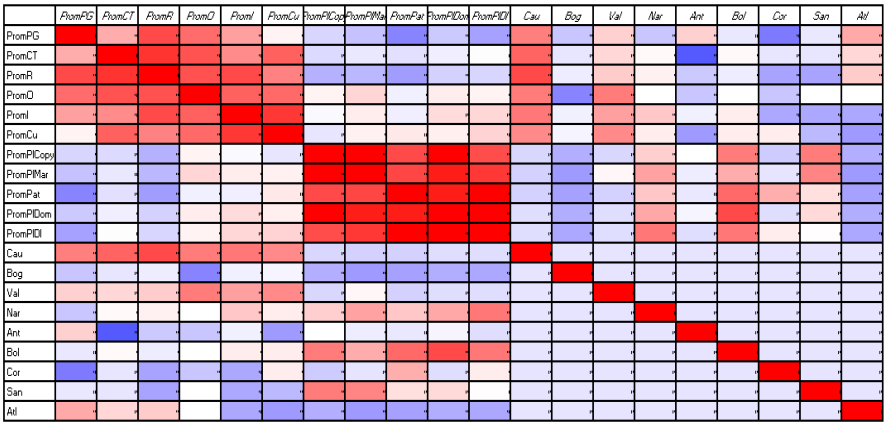

Fig. 1. Visualization of the correlation matrix

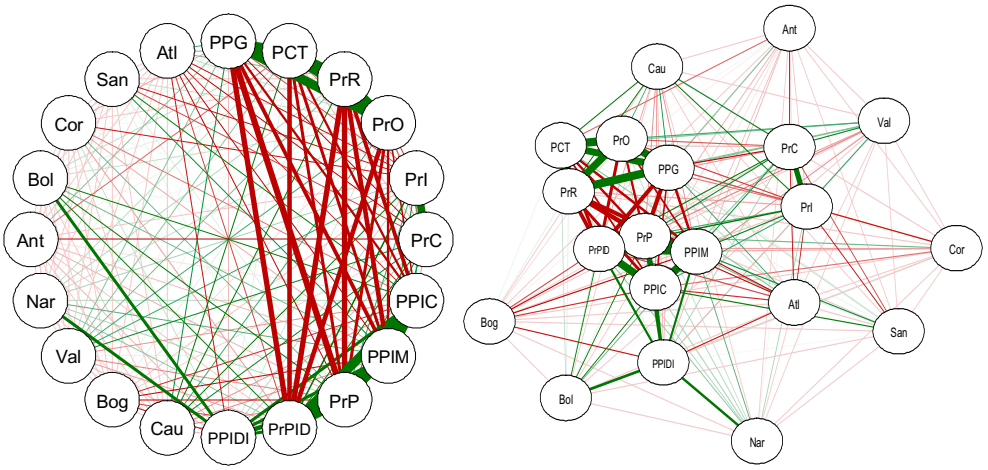

Fig. 2. Visualization of the correlations between proximity, use of intellectual property and museum networks.

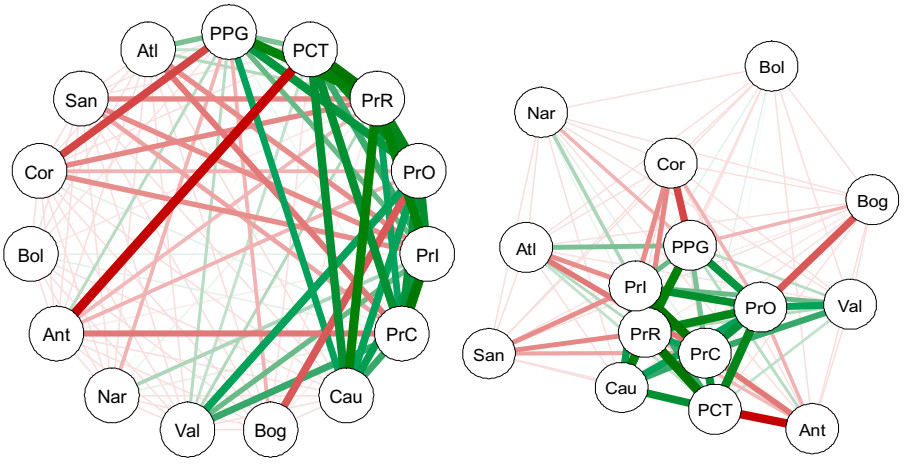

Fig. 3. Visualization of the correlations between proximity and museum networks

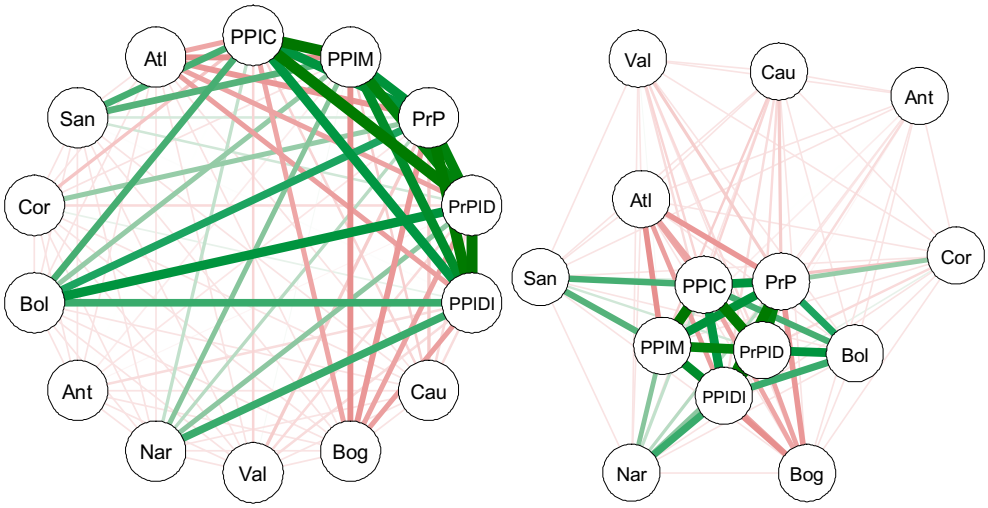

Fig. 4. Visualization of the correlations between the use of intellectual property and museum networks

4. Conclusions

Based on the analysis of information, we established that networks face 6 types of proximity. The most frequent is geographic, followed by organizational, cognitive, relational, institutional and cultural. Now, considering all correlations in absolute value that are greater than 0.5, it was possible to establish that: (i) the Antioquia's network only presents a significant and strong relationship with cultural proximity; (ii) the Santander´s network has a significant and weak relationship with brand protection; (iii) the Cordoba museum table has a significant and weak relationship with geographical proximity; (iv) the Bolivar museum table has a significant and weak relationship with the protection of patents, copyright protection and industrial designs; and very strong relationship with the protection associated with domain names; (v) the Bogota museum table has a significant and weak relationship with organizational proximity; (vi) the Valle del Cauca museum table has a significant and weak relationship with cultural proximity and organizational proximity; (vii) the Cauca museum table has a significant and weak relationship with cultural proximity, organizational proximity, institutional proximity and patent protection. The strongest relationship is with relational proximity; (viii) the Nariño museum table has a significant and weak relationship with industrial design protection; (ix) the Atlantic museum table does not appear in the network graph.

Likewise, we can infer that (i) proximity does not have a clear effect on the configuration of Intellectual Property management strategies; (ii) there is a clear interdependence between the different types of proximity, as for intellectual property protection decisions; (iii) there is no systematicity in intellectual property protection, the few results obtained are due more to isolated or even random behaviors, but not to a clear trend of interest.

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