Similar Patterns of Cultural and Creative Industries.
A Preliminary Analysis Based on Self-Organized-Map
to the Italian Case

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Abstract. In recent years, there has been a widely belief that creativity, going hand in hand with innovation and knowledge creation, readily translates into regional competitiveness. In the same time, cultural and creative industries (CCI) industrial pattern have been attracting a growing interest from a wide range of academic research and policy interventions. The aim of this article is to establish a better understanding of relevant industry relevance (RIR) of geographic samples with a relevant similarity in terms of industrial patterns and not of industry concentration. In this sense, we move from a methodological approach, based on Self-Organizing Maps (SOM) by comparing patterns of local employment. The Italian case provides an interesting case study to analyze industrial patterns by offering new insights of occupational dynamics. We conclude that this paper represents a firs explorative attempt to extend the previous literature to seize the overall productive structure of the local creative economy.

Keywords: Cultural and creative industries · Self-Organizing Maps · Pattern recognition

1 Introduction

The cultural and creative industries (CCI) have become increasingly the most dynamic component of the European economy. These industries are experiencing a growing role in the post-fordist economy and facing the challenge of strong international competition [3]. According to the European Commission, the CCI in Europe account for 3.3% of GDP and employ 6.7 million people (3% of total employment). Furthermore, employment in the CCI over the last five years has proved more resilient than in the EU economy and includes a higher percentage of youth employment than the rest of the economy [10]. CCI and their occupational features have received a huge amount of interest both theoretically and empirically as new driver of economic performances at both national and regional level. Although there is an increasing recognition of the positive role that CCI play in innovation and growth, there is little evidence on the dimension of this impact [16]. This paper tries to explain the industrial patterns of CCI in terms of local supply of creative

workers, measured by similar patterns of labour factor employed within an industry that is engaged in creative occupations providing three main contributions to the literature. It provides a taxonomy by moving from the recent and well-documented KEA model [13] applying this framework to specific Italian context. It develops a methodology based on Self-Organizing Maps (SOM) overcoming the traditional metrics in defining the CCI spatial patterns. According to Carlei and Nuccio [5], this methodology can be suitable in the analysis of different sizes of economic regions, of different industries and at different levels of industry classification, but to our knowledge have never been applied in creative economics literature. The paper is organized as follows. Section 2 delineates the literature background of the study. Section 3 describes the methodology. Section 4 develops some empirical results. Section 5 concludes.

2 Literature Background

The issue of culture and creative-led development has become increasingly relevant in the regional science, sparking a growing literature based on the main assumption that the cultural and creative industries (CCI) pave the way for shaping a knowledge-based economy, and that CCI are conducive to sustainable regional growth [4, 8, 17, 19]. Contributions in the literature reveal some important considerations. The operational definition of CCI is not without controversy and the consequent taxonomy is suffering from a lack of methodological convergence. In the early (and most cited) taxonomy developed by DCMS [9] was not clear what were the underlying threads linking this seemingly heterogeneous set of industry subsectors [11]. As a matter of fact, the structural system of interdependencies that governs the cultural and creative sectors is much more complex than it might seem [18] and the contribution of culture to development processes, is not mechanic, and is subject to complex nonlinear effects [7] which are often elusive and difficult to evaluate. In the first place, each form of production borrows processes, content and skills typical of other forms: the making of film needs of photography, the costumes, the script, the soundtrack, the design of interior. Moreover, contemporary capitalism is characterized by flexible production, the commodification of culture and the injection of symbolic 'content' into all commodity production [1, 14]. In this way, cultural and creative production interacts deeper with the multiple supply chains products and services. These new forms of production with a strong symbolic therefore require a continuous process exchange and cross-fertilization with the cultural and creative sphere. In a such industrial configuration, firms could benefit from sharing skilled staff and services, gaining the opportunity to capture valuable knowledge spillovers [6]. Since CCI provide a direct input to the wider economy, its innovation capacity depends from a high degree of diversity/variety and the subsequent processes of inter-sectoral cross-fertilisation [2]. In that sense a recently work of Lazzaretti et al. [15] try to evaluate the co-evolution of firms by moving from the evolutionary economic geography (EEG), adopting the recently established approach based on related variety [12].

3   Method and Data

To define the Italian creative economy, we adopted the industry-based approach, similarly as Bertacchini and Borrione [3] do. The model has been introduced in the Report "The Economy of Culture in Europe" by KEA [13].

The KEA Survey has distinguished the cultural and creative sectors; the cultural sector comprises traditional arts fields and cultural industries, whose outputs are exclusively "cultural". The following fields of activities are included: visual arts (crafts, paintings, sculpture, photography, etc.), performing arts (theatre, dance, circus, festivals, etc.), heritage (museums, libraries, archaeological sites, archives, etc.), film and video, television and radio, video games, music (recorded music performances, revenues of collecting societies in the music sector), books and press (book publishing, magazine and press publishing). In this paper, we move from the 5-digit taxonomy identifying a specification necessary to catch the peculiarities of the Italian production system, where culture, creativity and production activities are particularly interrelated. The main advantage of this 5-digit classification is that it potentially allows capturing relationships among different economic activities. This is especially true in the Italian case, where there is a large component of the sector manufacturing often founded on a tradition of craftsmanship of small, and micro-enterprise, there a large "grey area" in which the boundary between the creative industries and traditional manufacturing becomes blurred and particularly elusive. We feel that an approach based around the analysis of occupational data offers greater insight. Such accumulation of creative skills is imperative to a region's success in the knowledge economy as the value creation in many sectors rests, increasingly, on non-tangible. By moving from a methodological approach, based on Self-Organizing Maps algorithm [5] we focus on the strongest regularities, in terms of occupational patterns, emerging from the model. SOMs are among the most important and widely used neural network architectures. They were developed by Kohonen [5]. The key element of a SOM network is the Kohonen Layer (KL), which is made up of spatially ordered Processing Elements (PEs) or neurons. The global state of the layer evolves during the learning process, identifying each PE as a representative pattern of the input data with an unsupervised learning technique. A vector is associated with the generic PE in the KL, whose elements are the weights relative to the patterns identified. The weight vector associated with the generic PEs in the KL is indicated by:

$$W_r = (w_{r,1}, w_{r,2}, \dots, w_{r,p}, w_{r,p+1}, \dots, w_{r,N-1}, w_{r,N}).$$

At the end of the training process of the matrix Y, we obtain the $RIR_{r,p}$ index 235 for a given industry p defined as the value of the weight $w_{r,p}$ in the vector W_r associated with the respective PEs. Therefore, the RIR represents the convergence value of W, by which the SOM algorithm has reconstructed the relationships between the given industry and all the others through examination of observed data and the consequent training process. Contrary to the results of spatial analysis based on the concentration of a single industry, high values of the RIR define spatial agglomerations of geographic samples with a relevant similarity in terms of industrial patterns. With RIR we achieved three main results:

1. a new measure of relevance for a given industry p on a given P Er: high values of $RIR_{r,p}$ suggest that a given industry has a relatively greater weight than the others;
2. a new relation between high levels of RIR_p and similarities of the geographic samples in terms of industrial patterns (the neighborhood of PEs on the KL).

The overwhelming presence of a specific economic sector can be identified through the RIR (Relative Industrial Relevance) indicator for each creative industry. In other words, the proposed methodology allows us to understand whether an industry is important in relative (rather than in absolute) terms and how it contributes to the formation of observed industrial patterns for understanding the development and adaptive transformation of the economic landscape. Data supporting the analysis are drawn from the 2011 Census of Industry and Services. They concern the number of employees in the local productive units which are recorded by place of work on the basis of the 8.092 Italian municipalities, being the most updated ones at this territorial level. Employment data refer to the private sector, as the final version of those regarding public institutions has not yet been released, while non-profit ones have been recorded on a four-digit base. Data have been extracted with a five-digit detail according with the ATECO 2007 classification of economic activities, the Italian version of the NACE Rev. 2 nomenclature.

4   Results and Discussion

The output made by the SOM algorithm is about 10 creative industries as described by the following picture. The results put in evidence three major results:

1. The RIR value is high (red) only in a few exagons on the map for all the creative industries, except for "creative goods and services": patterns of creative industries for a defined industry are with low variance and are good representations of relationships among the analyzed industry and the other creative sectors.
2. Some creative industries like "Design", "Branding and Communication" and "Motion Picture, Video, TV and Radio" have two spots with high values in terms of RIR: those sectors have multiple patterns, different among themselves but coherent with the industry with;
3. Some creative industries present same or very near patterns with high values in terms of RIR: same patterns with high RIR's values represent a good proxy to highlight linkage in terms of skills and cognitive capacity (Fig. 1).

In general the analysis of the map can give a good representation of the related skills which find place in productive architectures that have similar patterns for creative industries. In fact what can emerges from the output is a good regularity for people employed in the creative industries ad also some relationship in terms of higher RIR values for some of them.
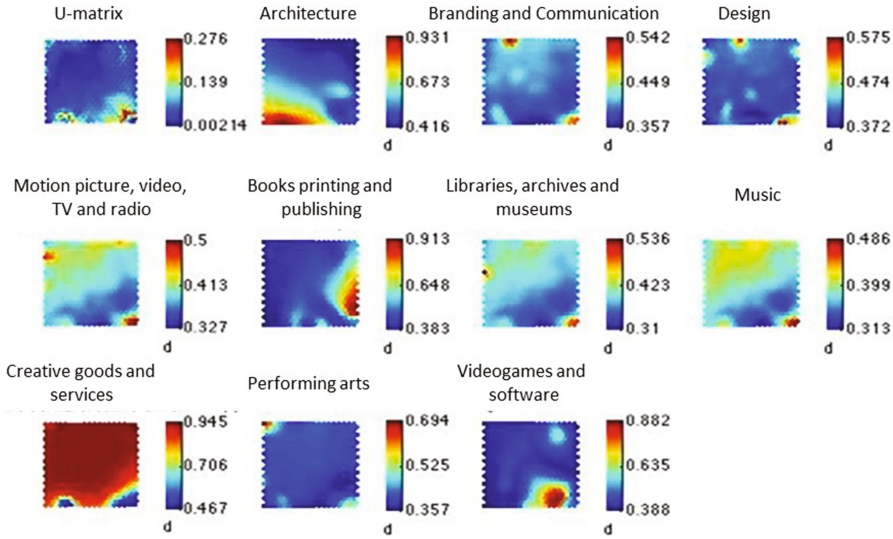
Fig. 1. Kohonen Layer for the creative clusters

5 Conclusions

The present work has studied organizational pattern of CCI via cultural and creative workers, considering their intrinsic socio-economic complexity of local development paths, which often are unique. To put in evidence the multidimensionality of this phenomena and its simultaneous similarities and differences, the authors have chosen artificial neural network Self Organising Map (SOM) as tool of work. This approach allowed the representation of industrial pattern of the CCI in Italy and a characterization of them not based on specialization but built on similarity in resources allocation.

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