Chapter 27
Clustering Global Entrepreneurship through Data Mining Technique

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ABSTRACT

The purpose of this chapter is to contribute for the identification of groups of countries that share similar patterns regarding the characteristics of Global Entrepreneurship and capturing features of entrepreneurship by focusing on entrepreneurial attitudes and entrepreneurial activity. For this purpose, 67 countries from 2013 GEM survey were selected, and Data Mining Methodology was used. In particular, evolutionary computation is used to determine a finite set of categories to describe the data set according to multi-dimensional similarities among its objects. In other words, several clustering algorithms where used, to get the best categories possible. The results show four clusters with different entrepreneurial attitudes among the countries - very high, medium and low entrepreneurial attitudes and entrepreneurial activities.

INTRODUCTION

Entrepreneurship has become a subject with worldwide interest and relevance. The importance of this issue has increased in the last years, since that initiative and innovation are significant factors of economic growth, generating new jobs (Winkel, 2013). Although entrepreneurial activities are important, the enhancement of corporate entrepreneurship is also fundamental, to prevent stagnation in the economy and enhance the growth of organizations (Goosen, Coning, & Smit, 2002).

According to a wide spectrum of key actors of society, including politicians, academics, and businessmen, entrepreneurship has been associated with economic development (Zoltan Acs, 2006; D. B. Audretsch, 2007; Bosma, Acs, Autio, Coduras, & Levie, 2008; Bosma & Levie, 2010; Carree & Thurik, 2003; Van Stel, Carree, & Thurik, 2005). Along this line, and given the

strong association between entrepreneurship and economic growth, the Global Entrepreneurship Monitor (GEM) has had as a major goal to analyze and assess the role of entrepreneurship in national economic growth, comparing data across a wide variety of countries on entrepreneurial activity, aspirations of entrepreneurs for their business, and attitudes towards entrepreneurship. Encouraging and inspiring entrepreneurship is a favored policy for economic development researchers (Goetz, Partridge, Deller, & Fleming, 2010), and the creation of new businesses could contribute to the economic performance of countries since entrepreneurial activities introduce innovation, competition and intensification competitiveness (David B. Audretsch & Keilbach, 2004).

This scope is aligned with the Schumpeterian perspective where entrepreneurs are ambitious and spur innovation, speed up structural changes in the economy, introduce new competition and contribute to productivity, job creation and national competitiveness (Schumpeter, 1934).

In this sense, knowledge can be extracted from data by using applied statistical methods in addition to data mining and the data mining term emerged which aims to get information from large scale of data (Rijmenam, 2014). The applications and developments of data mining and analysis have amazingly evolved in many applications in the last two decades (Fayyad, Piatetsky-Shapiro, & Smyth, 1996).

The present study focuses on a crucial determinant of entrepreneurship of 67 countries from the 2013 GEM survey and it aims to identify groups of countries that share similar patterns regarding the characteristics of entrepreneurial attitudes and activities. The number of indicators and their disperse nature makes a difficult task to obtain the best country categories, or clusters. In this chapter, we applied several clustering algorithms, validating the results each gave. We kept the best result, to have a stronger confidence on the obtained groups.

This chapter is structured in three sections. In section 1, we introduce data mining techniques, namely, cluster analysis, evolutionary algorithms, genetic algorithms for clustering, DBSCAN clustering and clusters validation. Section 2 describes the problem analysis, the methodology and presents the analysis and corresponding results. We finish with the main conclusions of the study.

1. DATA MINING TECHNIQUES

The way we work and live has been shaped by the advances of technology. As devices become smaller, they tend to be with us anywhere, anytime. The storage, processing capacity, autonomy has been constantly increasing, which makes us less afraid of relying on their functionality and on keeping including them in our daily routine.

These omnipresent devices make it easy to save things previously discarded. Our decisions, holiday pictures, documents, supermarket choices, walking tours are all registered in the devices and uploaded for future reference to the huge information repository in clouds everywhere. The generation of data is growing much faster than our capacity to understand it.

Behind all this data there is potentially useful information, rarely uncovered or taken advantage of. In this context, information is usually hidden in patterns that can be uncovered by computational methods. These use artificial intelligence, machine learning algorithms, statistics and others to extract a structure from large data sets. Data mining tools and techniques are used to extract valuable gems buried under this huge amount of data.

The extraction of knowledge from unstructured data is, sometimes, a difficult task. The more disperse and unrelated it is, the more difficult is to understand relations and meaning of certain enclosed aspects. However, modern data mining techniques provides scientists with the tools to go even further and to get more meaningful meaning from otherwise inaccessible knowledge.

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