A Systematic Literature Review of Youth Employment and Employability in Morocco: Role of Data Mining Techniques

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Abstract: Data mining (DM) is a method involving the all used techniques in data discovering; it aims to get beneficial facts, which are hiding behind data. So, Data Mining techniques deploy several methods to discover patterns and relationships between our data. In this paper, we present an overview of research works concerning by youth employment and employability in Morocco; our goal is to identify and examine the contribution of data mining techniques to analyze quantitative and qualitative data. This systematic literature review uses scientific databases, repository and research engine to collect 186 references, between 1988 to 2020, we use IMIST repositories, Google Scholar, Scopus, IEEE, Cairn.info, ScienceDirect, Persee, HAL and ILO Publication. As a result of our queries and meta-analyze 1/3 of this corpus is in English, the Moroccan journal "Critique économique" publish the most works in this topic and the authors " El Aoufi, Noureddine et al." produce mostly the books about the subject "Employment" and "Employability" in "Morocco". After text analysis, we found that theoretical works (63%) are more mostly present in this corpus than empirical works (37%). Concerning Data mining techniques used in Moroccan works, we found that the Data mining algorithms are used to explore the data, a few works utilize test hypothesis, classifications and prediction models.

1 INTRODUCTION

In Morocco, HCP employment survey shows that since 2006 (HCP, 2006), the most active population has been with a diploma: Higher level, but the unemployment rate by diploma at the national level reveals that the tendency to have higher levels of education does not positively lead to a good integration into the labor market. This is manifested by the high unemployment rate which increases significantly when the level of education increases.

Multiple factors influence the future of laureate after they graduate from university. Thus, it leads us to look for related works to treat this panoply of data by multiple Data mining techniques.

In this paper, we will present an overview of the most important Moroccan works about the employment and employability of youth, and we exam the use of data mining methods to analyze the data collected from the survey, national or international institutions.

2 DATA MINING

According to Jiawei Han (Han et al., 2012) Data mining (DM) can be viewed as a result of the evolution of information technology, Since the 1960s, database and information technology has evolved systematically from primitive file to sophisticated database systems. The research and development in database systems since the 1970s progressed from early hierarchical and network database systems to relational database systems, data modelling tools, and indexing and accessing methods. From the mid-1980s, after the establishment of database management systems, database technology moved toward the development of advanced database systems and data mining for advanced data analysis.

Data mining techniques deploy several methods to discover patterns and relationships between our data. Data mining can be used in the various important field as "Employment and Employability of youth" which remains the primary concern and commitment of any institution.

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3 EMPLOYMENT AND EMPLOYABILITY

The concept of employment or unemployment was introduced for the first time by the theory of unemployment attribute to Arthur Cecil Pigou (1933) and updated by Robert M. Solow (1980) (Solow, 1980). Also, the theory of employment was attributed to John Maynard Keynes, published in 1936 (Keynes and Press, 2019), who defines that the employment is determined not by the price of labour, as in classical economics, but by the level of aggregate demand. In 1944, "Full employment" as a qualification of employment, in the context of after second world war, it's defined as "a theoretical level of unemployment where only those who are unable to work, or who are temporarily changing jobs, are considered unemployed". In 1958, Alban Phillips (Phillips, 1958) established the relationship between the rate of inflation and the rate of unemployment: when the unemployment rate fell, wages rose, and companies raised prices to restore their margins; conversely, prices fall when unemployment increases. After this Keynesian view of employment, in 1968, Milton Friedman and Edmund Phelps introduce a new attribute for employment, defined as: "natural rate of unemployment" (Maurice, 1964), for Friedman and Edmund, the employment is related to monetary circulation and production (Phelps, 1968). In 1999, International Labour Organization (ILO) (ILO, 1999),(Burchell et al., 2014) proposed a new redefinition of the concept of "Quality of Employment" or "Decent Work", as the respects the fundamental rights of the human person as well as the rights of workers in terms of conditions of work safety and remuneration.

Concerning the employability and according to authors (Deacken, 2015; Gazier, 1990; McQuaid and Lindsay, 2005; Zgoulli-Swalhi, 2014), this concept was introduced in United-Kingdom and USA, in 1900 and 1930 respectively. The first definition for employability was the capability of an individual to integrate job market. In the 1960s, this definition will evolve the aptitude of an individual to work according to her functional test. In the 1970s, the employability became the attractivity of an individual for potential employers, appreciated by the result of functional tests, the ability to work and professional behaviours. With this definition, we distingue two meaning of the employability, the first one is conditioned by the labour market and the second one, related to personal characteristics. In the 1980s, according to the Canadian Labour Force Development Board (Zgoulli-Swalhi, 2014), the employability is the capacity of an individual to achieve meaningful employment given the interaction of personal circumstances. In the 2000s, the definition of employability will integrate other attributes as mobility and knowledge of the labour market.

After this brief chronological introduction to "Employment" and "Employability", we can conclude that employment is a concept related to the macroeconomic context. However, the employability is related to both individual attributes and economic context.

4 METHODOLOGY

Our purpose is to focus on the position that data mining techniques could occupy in the service of the employment and employability of young university graduates in Morocco. We have conducted this review in September 2020.

To elaborate our works, the keywords chosen are: "employability", "employment", "unemployment", "Morocco", in both languages "English" and "French".

We perform those requests in scientific databases and repositories: IMIST, Scopus, IEEE,Cairn.info, ScienceDirect, International Labour Organization Publication and Google Scholar. After extraction of references, the Zotero database contains 186 references, which will be analyzed by NVIVO. In the first step, we construct a text analysis to elaborate a word cloud for each corpus (french and English) and create codes for "Employment", "Unemployment" and "Employability". Then we generate a crosstable to identify what references related to nodes. Finally, we extract all characteristics from NVIVO to SPSS and elaborate our meta-analysis by sources, type of references, language, authors, publications, year of publication.

After this first part of our analysis, we go to discuss all Empirical studies: quantitative and qualitative, to identify what Data mining algorithms use the authors to analyze and present their results.

5 RESULTS

5.1 Languages

We constitute our corpus by 186 references in both language English and French. The proportionality of french bibliography (70, 97%) is more than English (29,03%).

This situation is due to the authors, especially in management and social sciences, which utilize French to communicate further than English. So to analyze our corpus, we subdivide it into two subcorpus: French and English.

5.2 Type of References

Articles constitute 66,6% of the corpus, with 55,4% for french articles and 11,3% for the English. The report is in the second-ranking with 6,4%, in this category the English reports are mostly than french.

Table 1: Types of publications

	Language		
	English	French	Total
Article	21	103	124
Paper	7	4	11
Book	4	8	12
Video	1	0	1
Report	17	8	25
Chapter	4	1	5
These	0	8	8
Total	54	132	186
	29,0%	71,0%	100,0%

5.3 Sources

In this synthesis, we are interested in works dealing with "Employment" and "Employability" in the Moroccan context, that is why the repository of IMIST (Institue Marocaine de l'Information Technique et Scientifique) is predominant in the corpus, with 42%. In the second place, we found Google scholar as an access point of secondary data, followed by "Cairn" the repository of francophone "Humain and Social Science" journals.

Table 2: Scientific databases or search engine * Language Crosstabulation

	Language		
	English	French	Total
Cairn	1(,5%)	12(6,5%)	**13 (7,0%)**
Google Scholar	22(11,8%)	25(13,4%)	**47(25,2%)**
Archives Ouvertes (HAL)	0(0,0%)	5(2,2%)	5(2,2%)
Research Papers in Economics	5(2,7%)	0(0,0%)	5(2,7%)
IEEE Xplore	2(1,1%)	0(0,0%)	2(1,1%)

International Labour Organization Publications	4(2,2%)	0(0,0%)	4(2,2%)
OpenEdition	0(0,0%)	3(1,6%)	3(1,6%)
Open WorldCat	2(1,1%)	2(1,1%)	4(2,2%)
Social Science Research Net.	3(1,6%)	0(0,0%)	3(1,6%)
Persee	0(0,0%)	2(1,1%)	2(1,1%)
Revue IMIST	2(1,1%)	77(40,9%)	**78(41,9%)**
ScienceDirect	7(3,8%)	0(0,0%)	**7(3,8%)**
Scopus	4(1,6%)	1(,5%)	5(2,2%)
Theses.fr	0(0,0%)	2(1,1%)	2(1,1%)
Toubkal IMIST	0(0,0%)	2(1,1%)	2(1,1%)
Others	2 (1,1%)	1(,5%)	3(1,6%)
Total	**54**	**132**	**186**
	29,0%	**71,0%**	**100,0%**

5.4 Years

According to this corpus, concerning the years of publications (figure 3), we remark that :
• First work dealing with "Employment" was in 1988
• Since the 2000s, "Employability" and "Employment" become an important topic for the community.
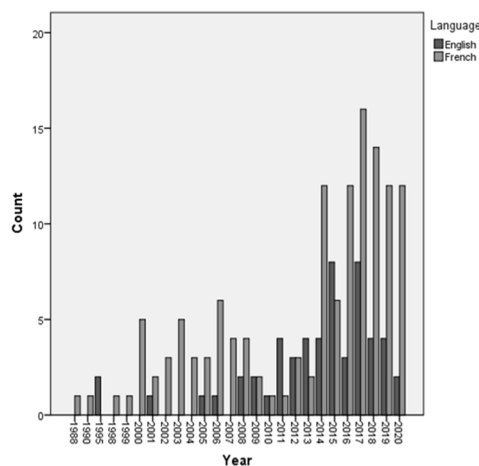 • More research published in 2017

Figure 2: Publication number by year.

5.5 Publications

The most important journals that published on Employment and Employability in Morocco are: "Critique économique", "Moroccan Journal of Entrepreneurship, Innovation and Management", "Procedia - Social and Behavioral Sciences" and "Revue Economie, Gestion et Société".

"Critique Economique "(CR) is a journal founded in 2000 by the research team from university Mohamed V of Rabat. CR is interested in economic subjects. We have found published on its 25 papers related to employment and unemployment.

Table 3: Publication * Language Crosstabulation

	Language		
	English	French	
Critique économique	0	25	**25**
Dossiers de Recherches en Économie et Gestion	0	4	4
La Revue Marocaine de la Pensée Contemporaine	0	5	5
Moroccan Journal of Entrepreneurship	0	7	7
Procedia - Social and Behavioral Sciences	6	0	6
Revue Economie, Gestion et Société	0	6	6
Revue Marocaine de Recherche en Management et Marketing	0	4	4
Total	54	132	186

CR is flowed by "Moroccan Journal of Entrepreneurship, Innovation and Management" (MJEIM) and " Revue Economie, Gestion et Société" (REGS), launched in 2016. these journals are hosted by IMIST.

Procedia - Social and Behavioral Sciences, is an Elsevier open-access collection of conference proceedings published between 2009 and 2018, with an emphasis in core social and behavioural sciences disciplines. Procedia - Social and Behavioral Science was indexed in Scopus.

5.6 French Word Cloud

The word cloud illustrated in the image below was obtained after the analysis of collected abstracts of French references. According to the occurrence of words, it's seems that we have three categories :

- 1st category (high occurence) are respectively "travail", "Emploi", "Maroc"
- 2nd category of words (between high and medium occurence): "développement", "diplômé", "formation", "chômage", "économique", "marché","jeunes","recherche"
- 3th category of words (between medium and low occurence) : "Employabilité", "politique","programme","secteur","entreprise", "supérieur","modèle","système","croissance","c ompétences","entrepreneuriat","économique","f acteurs","social","professionnelle","approche".

5.7 English Word Cloud

Concerning the English references, the word cloud present three categories according to the word occurrence:

- 1st category (high occurrence) are respectively "data", "mining", "employment"
- 2nd category of words (between high and medium occurrence): "student/students", "graduate", "university", "skills", "algorithm", "education","information","decision","analysis
- 3th category of words (between medium and low occurrence): "Employability", "prediction","classification","association","tree" ,"academic","higher","educational","quality","m anagement","technology","factors","career","pr ofessional","techniques","market".

5.8 Quantitative and Qualitative Studies

From cloud word, we can elaborate on, the textual requests to identify papers with empirical study, as indicated below:

	Words
Quantitative	quantitative empirique analyse déterminants facteur factor empirical prediction statistique statistic algorithm classification association donnée
Qualitative	qualitative exploratory "étude exploratoire" interviews

As a result, we found that in this corpus we have 61 references for a quantitative study, 6 references for mixed study and 1 reference for a qualitative study.

We remark that the theoretical studies are dominated in this corpus, with more than 60% of all references.

Table 5: Empirical * Language Crosstabulation

		Language		Total
		English	French	
Empirical	Non-empirical study	43	77	118
	Quantitative	11	50	61
	Qualitative	0	1	1
	Mixte	0	6	6
Total		54	132	186

6 DISCUSSION

Regarding the results of corpus analysis presented above, to elaborate our discussion, we will select the works according to two criteria:

- The paper must present an empirical study or documentary study with data analysis.
- The paper must include discussion employment or employability for Moroccan students or youth.

6.1 Quantitative Studies

In 1995, World Bank (World Bank, 1995) elaborated an economic study of the employment to describe, first of all, the economic framework of Morocco and the historical macroeconomic indicators. Also, in this report world bank present the factors of the labour market. We notice that this report include a univariate and bivariate descriptive analysis.

In 2002, Mohamed Bougroum and Aomar Ibourk (Bougroum and Ibourk, 2002a, 2002b) present two studies about unemployment of graduate students in Morocco, the authors used crosstable of historical indicators, histogram, the test of hypothesis and probabilistic model to predict unemployment of an individual.

In 2004, Belghazi, Saâd (Belghazi, 2004) presented an analysis of quality of employment regarding many survey and data collected from an official institutions, international and national organization, as : HCP, CNSS, BIT, CGEM, AMITH. The author use frequencies analysis and historical data to describe the factor that affects employment quality. Also, in the same year Aomar Ibourk (Ibourk, 2004) describe the institutional support to professional insertion of youth graduate. To present his interpretation, the author utilizes crosstable, percentage and effective analysis of data collected

from institutions (HCP, CNJA, CIOPE, ANAPEC, OCP) and survey.

In 2005 and after in 2008, El Aoufi Noureddine and Bensaïd Mohammed (Aoufi and Bensaïd, 2005; El Aoufi and Bensaïd, 2008), edited a book about employability and unemployment of Moroccan youth people. The authors use crosstable, histogram, graphics, percentage and also they present prediction of some indicators as population.

In 2006, Nizar baraka et al. (Baraka and Benrida, 2006) present a study about employment and the relationship with the economic context, labour market and education system.

The authors present their result with crosstable of historical data function of many variables (PIB, Population, Age, Sexe...) also the authors use T-Test to present a comparative study with other countries, the data was collected from many international and national institution (Ministère de l'emploi, Ministère de l'économie, Conseil National de la Jeunesse et de l'Avenir, HCP, OCDE).

In 2012, Bouzekri Touri (Bouzekri, 2013) presented a study about the impact of the impact on college students scientific content acquisition and employment market Requirements in Morocco. The author uses three tests for 1,456 students to demonstrate that the students suffered from language skills; this situation will impact their employability. The author uses descriptive analysis, graphics, crosstable and proportionality to present his results.

In 2014, Ibourk Aomar (Ibourk, 2014), present a study about the attitude of youth graduate in the job search process. The author uses a mathematical model, an econometric model, hypothesis test and multivariable analysis to describe the attitude of youth. For the econometric model, the author uses a database of 1 934 Moroccan students from four universities: Moulay Ismail University, Chouaib-doukali university, Mohamed Ist university and Cadi-ayyad university. In the same year, Fatima BOUTALEB (Boutaleb, 2014) present a conference paper that includes a quantitative study with a questionnaire about the effect of gender in employability, this study concern ENCG and ENSA laureates. Also, the author exposes a theoretical study to elaborate a conceptual framework for employability.

In 2019, Tejan et al. (Tejan and Sabi, 2019) present a result of an empirical study conducted by questionnaire about employability skills of graduate students, This study involved 20 employers from three sectors, primary education, banking and tourism in the region of Marrakech-Safi. The authors use Standard deviation and Mean to expose their results.

6.2 Qualitative Studies

In 2020, Balhadj Said et al. (Balhadj and Melhaoui, 2020) present a study about support for autonomy to improve students' perception of employability. The authors adopt a qualitative approach for ENCG students in Morocco. Also, NVIVO was used to analyze the textual data.

6.3 Mixte Studies

In 1988, Mohamed Guedira (Guedira, 1988) focused his works on non-adequation between educational programs and labour market demand for economic and management students. The author adopts an approach qualitative by using interviews with employers and quantitative study which use a questionnaire with students and workers. Mohamed Guedira uses manual text analysis for exploratory research, and then he uses descriptive statistics (frequencies and percentages) to present the result of the questionnaire without any use of other Data mining techniques, like regression or classification.

In 2014, Mohamed Essaoudi et al. (Essaoudi et al., 2014) present an empirical study on evaluation of the experience of the first year of employability among novice inspectors of education in morocco. The authors use interviews coupled to questionnaire to collect a total of 26 novice inspectors opinions about their first year as an inspector. Three data collection tools were used according to the principle of triangulation. The quantitative data analysis was performed by different statistical treatments: percentages, frequency distribution, and processing correlational.

In 2020, Mezzour (Mezzour, 2020), present a research project that combines Data Sciences and Artificial Intelligence for Improved Youth Employability in Morocco, the author use Natural Language Processing (NLP) and Social Network Analysis (SNA) techniques to analyze unstructured and semi-structured text. The data was collected from job ads of 10+ top Moroccan recruitment websites to identify job market needs and then compare these needs to university curricula.

7 CONCLUSIONS

According to this overview, data mining methods have proven their utility to study employment and employability in a different context. However, most works collected in this corpus, present a view and interpretation of data already collected and published by institutional and organizations, under this institutional references, the authors utilize descriptive analysis to present their results. Also, we remark that Moroccan references are mostly writing in French; they are present in many scientific databases a repository; this situation complicates the collection of references. Finally, we conclude that Data mining algorithms are mostly used to explore the data; however, a few works utilize test hypothesis and prediction models.

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