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AUTOMATIC PATENT ANALYSIS (APA) to IMPROVE INNOVATION and DECISION MAKING in SCIENCE and TECHNOLOGY

[1]Henri Dou, [2]Jacky Kister, [3]Bruno Mannina
[1]Atelis, France Business School, 1 rue Léo Delibes, 37205 Tours cdx France douhenri@yahoo.fr
[2]METICA Laboratory, AMU, Centre Scientifique de St Jérôme, 13397 Marseille cdx 20, France jackykister@voila.fr
[3]Matheo-Software, 69 rue du Rouet 13008 Marseille, France, bmannina@matheo-software.com

Abstract* : *Patents are a unique source of information which links science and technology. The world patent database available free of charge via the EPO (European Patent Office) prompts for the use of patents as a privileged source of information. But, to have the best possible view of the whereabouts of a subject, it is necessary to perform searches large enough to embrace all its different aspects. This will lead to the creation of a local database of several hundred even thousands of patent notices. The analysis of this large amount of data calls for the use of special resident software which will enable the user to mine the patent data and get the best possible knowledge of the subject. This paper deals with the presentation of various analysis done through the use of the Matheo-Patent software and their links with the development of a Competitive Intelligence Unit in Scientific laboratories and SMEs

Keywords *– APA, automatic patent analysis, competitive intelligence, patent, EPO*

INTRODUCTION

Databases such as the US Patent databases [1], the World Patent Database from the EPO (European Patent Office) [2] are available free. Because the patents provide a unique information which most of the time does not appear elsewhere, this living encyclopaedia of more than 89 million of patent notices constitute one of the best way to get aware of the technology trends, the main actors (applicants as well as inventors), the automatic benchmarking of companies or inventors knowledge, the research potential of enterprises or laboratories with granted patents, etc. The analysis of large groups of patents provides also most of the answers to the questions asked when you perform a SWOT analysis or when you determine the Porter's five forces. The answers provided by this type of analyse are also a bridge between academics and industry, helping to the development of PPP (Public Private Partnerships). [3]

MATERIAL

We use the World Patent Database available through the European Patent Office host. This database covers about 90 countries among which the most important EU (European Union), Japan, United States, etc. This database is free and gives access to the bibliographic data of a patent as well as to the full text and drawing if necessary. A local automatic extraction of the words from the titles and abstracts allows the user to develop strategic groups of patents which will be analysed in detail if necessary. All the documentary fields of a patent presented underneath can be correlated to provide lists, matrix, networks on the full local database or on strategic selected groups of patents.

A. Fields available in a patent notice

In a patent notice the main fields available, and which will be used to build up all the necessary bibliometrics correlations are the following:

Title: full title of the patent, in English
AP: applicants or patent assignees
PR : priority number, first patent granted
PN: patent number, extended patent
Date : patent date
IPC : International Patent Classification
Abstract : abstract of the patent most of the time in English

Provided offline: extraction of the words from titles and abstracts - drawings (from the first page of the patent) to build up a drawing local database - time line which is the "life of the patent" various extensions, demands, etc.- international patent coverage – Inpadoc (International Patent Documentation Center) [4] and links with the EPO Register (where all the remarks, development and implementations, advice of the examiners, cited patents if they are available) – link with the WIPO (World International Patent Office) database (Patentscope).[5]

B The International Patent Classification (IPC)

The bibliographic description of a patent does not contain key words. Then, the International Patent Classification has been developed to provide a fine description of the products, applications and uses of a patent. The IPC is available free, online through the EPO host [6]. The classification contains 1 to 8 digits, the more digits the more precise is the classification. The table 1 gives an example of the IPC dealing with "welding".

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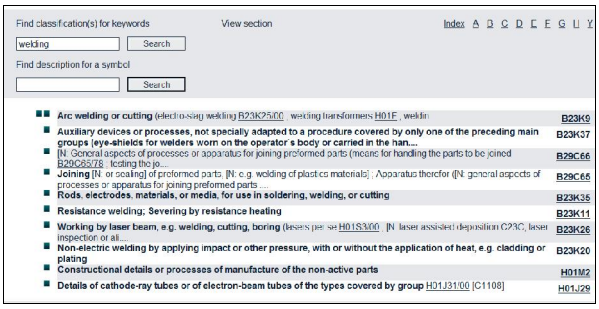
TABLE 1 EXAMPLE OF IPC



The letters A to Y deal with different aspects of the technology such as A:Human necessities, B;Performing operation, transporting, C:Chemistry, metallurgy, etc. In most correlations the IPC with 4 digits is used and if the correlations must be more precise the full IPC may be used.

METHOD

A. Creation of the local database

The software resident interface Matheo-Patent [7], allows to query the EPO database (or the two US Patent Databases (Patent granted or on demand). The query is performed through the use with Boolean operators of the titles and abstract words, the IPC, the PN or PR numbers, the Applicant or Inventor names, the dates. Once performed the query gives rise to a window which shows all the patent titles. The user may select some patents or all the patents and download all of them with or without the patent family members. A patent can be extended to other countries then the same invention may be described by different patent numbers. All of them constitute the patent family. The figure 1 shows the way that this system works: [8]

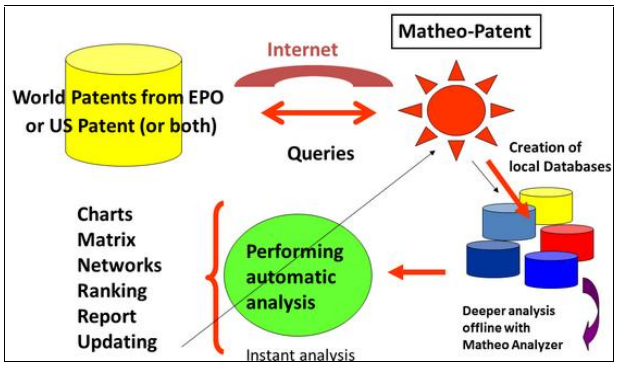


Fig 1 How Matheo-Patent works

Once downloaded all the patent titles and family members appear on the screen, and clicking on one titles makes available in another window the bibliographic data of the patent as well as the drawing, the IPC, PN and PR, the abstract, the cited documents (related patents cited by the examiner), the time line, the world coverage, the Inpadoc comments and the links with the EPO register [9] and the WIPO patent database. But to process that way with a large number of patents is tedious, even impossible when the number is large. For this reason, the software provides via the Analysis, the facility to select and display all the patents related to the various items present in the patent notice fields as well as related to the titles and abstracts words and the drawings (if present in the first patent page). The figure 2 indicates the selection of patents dealing with the query "welding AND apparatus" performed in patents titles on the World Patent EPO database, from 2010 to 2012, 1581 patents are reported. You can select some patents for downloading or download all of them if necessary.

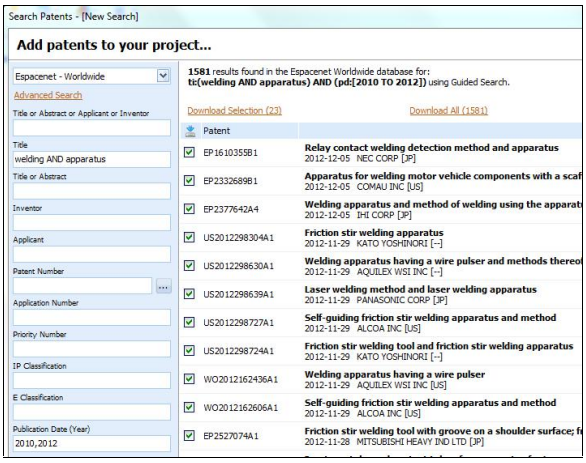


Fig. 2 Selection of downloaded patents

The figure 3 indicates how, after downloading you can obtain the detailed information about a patent.

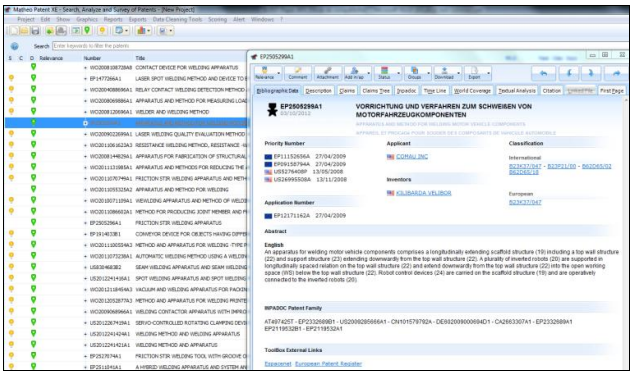


Fig.3 Information about one of the downloaded patents

The figure 4 precises the type of information which can be obtained automatically.

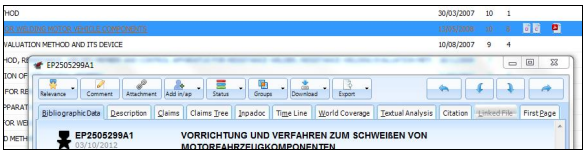


Fig. 4 Type of information which can be obtained

B – Selecting patent throughout their bibliographic field's analysis

Now, the problem when you have to deal with several hundred of patents is that you cannot look to the patents one after the other. It will be a lot too long. This is the reason why we provided the automatic analysis system which presents all the available field's contents with the associated patents. A

click on a patent provides all the information about this patent. This system, which provides in fact lists of field's contents and the patents associated may be useful to select important patents and put them into a group. But the information provided needs to be implemented by more advanced correlations such as matrix or network between various fields present in the whole local database or in various patent groups. The patent groups may be also used as entity in matrix or network giving so a meta-information. The figure 5 indicated how the patent analysis works. In this example the IPC 4 digits are analysed and for each of them the relevant patents are listed. A click on one patent provides the information (bibliography, abstracts, first page, etc.)

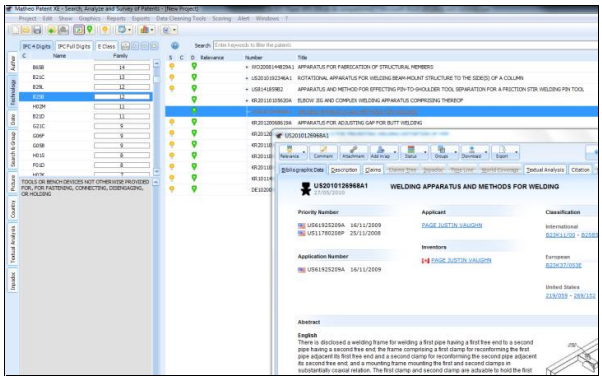


Fig.5 Analysis of the IPC 4 digit field

GROUP CREATION AND EXAMPLES OF RESULTS

A Group creation

We are interested in certain welding systems such as friction, laser, etc… Using the analysis of the titles and/or abstracts words, we selected the relevant patents and put them into different groups: available in table 2 which represents the domains in which we are interested.

TABLE 2 WELDING SYSTEMS

group	Nb of families	Nb of patents
laser	153	408
friction	63	187
ultrason	26	95
vibration	17	48
plasma	10	32

We are also interested in the comparison of the US, South Korean, Japanese, Chinese and German technology in this area. We will build up the groups related to these countries. The analysis may be developed according the needs of the user as well as the combinations which will result. The objective is to select the right patents and go to the full text of them for a further analysis by experts. These groups may be analysed in detail (list, matrix, network with all the fields available) or may be used in combination to get a meta-information.

B Simple correlations

Let us see the analysis of the groups themselves. For instance we will list the Applicants in the plasma group. This is presented in figure 6.

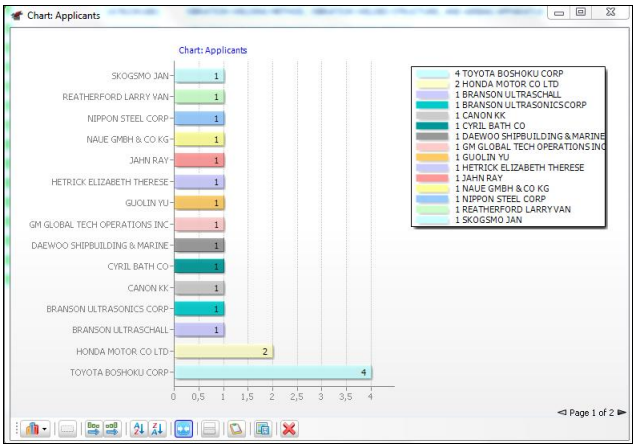


Fig.6 Example list of applicants, vibration group

The lists are important but not sufficient to go deeply into the subject. To do so, here is an example given in figure 7, which presents the automatic benchmarking of the Applicants in the same group. To do so we build the matrix Applicants/IPC4 digits.

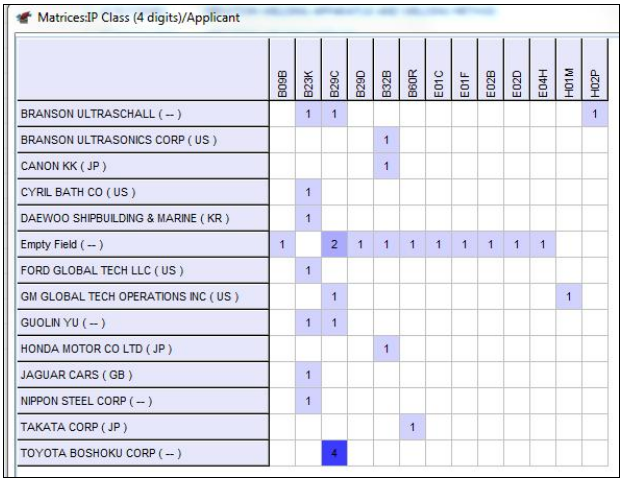


Fig.7 Benchmarking of the Applicants – friction group

The networks will give for instance the representation of the various groups of inventors which are related together since they appear in various patents. This is presented in figure 7.

C – Meta-Information

This information is obtained when a group is directly involved in a matrix or network, either with the data of one of the patent fields or with another group. The figure 8 indicates which Applicants are involved in the various welding systems groups and if some of them have simultaneous competences in different groups. This type of information cannot be answer by the query of the database with Boolean operators [10]

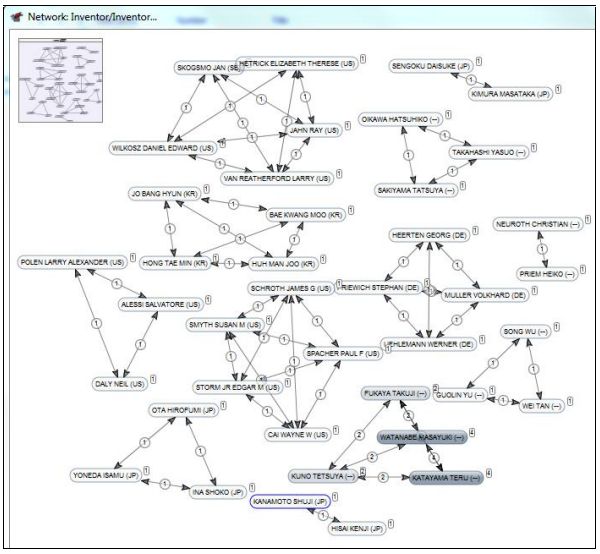


Fig.7 The various grouos of inventors from group friction

This type of information is essential if we want to select the applicants which present the best experience since they have an expertise which covers the larger number of groups.

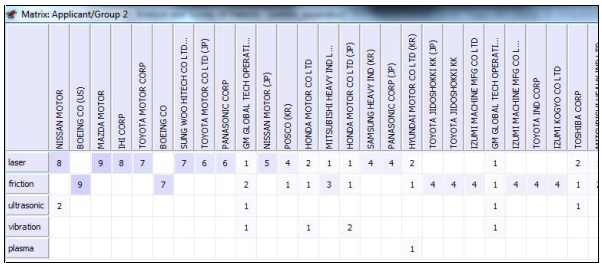


Fig.8 Partial view of the applicant expertise in different groups

Using now the country groups and the welding system groups we will analysed the different policy in patenting of the different countries in the different welding system groups. This is presented in figure 9.

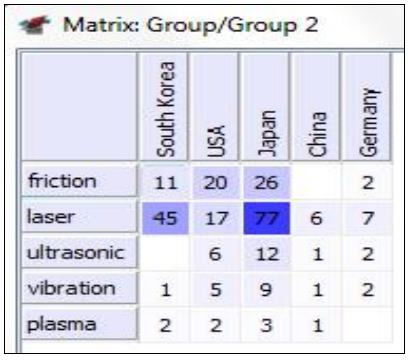


Fig.9 Which countries are involved in the different groups

It is possible also, with the meta-data to see for instance the strategy difference between the various selected countries. This is presented in figure 10. In this table we used all the patents. But because we can select also the type of patents it is possible either to analyse the most important patents, for instance WO, EP, PCT (Patent Cooperative Treaty), US in some cases (this will be what is called triadic patents) [11]), or to refine the analysis by using the full IPC as technology marker.

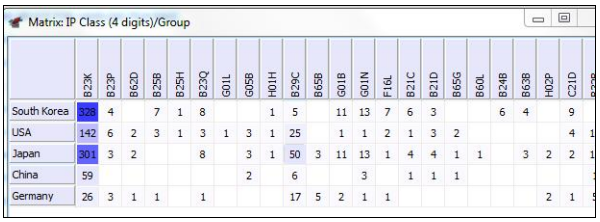


Fig. 10 Difference in strategy between various countries

USING APA IN COMPETITIVE INTELLIGENCE

There are numerous definitions of Competitive Intelligence or of Economic Intelligence (for French speaking countries), but the core of this discipline is to collect the best possible information, to analyse it to comment it with the help of experts and then to sustain the decision of the makers decision and strategy.

The APA, which deals with scientific and technical information, has a special place in Competitive Intelligence and thus for two main reasons:

The first one is to transform the competencies and knowledge build (mostly with the State money) by the universities and research laboratories in products and services The second because from the work of Michael Porter [13] and of the Holland school about the Triple Helix [14], they underlined that the best way to innovate is to do it in the space provided by the intersection of the spheres of the State, the Industry and Research. This prompt for the development of Public and Private Partnerships and then to develop various "ingredients" which will catalyse this development. Patents, because they are at the intersection of the Research and Industry can be used in this way. They will enlarge the view of the enterprises and show to the academics what is done with their competencies.

Tentative of the use of patent analysis to provide information to SMEs and help them to regroup of to enter in the clusterization process have been done by the WIPO (World Patent Organization) in various African countries [15}. Other examples of the use of APA in the French poles of Competitiveness [16] are also available. This is the reason why, Automatic Patent Analysis should be included in all Competitive Intelligence Units (in enterprises, clusters or poles of competitiveness) not necessarily to protect an invention but as an invaluable source of information. The necessity to decrease the gap between research and industry must also prompts the academics to use most widely the patent information in research projects and PhDs.[17]

CONCLUSION

APA provides a way to enlarge the vision of a technological field and open two windows, one for the enterprises which often have not the time and the facilities to analyse large amount of patents and second for the academics

since patents are most of the time not cited as reference in scientific papers. This double approach is useful since it can be used to pre-clusterize the PPP (Public and Private Partnership) by reducing the gap which exits between research and industry [18]. The system of analysis is simple with a very low cost [19] and the access to the patent databases free. This will be of a great help for SME, researchers and consultants. The words used in abstracts or titles, as well as the applicant and inventors names, can also be used as a significant entry in scientific databases, opening the field to a more precise bibliography.

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