COMPAS - Competitive Analysis Service for Informed Decision-Making

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I. Introduction

1. Competitive Analysis

Competitive intelligence can be defined as a systematic process and results from it for "gathering and analyzing information about (your) competitors' activities and general business trends to further (your own) company's goals" (Kahaner, 1997). Researchers have tried to develop a framework to obtain competitive intelligence by using the public data such as patent or journal article information (Shih et al., 2010). Utilization of these intellectual property information helps firms conduct extensive range of competitive analyses including competitor monitoring, technology trend analysis, strategic R&D planning, and so on (Ernst, 2003).

Since patent information have been regarded as a proxy to measure R&D performance for a long time (Basberg, 1987), it is not difficult to find the competitive intelligence activities using patent information in various technological domains since 1990s (Mogee, 1991; Liu and Shyu, 1997; Huang et al, 2003; Fabry et al, 2006; Chang et al, 2010). Recent technological achievements in computer science have made it easier for firms and researchers to access the patent information free of charge. Patentscope (WIPO), Espacenet (EPO) and Google Patents (Google) are good examples of the free resources. Commercial analytics services and softwares provide even more various features including the global patent full-text search and specialized services focusing on the variety and depth of functions (Trippe, 2013; Dou et al, 2005; Bonino et al, 2010).

Despite this abundance of information sources, services and tools, most of the firms and researchers seeking competitive intelligence cannot utilize them efficiently because they often require a certain level of knowledge in informetrics and time to get used to operate them properly. A recent study following up a series of literatures focusing on what information the firms want to know for obtaining the competitive intelligence suggested a systematic process to monitor a competitor's technological challenges (Kang et al, 2010). In relation to the literature, this paper introduces COMPAS (COMPetitive Analysis Services) provided by KISTI (Korea Institute of Science and Technology Information) as a new tool for competitive intelligence.

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2. COMPAS(COMPetitive Analysis Services)

COMPAS is an on-line analysis service which is intended to help firms make informed decisions by providing means to analyze the competitive environment – often represented by the vast amount of the intellectual properties such as patents, journal articles, and trading statistics. Users can conduct rapid and in-depth analyses on the most frequently asked MOT (management of technology) questions of targeted technological areas by following the simple and easy steps in COMPAS. Users can start using COMPAS by visiting the webpage (shown in Figure 1) at http://compas.kisti.re.kr.

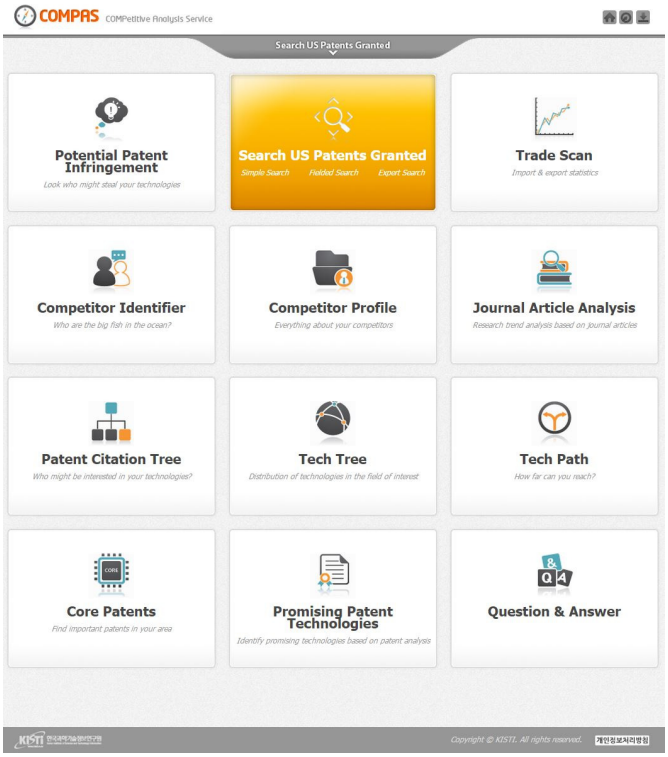


Figure 1. Webpage of COMPAS (http://compas.kisti.re.kr).

II. Structure and Features of COMPAS

1. Main Features of COMPAS

COMPAS is specifically designed for non-experts in informetrics, who do not have access to the information source of important intellectual properties and to the means to manipulate and analyze them. Users can connect to COMPAS using conventional web browsers such as Internet Explorer, Chrome or Safari; No additional application is required.

A simple design of COMPAS provides quick navigation throughout the service. Large portion of the analytical models runs automatically once the users specify what to analyze. Users don't need to undergo complicated and time-consuming steps which are often required for conventional analytical tools. No high

computing power is required on user's side regardless of the amount of data to analyze because all the computation is carried out on COMPAS servers.

COMPAS is different from the conventional search sites for patents (or other intellectual properties). COMPAS provides ten analytical models essential for R&D and R&D planning, which corresponds ten most frequently asked MOT questions. Though COMPAS basically works on USPG (US Patent Grants), there are models using other types of information: journal articles from Web of Science (Thomson Reuter) and trade statistics (Korea Customs Service).

COMPAS provides several handy features for the users' convenience. Users can store search results so that they can be viewed or used afterwards as input materials for the analytical models. Results of analyses are automatically stored on server, which can be viewed or organized when necessary. Users can run a simple and quick analysis (Basic Analysis) on a search result without saving it, and even without running the analytical models, which is useful for a quick review of a technological area. Automatic analysis upon database updates is available for selected analytical models.

2. Structure of COMPAS

Data source lies at the bottom of COMPAS as with other conventional analytical software. Main data source of COMPAS is the USPG (from USPTO). PATSTAT (from EPO) is used as supplementary data source for non-US family patents and patent citations. Used for trade balance analysis is the trade amount data of the import and export items that Korea has traded for the most recent 5 years. COMPAS provides functions to (automatically) manipulate and analyze the bibliographic data of journal articles (obtained elsewhere) such as Web of Science.

COMPAS has a built-in patent search page where users can run searches to define TOIs (technologies of interest). Ten analytical models - corresponding to the ten most frequently asked MOT questions - operate when the input data is specified either by feeding one of the saved searches, uploading the bibliographic data of journal articles, or specifying the trade item. Once the input data is specified, the analytical model starts analyzing and the result is shown on the visualization page. Users can download the result as MS-Word and Excel files at the end of the visualization page.

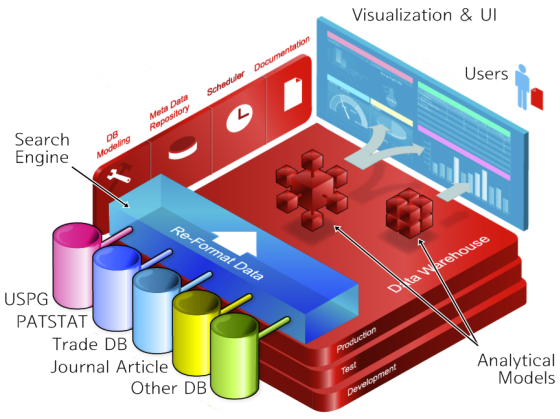


Figure 2. Structure of COMPAS.

3. Searching Patents

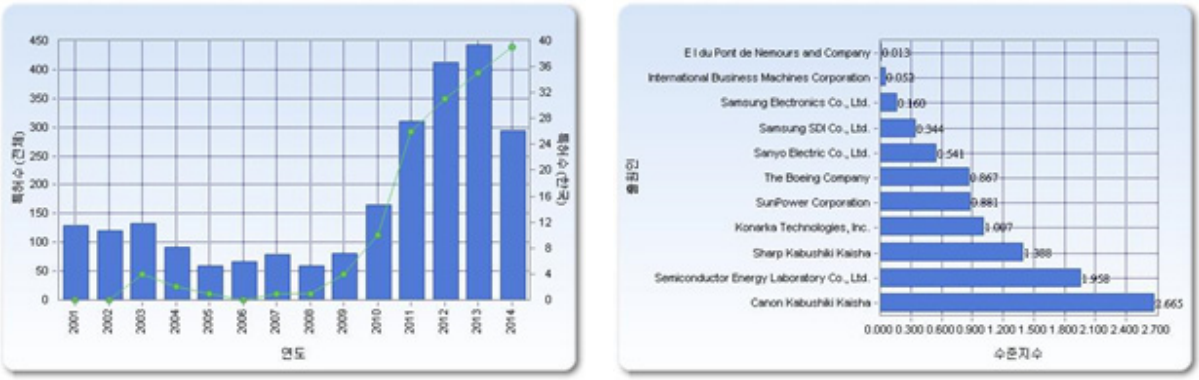
Users need to define a TOI in order to start using the analytical models of COMPAS. A TOI can be defined using the patent search function of COMPAS by the users' own efforts. COMPAS provides full-text of USPG as searchable patent documents. Users can search patents using one of the three search modes provided by COMPAS: Simple, Fielded and Expert Search modes.

Whatever the search mode is selected, a list of patents satisfying a search query appears on the search result page. All of the patents shown in this page are linked to the original patent documents in USPTO so that the users can review them as needed. Multiple search queries submitted during an active log-in session are stored in the server memory, and can be re-viewed by using Search History function. Applying Boolean operation to the search queries in the Search History is available. Once a satisfying search query for a TOI is made, it must be saved to be used as the input material for the analytical models of COMPAS.

III. Analytical Models of COMPAS

1. Competitor Identifier

When planning R&D for a TOI, the first thing to do is to gain an overall 'landscape' of the TOI and to identify major competitors in it. Competitor Identifier is for this purpose. It provides a picture of the overall R&D activity in a TOI such as patent count (with publication year) and the share of the patents by assignees (competitors) and assignee countries. It also provides indicators, based on patent citation and family patent size, to analyze the qualities of the patent sets of major assignees (and assignee countries). A list of highly cited patents in a TOI is given as well. Along with the indicators mentioned above a list of potential core competitors, the top 30 assignees with the highest number of patents, is provided at the end of the model.



(a) (b)

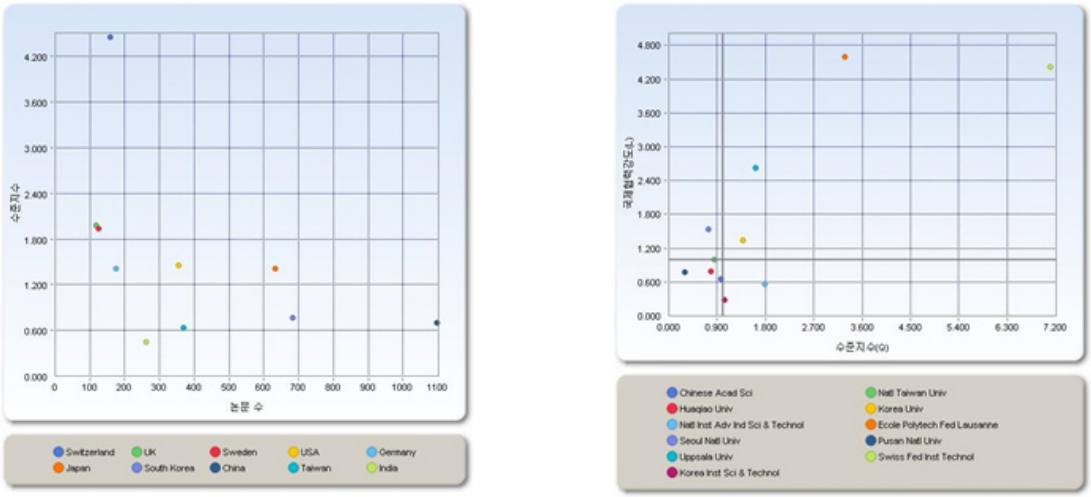
Figure 3. Selected charts from Competitor Identifier: (a) Patent count (overall, Korean assignees), (b) Quality factor of assignees.

2. Competitor Profile

Once identified the major competitors from Competitor Identifier users may need to obtain detailed activities of the competitors. Competitor Profile provides an in-depth analysis of the activities of selected competitors (10 competitors at max). Provided by this model are sub-technologies represented by the International Patent Classifications (IPCs) and the US Patent Classifications (USPCs), target markets (countries), researchers (inventors) and major patents of the competitors.

3. Journal Article Analysis

While Competitor Identifier examines a TOI in a technological point of view, users may need to know what is going on in a scientific point of view. Journal Article Analysis provides a means to analyze the bibliographic information of journal articles, which is obtained elsewhere by the user's own effort. Only Web of Science is currently available for the analysis, and the extension of databases will be made as the service continues. Journal Article Analysis works in a similar way to Competitor Identifier where it provides more information such as activity index and network based indicators for collaboration analysis.



(a) (b)

Figure 4. Selected charts from Journal Article Analysis: (a) Quality Factor for Author countries, (b) International collaboration factor for institutions.

4. Potential Patent Infringement

Being aware of and preparing for the future threat is important when conducting an R&D. An R&D without recognizing competitor's activities would be lethal when it comes to a patent infringement whether it is intentional or not. Hence monitoring a TOI for potentially similar works of others is a mandatory task. Potential Patent Infringement calculates the similarities of patent pairs, a POI (Patent of Interest) and the ones in a patent set, and gives the result in Cartesian coordinate visualization interface, where users can review the bibliographic information of the 'close' patents and save them for the record.

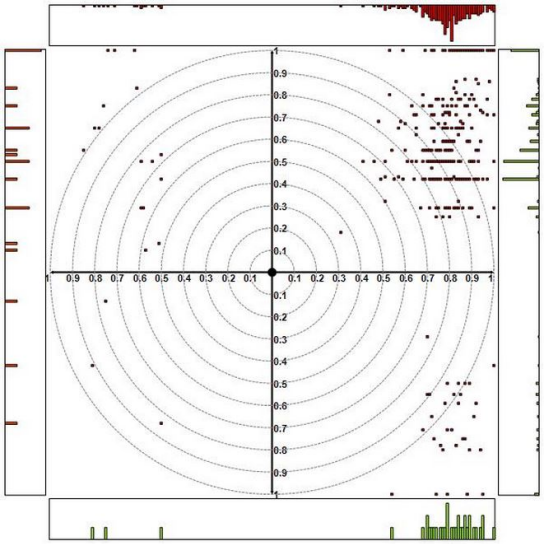


Figure 5. Screenshot of Potential Patent Infringement applied to the patent of interest US6873382 and LCD color filter patents.

5. Patent Citation Tree

Patent citation is a useful source of information not only for counting the number of citations but also for indicating the direction of knowledge flow of R&D. Patent Citation Tree gives the means to measure the backward and forward citations of a patent. Once the user specify a POI, the model builds the backward and forward citation tree in graphical interface where the user can specify the direction, level, and time window of citation. According to the user's specification, the model gives a list of patents and analysis result such as the patent count with publication time, assignees, and IPCs.

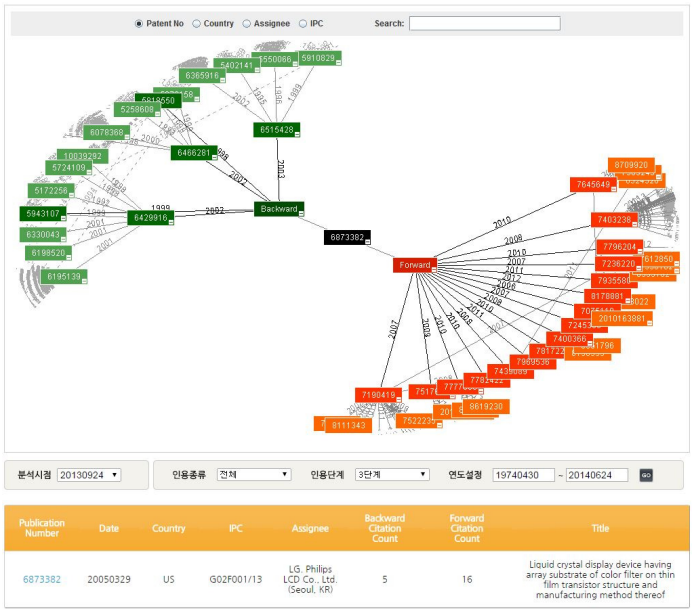


Figure 6. Patent Citation Tree of US6878382.

6. Trade Scan

Trade Scan uses trade data as an indicator for potential market measurement. A user can find trade statistics on a certain item using 'Specify HS code' Mode if one knows the 6- or 10-digit HS (Harmonized System) code of the item. Otherwise the user can select one from the list of items satisfying the range of import or export amount for specified year in 'Trade Deficit' or 'Trade Surplus' Mode. Reports are available for all the goods that Korea has traded for the most recent five years.

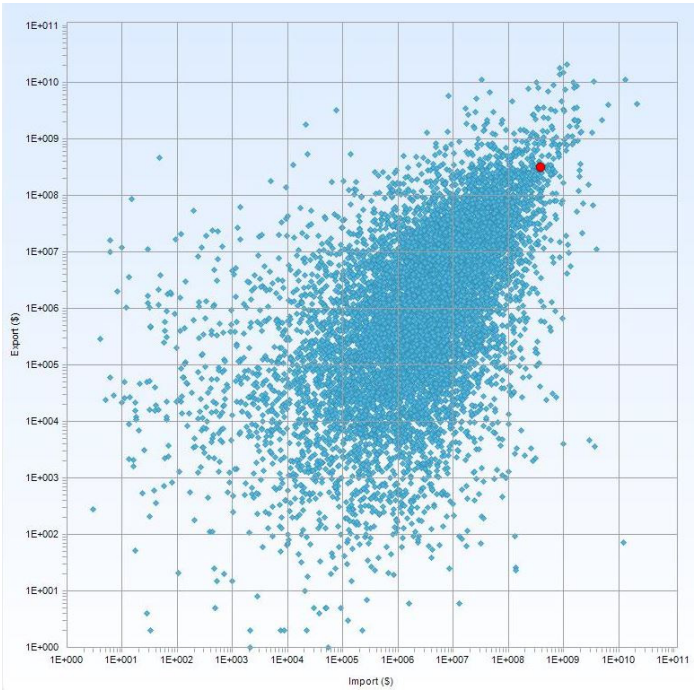


Figure 7. Import-export chart for all the items in 2013 with 90-13-90-9000 (color filter for LCD) highlighted in red.

7. Core Patents

Identifying core (or important) patents in a TOI could be a burden when the TOI is relatively new to the users and/or it contains a large set of patents. Core Patents provides patents of high impact in a specific TOI by means of two citation-based indicators: simple citation count and impact value (IV). Impact value is a citation-based indicator reflecting the weights of individual patent's importance and age. Users can obtain, in the analysis report, a list of selected core patents, summary of bibliographic information and citing patents of the core patents.

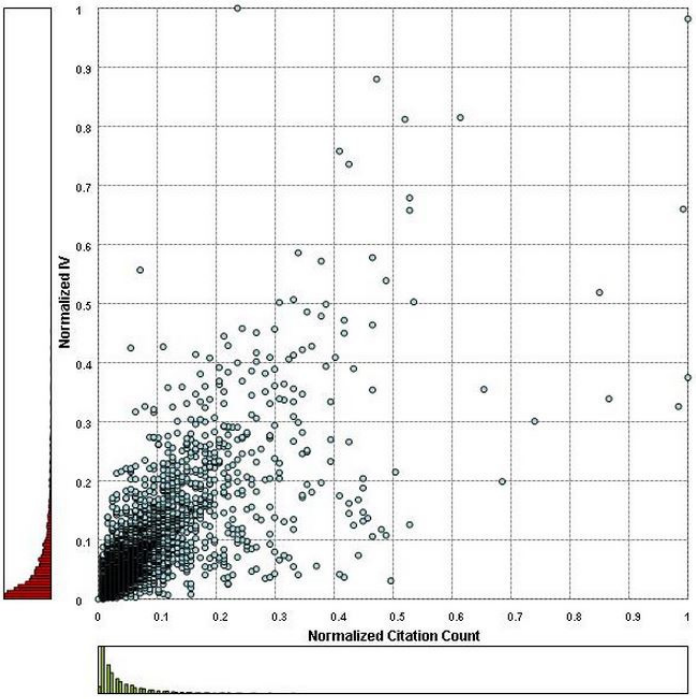


Figure 8. Screenshot of Core Patents showing the patents of Toyota Motor published from 2001 to 2013.

8. Tech Tree

A researcher new to a TOI may find it difficult to identify all the technologies comprising it. A simple (and useful) way is to regard the patent classifications as the building blocks of a TOI. IPC, for example, has the structure of section, class, sub-class, main group and sub-group, where the number of sub-group – the lowest classification in its hierarchy – is 61,403 according to the 8th edition. Tech Tree provides all the subsidiary technologies building a TOI based on IPC. Once a user specifies a TOI, the model gathers all the IPCs from the consisting patents and shows them (with the code descriptions) in hierarchical interface.

9. Tech Path

Tech Path provides a means to find out where a firm's R&D activity can be extended to, based on an assumption that the technological innovation may arise from the recombination of the existing technologies. Once a user specifies a technology (IPC main group) to start with, the model returns all the IPCs co-occurred with it as the candidate extendable technologies, among which the user can select one as a new starting point and repeat the process. When the user completes the scouting process, the model provides an analysis report on each stage (individual selected technology) and the path (connecting the stages).

Figure 9. Tech Path showing the path from G03F007 to A01N037 via C07C309.

10. Appealing Patent Technologies

Analyzing the interest of peers in near-by technological areas could give researchers an insight for identifying new opportunities. A researcher in a technological area related to ‘solar cell’, for example, might find it useful to survey what technologies have attracted the peer’s attention the most in a larger area such as ‘semiconductor’ or ‘renewable energy’, Appealing Patent Technologies provides the users with a list of clusters of highly cited patents in a user-specified area, which can be the candidate for the new opportunities.

Ⅳ. Conclusion

In this paper, we have presented COMPAS, an online competitive analysis service for informed decision-making. Unlike conventional patent search databases or bibliometric tools, COMPAS provides the users an easier way to conduct rapid and in-depth analyses on the most frequently asked MOT questions of targeted technological areas. Though the main data source for COMPAS is USPG, users can analyze other types of information such as journal articles and trade statistics.

COMPAS has been used in a variety of competitive environment analysis projects funded by the government, and private and non-private organizations. In our future research and development, COMPAS will be enriched in terms of databases and analytical models, which will broaden the benefits the users can get from COMPAS. As a freely accessible online analysis service, we hope COMPAS to be an easy starting point to obtain the competitive intelligence.

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