How Do We Extract Solutions of Unmet Needs from the Vast Sea of Big Data?

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Abstract

Thanks to the expansion of ICT technologies and growing databases, we are now allowed easy access to much more valuable information and can easily utilize it to suit ones needs. But all the information is from the past, is primary, and in an unstructured format which is like only having the basic ingredients before baking a cake. And to precisely satisfy unmet needs, we have to choose the appropriate cooking method. After over 9 years of using an original predictive analytics methods using Big Data, VALUENEX continues to provide solutions for R&D and business strategies, and other types of user specified fields or subjects to find the way of the future up to 20 years from now.

The feature of this method appears as white space on the Radar Map through visualized data of up to 100,000 text documents. White space on the radar is a form of intangible contents. Analysis around white space shows us the future scene and solutions for unmet needs.

Grasping gravity trends, measuring density, and extracting amounts of characteristics of any groups with precision on our plotting radar tells us the objective truth. We call this method "panoramic view analytics for prediction." By using panoramic view analytics, you may find alternative solutions from an unexpected group on the radar when you expand your target scope beyond the field you are familiar with. Thus, we show the effectiveness of panoramic view analysis by saving time and providing solutions for unmet needs according to use case studies in the health care technological fields.

Visualizing to Radar map

The higher ones expertise is in a field, the likelier ones peripheral vision is limited. This is especially true in Life Sciences with very long research and development periods.

To explore surrounding technological regions, a high precision map is needed. Especially when the method, material, and purpose are diverse, it must accurately show the differences by combining similar distances. To maximize the accuracy, every word contained in the specified literature is analyzed, and the mapping tool calculates the similarities between documents, and converts it into a two-dimensional visualization. Contradictive data is minimized, the importance of each element is calculated, and an arrangement by optimization calculation is performed.

Finding White Space

If the map is accurately created, small blank areas can be precisely extracted.

There are three types of blank areas. First, niche fields which have not been realized yet, or have not been published in any documents. Second, companies concealing correspondence in the area with the intention of concealing secrets or remaining confidential. And finally, when there is a physical phenomenon that is impossible to be realized. Among these blank and hidden areas, many people hope, and expect, that the future can be found.

Between areas of expertise and alternative technologies, the phenomenon of white space was overlooked. Upon discovering it, people want to know what is hidden within. By using the words around white space, with suitable combination and order, it can be expressed. Even though it is a region that has not yet been documented or defined and terminology might not exist, it is not a problem in practice.

How to find emerging technologies?

In addition to studying the density of information in two-dimensional space, we can view time trends over specified periods. This makes it possible to identify a region containing an unmet need for research and development. On the other hand, research in rapidly emerging areas can also be identified.

Case Study of Regenerative Medicine

Regenerative medicine and the research and development around it has captured the world's attention.

Regenerative medicine is defined as the state-of-the-art medical technology to replace or restore the form and function of the tissues and organs that are affected by injury or disease by using their own stem cells. Organisms are originally equipped with a regenerative capacity of self-repair. Its capacity is due to the action of stem cells. Currently, regenerative medicine is moving away from the long-period stage of basic research, and is entering the area of practical research.

Using US Patent Applications, a collection of 4466 related documents including the words "regenerative medicine" in Claims and Abstract is shown in the radar diagram (Figure 1).

Major technological and growing areas

This field has three accumulated technology areas.

One is a pharmaceutical composition for treating or preventing cancer containing a compound in a general formula. The second is an area related to the fields of molecular biology, virology, immunology and medicine. The third states “The invention provides a quiescent stem cell having the capacity to differentiate into ectoderm”. Growing technology areas all include literature with compound words "damaged tissue, patient so as to repair, progenitor cells" etc. These high density technological areas also means high competition. Applicants tend to strive to, and go outside from, core technologies. Sparse areas clearly emphasize nanoparticles, liposome, insulin, PEG. We can likely interpret this as being a linkage to some kind of business opportunity.

Emerging Technology

Recently, "sprout area" applicants have begun increasing, located mainly in the middle of the three major areas. "A drug delivery composition" and "treatment of cancers using a rapamycin analog" etc. are apparent. Outside of the key areas, emerging technologies by applied technology exists. The red square area in Figure1 is the Emerging Technology region. These emerging technologies are part of the beginning stage of research and development. Matching the time trend curb and gravity trajectory of R&D, we can predict what kind of products may appear in those fields in about 5 to 10 years.

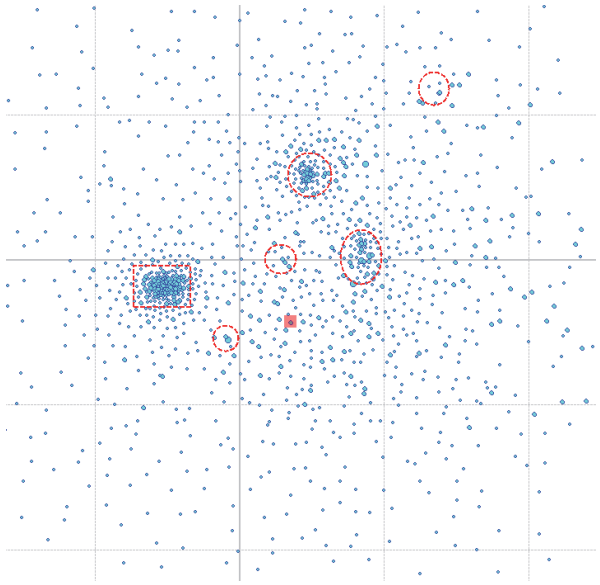

Figure1. Radar Map of “Regenerative Medicine” USA Patents

Conclusion

In order to transition smoothly to practical and applied research, it is important that the route to the future targeted area is clear, especially in basic technical research fields. Having an overview of a wide area of research and trends, one can correctly grasp concrete research and developments from the past to the present. The more fundamental the research is, the larger the contribution to society can be, and the more difficult it can be to see other ways for practical use. Also, the more specific the profession or expertise, the more difficult it is to realize relationships with other technology areas. Panoramic View Analytics can process a massive amount of information that can’t be done by human hand, and is visualized on a single radar diagram with relationships between information accurately represented. Utilizing technical information such as patent data, published research, and specialized literature, it is possible to indicate the research and development trends and blank areas of other companies. Viewing trends and changes over time, it is possible to predict the technology needed for the future. With precision and speed, we are providing a point-of-view of data fusion and Panoramic View Analytics for future developments.

References

Tatsuo Nakamura, 2015, *Will Panoramic View Analysis Save People and Add Value from the Information Flood?*, AAAI Spring Symposium 2015