A Survey of Changing Trends in Legal Industry from Manual Search to Legal Analytics using Artificial Intelligence

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Abstract- Artificial Intelligence is changing the future of legal practice. Being one of the fastest growing technologies, the word analytics is getting associated with various domains. From a lawyer's perspective, forming an opinion or deciding how to set up a defense in a particular case a lawyer has to take certain steps, mainly, finding statutory laws applicable to the facts of the cases, the evidence and materials available in the particular case, case laws including the judgments of the Apex courts and various High courts on similar facts and law points. Before the introduction of artificial intelligence tools like text mining, natural language processing, machine learning etc lawyers have to manually go through each judgments reported in the journals year wise. With the help of various searching algorithms and digitization these journals are now available online. Legal Analytics is one of the terms associated with analysis of various legal data to gain more efficient information from previous cases resulting into increasing capability to extract knowledge for forecasting and predicting future cases. In this paper a survey has done to show the changing trends of working of legal professionals using artificial intelligence and acceptance of legal analytics worldwide.

Keywords: Legal research, Legal Analytics, Google trends

1. INTRODUCTION

In today's world, concepts related to artificial intelligence and tools developed are being increasingly used in almost all fields of human endeavor like Aviation, Defense, Education, Finance, Marketing, Health, Medicines and even in legal services. This paper focuses on some of the existing secondary literature on legal research over the span of 40 years to show how the uses of artificial intelligence in the form of legal analytics are being exploited by legal fraternity. According to Black et al. [1] 'Research' is defined as basic or applied method of increasing the knowledge by finding new information. Similarly legal research is a method which includes various processes used by legal students, lawyers, judges, jurist, and legislature intends to determine current prevailing legal position with respect to a given case or circumstances. Legal research includes knowledge discovery from legal documents, case predictions, document automation, contract analysis etc.

In order to carry out any automated analysis or search of legal documents it is necessary to first digitize such documents. In fact throughout the world, including in India, digitization of legal documents and court proceedings has almost become a norm. After digitization, data management and artificial intelligence techniques are being used to store and manage such huge data in efficient

manner as well as for searching and its semantic analysis. While addressing problems related to legal data analytics, we need to exploit the advances made in Very Large Database Systems, Natural Language Processing, Machine Learning, Decision Support Systems, etc. Machine Learning techniques help to build models based on some complex phenomenon by detecting patterns and rules. Natural language processing (NLP) focuses on understanding of human language by machines.

Legal practitioners usually rely on various investigative findings, evidences, and take decisions based on alternative outcomes of the inquiry made. Applications of Artificial Intelligence to legal services [5] are changing the approach of a lawyer to analyze and solve the cases. Over the years different types of tools have been introduced to help legal professionals. Often these contributions and tools developed emphasize on the efficiency of searching, analysis and digitization of legal documents.
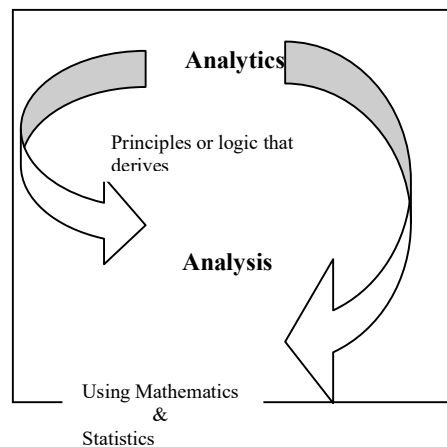
Figure 1. Transformation of Concept

Figure 1 depicts the changing trends from analysis to analytics possible due to some mathematical as well as some statistical approaches like probability theory, linear algebra, etc. This changing trend is helping in various ways to improve the process of decision making. Over the years different types of tools have been introduced to help legal professionals. Often these contributions and tools developed emphasize on the efficiency of searching, analysis and digitization of legal documents. In this paper, a survey has done on tools used by legal professionals. Legal litigations are mainly either of civil or criminal in nature. Most of the tools studied in this survey are based on civil law. In this paper we have studied mostly the important papers that deal with application of AI in Law. We gathered the information about the tools developed for legal research in India as well as in other countries all over the world. Our survey indicates that most of the tools [10][13] are working as search engines based on keywords. Very few tools also address the problem of extracting some relevant facts and analyze performance of a lawyer or a judge based on the number of wining cases. However existing tools or techniques, in general, do not efficiently analyze and extract the semantics behind the judicial decisions. Such findings however, would help to create high level decision making systems.

The rest of the paper is arranged as follows. A general literature review of AI and law is provided in section 2. In section 3, analysis and interpretation issues have been discussed with the help of results shown using Google trends and some tools already developed for legal professionals. The conclusion of our work is given in Section 4. Some findings related to research gaps that may help for future researchers are summarized in section 5.

2. A GENERAL REVIEW ON AI AND LAW

Legal professionals manually examine and arrange raw legal data in specific way to generate the arguments from it. It involves some analytical and legal logical reasoning skills of a lawyer which will lead to some sort of outcome or conclusion for that particular case. The quicker and more accurately a lawyer can find information that would actually be useful, he/she can devote more time on developing an effective strategy to deal with the case at hand. Over past few years, the role of lawyers are transforming the way of delivering the legal services such as discovery, legal research, document generation, document summarization and to certain extent predicting the outcomes using some artificial intelligence techniques[9]. The techniques adopted in this environment include machine learning, text analytics, detecting patterns and hidden relationship in legal data using data mining, etc. In [2] it is suggested that computer may assist lawyers to study as well as to perform reasoning. Most of the legal websites are based on key-word searching. Westlaw and Lexis [14]are offering the first application of legal research using natural language processing techniques over a decade. Using search websites a lawyer can access various case references and citation information. According to [7], in India emergence of new legal search engines like Legal Research India, Indlaw, Indian Kanoon, and Manupatra are helping legal professionals. The case details are available in digitized form. Gruner [6] advocates a new way to design machines that can mimic analytical skills like human experts. Dragoni et al[5] reports an approach of natural language processing techniques to extract certain rules from legal documents using WordNet, syntax-based extraction etc. These search based websites and tools [11] are considerably reducing processing time of law professionals. Such changing trend, from manual analysis to automated analytics, is becoming popular day by day. Recently most of the search engines of legal websites are showing the behavior of judge's decision pattern using various statistical measures and visualize the data using graphical forms.

3. ANALYSIS AND INTERPRETATION ABOUT THE ACCEPTANCE OF 'LEGAL ANALYTICS'

Legal analytics aims to combine digitized legal data and artificial intelligence to understand, manage, and improve services and outcomes. Within very few years law firms are improving their business strategies using analytics mainly in Judicial Analytics, Compliance Analytics, Document Automation Analytics etc[2]. Here, using Google trends we are trying to show the portion of Google searches of legal research versus legal analytics keywords in Figure 2, Figure 3 and Figure 4 that have

been queried over particular period of time across different countries. The line graph marked in red color is showing the appearance of legal analytics keyword in different countries.
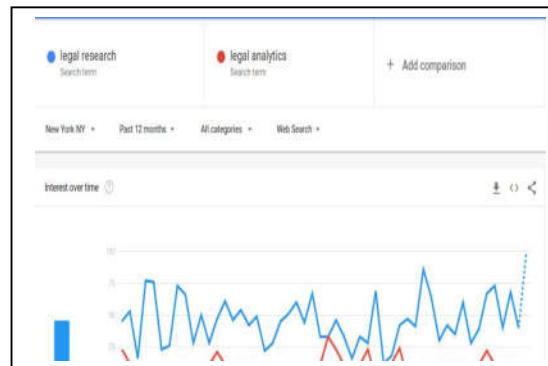

Figure2. Google Trends of Legal Research versus Legal Analytics in New York
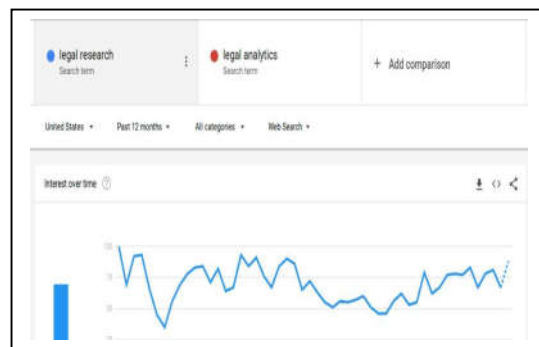

Figure 3. Google Trends of Legal Research versus Legal Analytics in United   States
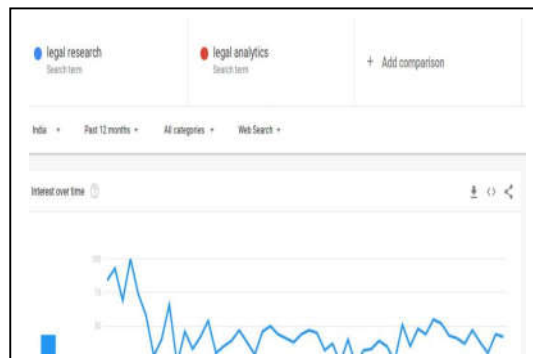

Figure 4. Google Trends of Legal Research versus Legal Analytics in India

As is evident, from the above visualizations, the concept of legal analytics is a new one and is more prevalent in the developed countries than in the developing ones. As shown in the graphs, it has a

prominent presence in New York which houses some of the world's biggest law firms. Coming to the Indian scenario, the concept of legal analytics is slowly picking up as more and more law firms and lawyers are trying to analyze the possible outcome in commercial arbitration, mergers & acquisitions, intellectual property rights, contract analysis, etc. With the introduction of text based legal databases, like the SCC online, Manupatra, etc, the work of a trial lawyer has become much easier in so far as he/she can now get a relevant list of judgments based on the input search criteria given in free text. However these tools have certain shortcomings. A lawyer cannot do a predictive analysis of the outcome of a case based on facts and evidence on hand. Manupatra has tried to address this issue with the introduction of 'Judge Analytics'. Katz & Bommarito [4] describe how to train legal students to manage, analyze, explore and communicate with legal professionals. Quantitative methods include knowledge of statistics for legal professionals to understand the process of extracting knowledge, predicting outcomes, etc.
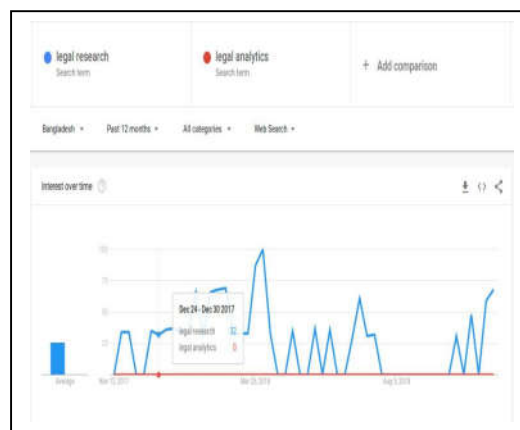

Figure 5. Google Trends of Legal Research versus Legal Analytics in Bangladesh

However still there are some countries where the usage of legal analytics is still not prevalent as is being evident from Figure 5. Traditionally lawyers are more familiar with the term legal research which would involve tedious process of going through voluminous case laws, statutes, journals, documents, etc. Day by day use of various artificial intelligence tools is helping legal professionals to change their way of doing legal research. This change is giving birth to legal analytics which will become a drastic game changer for legal industry in upcoming days.

4. CONCLUSIONS

In this paper, we noted that in many places legal analytics is frequently used as a tool by legal professionals. In the early days legal professionals used to manually analyze the legal documents and found the relevant information. Based on natural language processing techniques, this searching trend has been changed into online search engines based on keywords. This searching process is becoming more specific using multiple keywords. A list of recent tools or search engines and their capabilities

as searching based only on keywords or support for legal analytics is shown in Table 1. These tools are used by various law firms in different countries. In this paper we have emphasized on the increasing popularity of legal analytics used by legal professionals in upcoming days. Though in last few years, the word analytics has found its widespread uses in fields like business, medical, rural, etc, in legal domain, so far it has a limited exposure in developing countries. Using various artificial intelligence tools, this search is not limited to keywords. We have also seen that day by day the legal search engines are including analytics to understand a judge's thinking pattern for different cases. We have observed that most of the tools are based on civil laws like litigation, intellectual property, patents etc and their potential has not been properly exploited. The gaps need to be properly examined and addressed as a part of future work by the researchers.

Table 1. List of tools used by law firms across various countries

Tools/Search Engines	Based on Keyword/phrases Search	Legal Analytics	Task Defined
TAXMAN[8]	Yes	No	To perform legal reasoning on the basis of description of facts of corporate cases.
HELIC II[12]	Yes	No	To perform as a argumentator based on debating function
ALDA[7]	Yes	No	Legal document summarization
LexisNexis[10]	Yes	No	To perform computer assisted research, business research and risk management services
Westlaw[10]	Yes	No	To provide online legal services to lawyers and legal professionals in United States
Premonition[10]	No	Yes	World's largest litigation database
Lex Machina[2]	No	Yes	To discover the winning patterns about judges, parties and opposite counsels
Manupatra[13]	Yes	No	To search various case laws based on keywords, phrases, multiple phrases etc in India

5. FUTURE WORK

By merely typing a phrase or keyword in search engines like Manupatra, SCC online a lawyer can see the related judgments listed. However, these lists results in hundreds or thousands in volumes. So using approaches of combing machine learning techniques and natural language processing the summarization can be done more efficiently, reducing the number of listed judgments that satisfy search criteria thereby cutting down on the time required for a lawyer to find what he is looking for. Most of the tools developed on analytics are based on litigation, contracts cases etc. No tool till now is available that address the semantics of the judgements for criminal cases. Representation of argumentative part of any cases using artificial intelligence is another area of research. Judges arrive at different decisions for each and every case based on the facts of the case. Capturing the logic behind the judgments in different cases will be a major area of research in future.

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