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Law Automation using Data Analytics

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Abstract: “Justice delayed is Justice denied”, the oft-quoted aphorism by William Goldstone best portrays the state of the judicial system prevalent today in our country. Indeed the courts in India work for 5-6 hours a day which is inadequate considering we have over 3 crore pending legal cases in our judiciary. India, thus accounts for the most number of pending cases in the entire world. Therefore, it has become the need of the hour to find out practical and realistic solutions to curb down a reasonable amount of delays and make our judicial system more efficient.

In the “Information Era” of the 21st century, automation and computerisation have resulted in higher productivity and efficiency by using data intensive technologies. With rapid development in artificial intelligence (AI), automation is at a tipping point. Today, data-driven deep learning models can perform a slew of functions without considerable human intervention. Since the increasing population and a huge heap of pendencies have made it inevitable for the judicial system to undergo a constructive transformation, data-driven deep learning models can effectively optimize the entire judicial process and will positively impact the case processing time as well. The objective of this paper is to provide a way forward to automate the judicial process with the help of Data Driven Deep Learning Model backed by Natural Language Processing (NLP) to understand the nuances of the court proceedings and thereby considerably reduce the data processing time, reduce human error and thus, get a step closer to the verdict or, in some cases, offer a verdict as well, by considerably cutting down the delay.

Keywords: Law Automation, Law Transformation, Way forward, NLP, Deep Learning.

I. INTRODUCTION

India's legal system has transformed into an essential pillar of democracy since the time of our colonial masters and evolved into a crucial front in the battle to secure constitutional rights for every citizen. As of 2019, the Supreme Court of India has more than 59,000 pending cases, the high courts have around 44 lakh pending cases, and all the subordinate courts together are yet to dispose of around 3 crore cases. At all three levels, courts dispose of fewer cases than are filed. The number of pending cases keeps growing and litigants face even dimmer prospects of their cases being disposed of quickly.

This is the trend across the country. In high courts, 94 per cent of the cases have been pending for 5-15 years. In Allahabad, the country's largest and one of the most inefficient courts, 730,513 cases are pending.

In Delhi High Court, considered publicly as one of the best, 66,281 are pending. It takes an average of 2 years and 8 months to give its verdict in a case. Many advanced countries struggle to provide swift, high-quality justice to citizens. But, in India, the scale of the problem is massive. The Indian Judicial system is in urgent need of reforms, if we are to continue to strengthen our society that lives within a framework of fair justice for all. India has the dubious distinction of having the world's largest number of pending cases, which by some estimates, exceeds 30 million. The sheer time taken in bringing closure to a case often results in an accused spending a significant part of his life in jail. The issue is not whether the accused is ultimately found guilty or not, but the time taken to pronounce the final verdict often amounts to deny justice to both the victim and the accused.

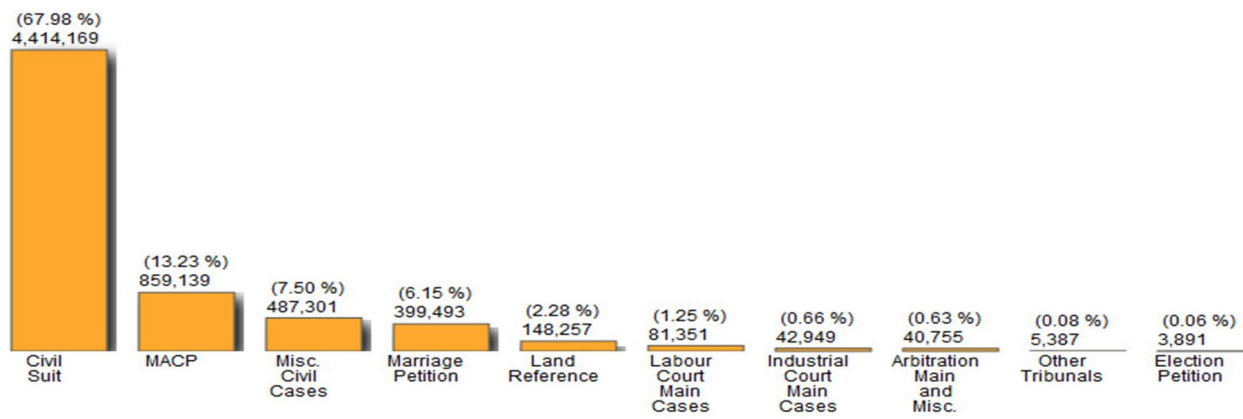
Crores of cases are currently pending in various courts in India including the Supreme Court. The magnitude of this problem was brought into perspective in a magazine article, which stated, "If the nation's judges attacked their pending cases nonstop with no breaks for eating or sleeping and closed 100 cases every hour, it would take more than 35 years to catch up." The problem of delay in Indian Judicial system has been studied extensively by the Indian Law Commission. Studies prove that infrastructural deficiencies are blamed over and over for the judicial delay. More judges and more courts are seen as a solution for the above problem. Before 1999, there was no limit on the number of adjournments courts could work on. The 1999 Amendment fixed the maximum number of 'three' adjournments during the hearing of a lawsuit. The 1999 Amendment also affected the time-frame for other important provisions that directly had an impact on the court's general power to extend the timeline of the hearings. It resulted in disallowance of frequent time extensions by the courts, restricting them from giving extensive extensions by reducing it to a period of one month.

Automation is coming after even the most highly-trained and experienced workers in their specific fields. The idea, however, is to give the lawyers and other professionals the tools to automate their own jobs, not to actually replace the humans actually doing the work but just to help them and make their work more accurate and easy. Be it a new employment contract, a rental contract, or a sale contract, it needs to be checked before signing. Everyone knows the struggle of working through the dreaded small print, searching for pitfalls hidden in the tiniest details, and trying to make sense out of the language of law.

Lawyers generally have to do a bunch of things before a contract is complete. They have to prepare the right first draft. Then they have to track the changes in versions as different parties contribute. They also have to get the right signatures. Finally, they have to store the document so it can be easily retrieved. Instead of having paperwork lying around, you have a simple flow. It would be the AI(Artificial Intelligence) that does what you expect it to do. But, the legal system, on the other hand, is not as straightforward as coding. Just consider the complicated state of justice today, whether it be problems stemming from backlogged courts, overburdened public defenders, and swathes of defendants and a disproportionate number of accused. So, can artificial intelligence help? Very much so. From a research done, law firms are already using AI to more efficiently perform due diligence, conduct research and bill hours. But some expect the impact of AI to be much more transformational and hence integrating the judicial system with AI can certainly impact the current state of our judicial system in an effective manner.

II. DATA ANALYSIS

There are many cases all over India that are pending till date. We have divided all the states into 5 clusters as cluster1 cluster2...cluster5. From the graphs below we can have a better idea in understanding the problems faced by the Indian judicial system and thereby identifying the loopholes.



- Appearance/Service Related:- 2075372 (24.42 %)
- Compliance/Steps/stay:- 1535828 (18.07 %)
- Evidence/Argument/Judgement:- 3858383 (45.40 %)
- Pleadings/Issues/Charge:- 1028260 (12.10 %)



- 0 to 1 years:- 3917366 (44.06 %)
- 1 to 3 years:- 2154218 (24.23 %)
- 3 to 5 years:- 1186090 (13.34 %)
- 5 to 10 years:- 1082892 (12.18 %)
- 10 to 20 years:- 422957 (4.76 %)
- 20 to 30 years:- 96703 (1.09 %)
- above 30 years:- 30940 (0.35 %)

- Awaiting Record:- 2518 (5.72 %)
- Bulky Case:- 10865 (24.67 %)
- Execution Delays:- 2538 (5.76 %)
- Huge Pendency:- 2234 (5.07 %)
- Offshoots:- 4903 (11.13 %)
- Securing Presence:- 3452 (7.84 %)
- Stayed:- 14234 (32.32 %)
- Unattended:- 3301 (7.49 %)

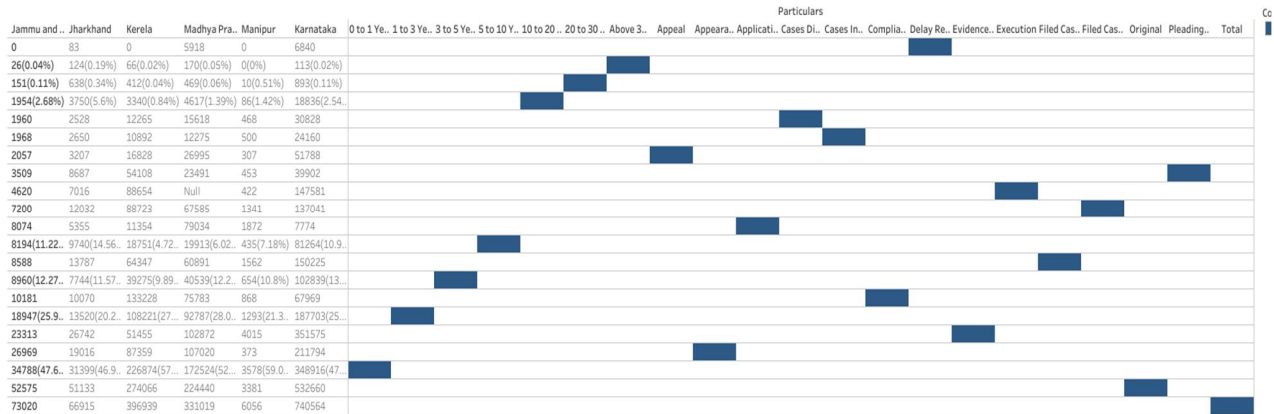


1) Cluster 1

State	Particulars										Total							
	0 to 1 Years	1 to 3 Years	3 to 5 Years	5 to 10 Years	10 to 20 Years	20 to 30 Years	Above 30 Years	Appeal	Appearan ce/Service/ Applicati...	Cases Dispose...		Cases Inst ituted...	Complia...	Delay Reason	Evidence...	Execution Cases By...	Filed Cases By...	Filed Cases By... Original Pleading...
Andhra Pradesh	167	120	Null	9	6115													
Assam	16(0.02%)	3632(0.92%)	17999	8(0.01%)	1767(0.15%)													
Bihar	120(0.04%)	68(0.07%)	10637(1.73... 0(0%)	62(0.04%)	6008(1.33%)													
Chandigarh	878	7296	28808	3839	20	123879												
Chhattisgarh	3221(1.05%)	818(1.23%)	35694(9.02... 3(0.01%)	381(0.67%)	43753(3.62%)													
Maharashtra	12166	2944	7337	1245	2818	18367												
	12466	3333	5104	2693	3288	19210												
	16862(5.49... 4385(6.61%)	69509(17.5... 20(0.11%)	1553(2.71%)	188064(15.56%)														
	25425	2700	29881	812	4241	86441												
	37465(12.2... 8329(12.55... 59338(15.0... 279(1.55%)	6949(12.14... 201325(16.66%)																
	47349	7860	65048	3417	9110	233575												
	54551	5363	16343	1088	6981	87472												
	61109	6760	23643	7221	12963	266231												
	63678	14802	124500	1760	20559	331828												
	64594	11235	58430	8689	5503	284494												
	65258	14849	76944	215	11647	185578												
	81783(26.6... 17795(26.8... 87872(22.2... 626(4.59%)	14805(25.8... 313212(25.92%)																
	114887	34567	165056	214	22424	443827												
	167551(54... 34974(52.6... 128963(32... 4484(24.91... 33468(58.4... 454232(37.59%)																	
	221543	49615	315730	1741	39978	731351												
	307017	66385	395843	11607	57226	1208361												

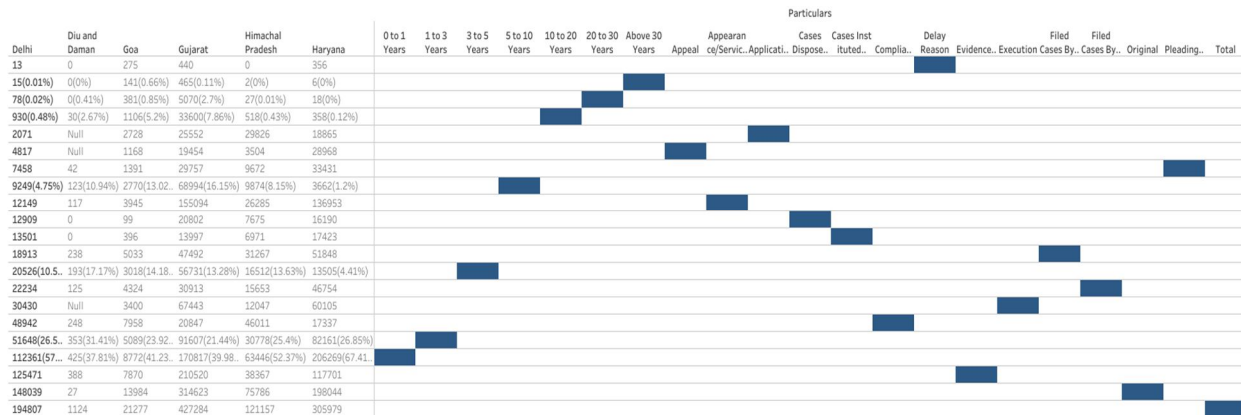
This cluster has six states, viz. Andhra Pradesh, Assam, Bihar, Chandigarh, Chhattisgarh and Maharashtra. Andhra Pradesh, Chhattisgarh and Assam have 15, 8(0.01%) and 16 civil cases, respectively, that are pending for over 30 years. Bihar, Chandigarh and Maharashtra take a big jump, with 3632(0.92%), 17999, and 1765(0.15%). Maximum cases that got disposed of last month in Maharashtra are 19210 whereas Andhra Pradesh disposed of 12466 cases last month; Assam, Bihar and Chhattisgarh releasing 3333, 5104 and 3288 respectively, with Chandigarh on the bottom of the list disposing 2693 cases. Cases filed by senior citizens in Maharashtra are 233575, which is the maximum; the second largest state is Bihar which has 65048, followed by Chhattisgarh with 9110. Assam has 7860 cases while Chandigarh has the least number of cases- 3417. Cases filed by women in Maharashtra are 185578 which is the maximum; the second largest state is Bihar which has 76944 followed by Andhra Pradesh with 65258. Assam has 14849 cases and Chandigarh has the least number of cases- 215. There is no single factor which is solely responsible for arrears of cases. On the contrary, the main reasons for delay of cases is lack of evidence/arguments/judgement, where Maharashtra which has the maximum number of pending cases, that is 443827 cases. The second largest is Bihar with 165056 cases, whereas on the third position its Andhra Pradesh with 114887 cases followed by Assam having 34567 cases and lastly, Chhattisgarh having the least amount of cases due to this factor, that is, 214 cases.

2) Cluster 2



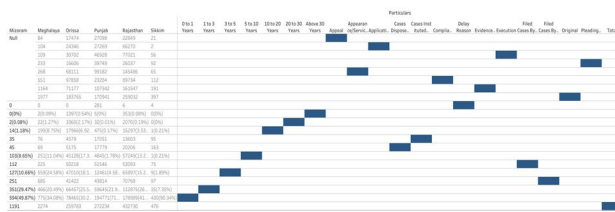
This graph consists of a set of another six states namely Jammu and Kashmir, Jharkhand, Kerala, Madhya Pradesh, Manipur and Karnataka. As a matter of fact, Kerala is the most literate state of our country but still the number of cases pending here too is considerably high. These states contain service related cases as well as cases filed by women - [137041(Karnataka), 88723(Kerala), 1341(Manipur)] and senior citizens - [60981(Madhya Pradesh), 13787(Jharkhand), 8588(Jammu and Kashmir)]. For all states mentioned above, duration of each case (as for each state too), even goes up to 30 years. As for Kerala, more than 60 cases are pending and for Madhya Pradesh, 170 cases are pending for more than 30 years. Also, there are cases that keep running for just a year or two. Numbers for those are 47% for Jammu-Kashmir, Jharkhand and Karnataka and over 50% for Kerala, Madhya Pradesh and Manipur. Lack of evidence, appearances of witnesses or service related problems are the main reasons for delay which results in pending cases. More than 5900 cases for Madhya Pradesh, 6800 for Karnataka and 80 for Jharkhand are pending due to delay reasons.

3) Cluster 3



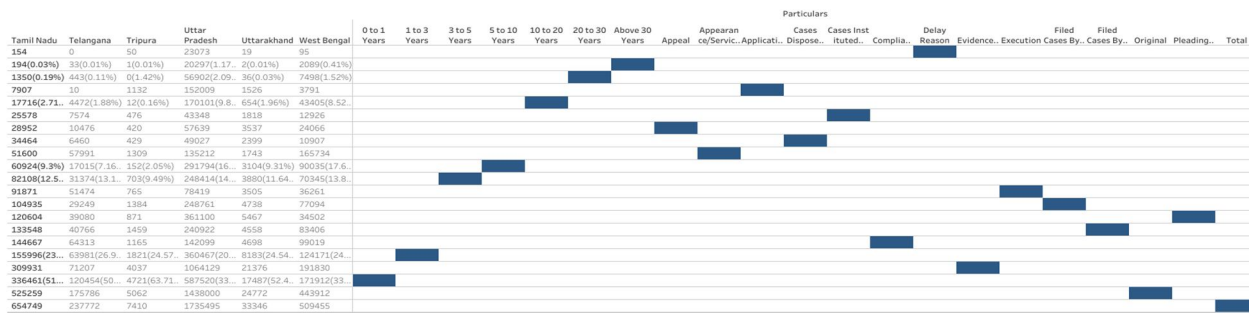
This cluster as well consists of six states namely Delhi, Diu and Daman, Goa, Gujarat, Himachal Pradesh and Haryana. It has been observed that during the duration of 0-1 years, most cases are pending in which Haryana is having the maximum number of cases that is 206269 followed by Delhi with 112361. Himachal Pradesh is third on the list with 63446 cases, Goa with 8772 and Diu and Daman with 425 cases. During the duration of 1-3 years, Gujarat has the maximum number of pending cases that is 91607, followed by Haryana with 82161 cases then Himachal Pradesh being third on the list with 30778 cases. Goa with 5089 whereas Diu and Daman with 353 which is the least. During the duration of 3-5 years, cases are pending in which Gujarat has the maximum number of cases that is 56731 followed by Himachal Pradesh with 16512 cases then Haryana being third on the list with 13505 cases whereas Goa with 3018 and Diu and Daman with again the least number of cases that is 193 cases. Maximum cases that got disposed in last month in Gujarat are 20802 whereas Haryana disposed 16190 cases, Himachal Pradesh disposed 7675 and Delhi 12909. On the other hand, Goa, Diu and Daman are on the bottom of the list disposing off 99 and 0 cases respectively.

4) Cluster 4



By analysing the above data, we see that Punjab has the highest number of pending cases (194771) in 0-1 year period whereas Sikkim has the lowest number of pending cases(430) . Number of pending cases decrease gradually over a longer span of time. For eg. Rajasthan has 65897 cases pending in last 3-5 years, but has only 353 cases pending for 30 and above years. Cases disposed in last month are 20206 for Rajasthan, 17779 for Punjab, 5175 for Orissa, 69 for Meghalaya,45 for Mizoram and 163 for Sikkim. Cases pending due to delay reasons are 281 for Punjab, 6 for Rajasthan and 4 for Sikkim. Due to lack of evidence and lengthy arguments, over 300000 cases(for the above 6 states) are still under process. Cases filed by women are 43814(Punjab), 70768(Rajasthan), 41422(Orissa), 685(Meghalaya), 251(Mizoram) whereas cases filed by senior citizens are 51546(Punjab), 50218(Orissa), 53093(Rajasthan), 75(Sikkim), 225(Meghalaya), 112(Mizoram).There are actually very few cases where charges have been established. Numbers for the same are 39749-Punjab, 26037-Rajasthan, 92-Sikkim, 16606-Orissa, 233-Meghalaya.

5) Cluster 5



After analysing the last cluster that comprises of the last six states which are Tamil Nadu,Telangana, Tripura , Uttar Pradesh , Uttarakhand and West Bengal . In this particular cluster we get to see that there are high number of cases which are pending in 20-30 years time span too(56902 for Uttar Pradesh).Tamil Nadu with 336461 ,Telangana with 120454 , Tripura with 4721 and lastly West Bengal with 171912 cases pending in 0-1years. Number of pending cases decreases over a period of time (0-30 years). Number of cases filed by women and senior citizens are more in number ranging from 1459 to 240922 and 1384 to 248761 respectively. Factors responsible for delay in judicial process are lack or tampering of evidence, delay in judicial verdict, lengthy arguments, witness tampering etc. which is indeed responsible for over 3 lakh pending cases. Uttar Pradesh has 36100, Uttarakhand has 5467, West Bengal has 34502, Tamil Nadu has 120604 , Telangana has 39080 and Tripura has 871 cases which actually came to a conclusion.

A. Machine Learning and NLP in Law

Natural Language Processing (NLP) heavily relies on Machine Learning or Deep Learning models. Machine learning based NLPs are indeed the best pick for effectively optimizing and automating the legal process- right from analyzing the texts from the legal documents to understanding the nuances of speech during the court proceedings. Legal system can thus be effectively integrated with AI to create operational efficiencies. And, of course, most legal documents are text, so the process of information extraction can be easily handled by our NLP to efficiently extract the useful data through the unstructured texts in considerably less time, as for an attorney or the bench it would take hours to review the documents whereas it would take merely seconds for a well-trained, sophisticated deep learning model to do the task and make reasonable predictions about the potential outcomes with minimal human intervention.

B. Necessity for Law Automation

In India, there are 13 judges for 1 million people. This is a major factor which adds to the cause of delaying of the cases. Manual data entry, report preparation, verifying and proofreading of documents are some types of work which consume a lot of time during the court proceedings. Law automation will make these time consuming but important tasks very efficient and accessible. Evidence tampering, false documentation and fake witnesses can all be tackled through automation. There are more than 3 crore pending cases in India today. Automation can help many cases to deliver justice or at least help such cases to take a few steps towards justice. Automating creative processes in legal work by segregating evidence and other paperwork by minimizing human effort is one of the motives of the law automation process. Repetitive data and tasks do not require critical thinking and decision making and as a result, this entire process can be automated which reduces all the monotonous work. Administrative data and tasks do not require analysis of substantive legal issues but they require minimal interpretation. As huge data interpretation is required at every stage, this process requires manpower but fragments of this process can be automated and a lot of tedious work can be tackled through automation. Automation will prove to be very helpful and time-efficient regarding the work of reviewing of contracts and conducting legal searches. The prediction of the probable outcome of the cases will be possible before adjudicating any case before the court. Legal analysis will be very efficient and accessible as automation will provide required data from the past case laws and case files. Tools of automation will help provide insights on the IP portfolios such as patents, copyrights etc.

C. Integrating Law Automation in Current Scenario

The proposed deep learning model which will be used for automation would be backed by Natural Language Processing (NLP) and the deep learning model will be trained by previous cases and database. The model will be extensively trained by segregating the similar types of properly tagged cases and database. Every case will be labelled uniquely based on its features. The neural network architecture will thus learn the nuances of the case directly from the database with least human assessment. The deep learning model has a sophisticated neural network in order to tackle the unique cases without pre-existing features and labels with the help of unsupervised learning and Adaptive Resonance Theory (ART), which will analyse the unknown pattern and offer a potential prediction on the basis of self learning. Every new closed case will be added to the self learning database of the model simultaneously. There will be an interface which will be accessible to lawyers and petitioners. Manual data entry, report preparation, verifying and proofreading of documents will be done through the interface and it will be accessible to everybody simultaneously. This interface with the help of deep learning model- which will be linked to the government database- will analyze all the documents and evidence, thereby verifying the authenticity of the documents and preventing incidents such as evidence tampering and forgery. The deep learning model will be a part of this interface but will solely be under the control of Indian judiciary.

D. Sample Case Which can be Effectively solved with the help of this Model

As a part of the development plans of the Bombay Dyeing Company, it was required to hand over 52,331 sq m at Wadala and 12,823 sq m at Lower Parel to the two agencies. However, the company had moved to the court saying that it should only be allowed to submit the land at one location in Wadala instead of separately under the Integrated Development Scheme for Textile Mills under Section 58 of DCR.

This section says that any developer going for redevelopment of any mill land should give away a part of the land to MHADA and MCGM. In March 2010, the BMC had issued stop-work notices to Bombay Dyeing after it failed to hand over the land.

The Bombay High Court had asked Wadia-promoted Bombay Dyeing to hand over 66,651 sq m of its mill land in Wadala to the Municipal Corporation of Greater Mumbai and the Mumbai Housing Development Authority so that a long-pending dispute could be settled and the company could redevelop its Wadala and Lower Parel lands in the city. It is essential to note that the Supreme Court specifically indicated the areas of the lands to be handed over to the Municipal Corporation and to MHADA from out of the lands of as many as 26 textile mills including the two mills of the present petitioner textile-company.

III. CONCLUSION

Taking under consideration the above cluster analysis, we have come to a conclusion that law automation would indeed help associates and not actually replace human lawyers. Our model would provide an automated interface which would reduce the paperwork as the interface will have a simple flow. The number of pending cases gradually decrease over a period of time(0-30 years), our model will help keep a record of those cases and analyse them in an effortless way. As the number of cases filed by women and senior citizens are more in number, the deep learning model will be an efficient way to provide a quick path to attain justice.

The automated interface will take each case under specific consideration and would treat them differently providing various solutions based on the analysis and the potential outcome offered by the model. This will provide a hassle-free environment by tremendously reducing the amount of time taken to process a case, thus helping in understanding the case better and thereby improving the judicial system.

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