An Integrated ERP system for Judicial Judgment Prediction based on DEDT using advanced deep learning.

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Abstract: —Due to the continuous growth in advanced deep learning, the algorithms of machine learning as well as deep learning have been applied to various fields as well as scenarios which alters people's work as well as lifestyle, and it has also brought new development as well as opportunities to the judicial field. As far as Judicial case judgment is concerned, a very significant task in the legal field, as well as it is also an indispensable process for the judges to determine the nature as well as the punishment of criminals. The prediction of any judgment can be observed as a multi-label text classification problem. In accordance with the large number of text files of judicial cases, it has been used recently a very prominent pre-training language model which is duplex encoder delineation from Transformers (DEDT) which has been used to train word embedding of the case data, as well as it also integrated deep learning model algorithms such as CNN(Convolutional Neural Networks), (LSTM) Long Short-Term Memory , (DPCNN) Deep Pyramid CNN , (RCNN) Recurrent Convolutional Neural Networks to predict the judgment of judicial cases. The ancient education systems were Vedic education system and Buddhist education system. In Vedic education system, the language was Sanskrit and in Buddhist education system, the language was pali. Today, the era is of modern education system. In modern education system, the legal terms are taken from Greek or Latin terminologies. The Latin-based word jurisprudence is constituted of two parts, juris means "of law" as well as prudence which goes back to mean "knowledge." Austin is known as the father of English Jurisprudence as well as the founder of Analytical school. Artificial Intelligence is a system where the simulation of human intelligence process is done by machines. ERP system is very significant for running the business. Enterprise Resource Planning (ERP) is seen as one of the best choices in all areas to amend the business process. ERP is one of the most popular software in managing the company for all solutions. ERP was developed by the joint efforts of J.I. case, the manufacturer of tractors and IBM to provide efficient planning to the resources and to connect the technology stacks. There is lot of research in data mining for intelligent enterprise resource planning system.

In simple way, ERP can be considered as a college and college has different departments of engineering, management, science, etc. In engineering, there are so many departments like electronics and communication engineering, mechanical engineering, computer science engineering, biomedical science and engineering, electrical engineering, civil engineering, etc. These departmens can be considered as modules of ERP. In any project, there is requirement of various engineering fields rather than a single engineering field.

Keywords—judgment prediction, DEDT,, text classification, deep learning, word embedding, ERP,Odoo.

I.   Introduction

ERP is all in one softwares in a single package. If Facebook implements different modules in its software in future, it will also become a software with ERP functionality. ERP is used to manage resources effectively and efficiently. Since every project needs multiple technologies, so it is named as a technology stack by IBM. Research is creative and systematic work and it involves the collection, organization, and analysis of information to increase understanding of a topic or issue. ERP provides the collection and organization of different technology stacks and our motive is to connect all laws of India i.e technology stacks to a single platform of intelligent ERP system. The intelligent ERP will be developed in such a way that it will provide central database system to all the technology stacks. IBM also connects the Mainframe as a central database system to its

ERP. Firstly the technology stacks will be connected to ERP in the form of modules and the second objective is to use the mainframe approach of central database system of IBM in the ERP. Enterprise Resource Planning (ERP) is business process management software that allows an enterprise to use an integrated application system to control the business and automate certain tasks in the back office. Odoo ERP is a powerful open source platform for business applications with a suite of closely integrated applications designed to cover all areas of business. The aim of this research is to design and build an odoo platform tool that helps Odoo developers create fast, simple, and flexible odoo modules for various laws of India. This method greatly reduces coding; the developer only inserts the names of the tables and fields of the database, and then automatically generates the module files.
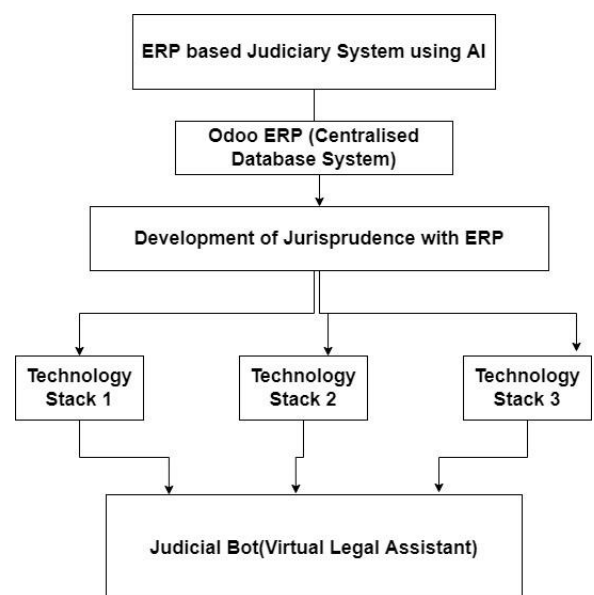

Fig: An ERP based judiciary System with AI

The platform also offers a forum for other Odoo developers to connect so that they can interact with each other, share the information, expertise and experience. Furthermore, the framework provides a module repository to manage changes made in the modules by the developer and to get back the changes at any time. The platform also provides the developer with support and good documentation which serves as user manual. The development of modules was very simple and quicker, where the time to produce modules decreased significantly by more than 50 per cent.

II.   Related Work

The Legal Artificial Intelligence is a subject which has been widely concerned by the researchers. In the recent years, many achievements as well as breakthroughs have been performed in application of natural language processing technology to the field of intelligent justice using ERP. With the incessant development of advanced deep learning along with ERP, many researchers dedicate their energy in the task of judgment prediction using a central database system.{1} [2]. The attention-based neural network have been proposed for joint modeling of the judgment prediction task as well as the corresponding legal clause extraction task in a unified framework of Enterprise Resource Planning [3]. The proposed few-shot neural network model, which has been used as a unified framework to model both judgment prediction task as well as legal attribute prediction task simultaneously. [4] It has also published a new dataset of English legal judgment predictions as well as it also evaluated a

variety of models on the dataset. [5] It also proposed a system which is based on neural network to analyze the interpretability problem in crime prediction tasks. [6].
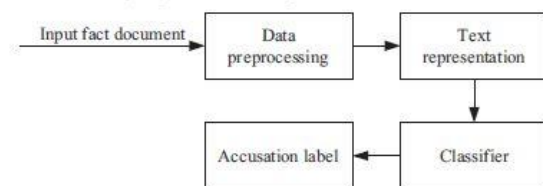

Fig: Legal Accusation Prediction Process

It also proposed a Multi-Perspective Bi-Feedback Network along with the Word collocation attention mechanism which is used to predict legal judgments [7]. It proposed a label-conditioned Seq2Seq model in odoo ERP with an attention mechanism to create court views from the criminal facts. [8] It also proposed a new semi-supervised convolution neural network (SSC) framework in Odoo ERP which is used to classify legal case texts [9] . It also proposed an attention neural network Legal attention, which is used for relevant legal provisions to ameliorate the performance as well as the interpretation of judgment prediction tasks. The above research works can also be divided into two categories [10] [11]. One is to use more new as well as complex models to ameliorate the performance of legal judgment prediction in odoo ERP and the other is to explore the introduction of exterior knowledge such as legal provisions as well as legal professional terminologies were used into the odoo ERP model to make the extracted features more discriminative as well as informative[12] [13]. In this paper, a DEDT model has been used

to train a large amount of legal document text data and to extract embedding vectors that can represent contextual semantic information in a better way, and also to combine them with popular text classification models such as CNN, LSTM, DPCNN, as well as RCNN for multi-label text classification of accusations, as well as to achieve good results[14] [15] . The Blue Brain Project is one example of artificial super intelligence. In this project, the human brain is interfaced with a computer. Its main objective is to reconstruct the human brain using reverse-engineering mammalian brain circuitry. This is an EPFL project whereas EPFL is a research institute in Switzerland that seeks to achieve a complete digital reconstruction of the mammalian brain. It is hoped that the project will enlighten us more about consciousness and how the project can be digitally implanted. At present, the synapses which are the junction between two nerve cells of the size of a bee's brain have been simulated to accomplish the objective of the project. Google Mind is also working on similar projects based on artificial super intelligence.

Deep Mind Technologies is a UK company that was founded in September 2010 and purchased in 2014 by Google. The London-based company has research centers in Canada, France, and the United States. In 2015, it became a wholly-owned subsidiary of Alphabet Inc. which was created through a corporate restructuring of Google. The company created a neural network that learns how to play human-like video games as well as a Neural Turing machine, or a neural network that can access an external memory like a traditional Turing machine, resulting in a device which mimics the human brain's short-term memory.
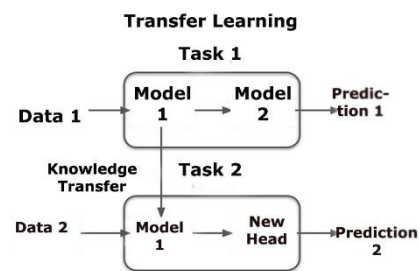

Fig: Transfer learning using advanced deep learning

There are many devices like IBM Watson computer that are growing to prove the technology of artificial super intelligence by beating the cognitive skills of a human. The deep neural network algorithm must be developed in such a way so that it can generate the features of artificial super intelligence.

III. Methodology and Results of proposed approach:

DEDT model with Odoo ERP will be used to develop an innovative project to transform the ERP solutions with Artificial Intelligence to enhance the potential of judgement process with the applications of artificial intelligence. The AI-enabled ERP solution will help Indian Judiciary System in satisfactory judgment prediction for plaintiff and defendant. In this research paper, the methodology will be as follows: 1) Preprocess the legal document dataset as well as the data exploratory analysis has also been conducted in odoo ERP [16]. 2) To construct Word2Vec word embedding

vectors, it has been used the DPCNN, FastText, TextCNN, BiLSTM, TextRCNN, BiLSTM+Attention advanced as well as efficient deep learning algorithm for the benchmark model to train as well as to predict the legal document dataset in Odoo ERP [17]. 3) To use the DEDT text pre-training model to make word embedding training on the legal document dataset to make new embedding vectors in Odoo ERP. 4) In accordance with the embedding vectors of DEDT training, the combined models such as CNN, LSTM, DPCNN as well as RCNN are used to train as well as to predict the legal document dataset in Odoo ERP. The natural language processing has achieved considerable results in the fields of text classification, namely entity recognition (NER), sentiment analysis, as well as recommendation systems. The courts have collected a large amount of beneficial judgment document data in the process of handling the case, which renders a research foundation for the implementation of natural language processing to the legal field, as well as is also expected to solve the errors in the operating of handling cases.
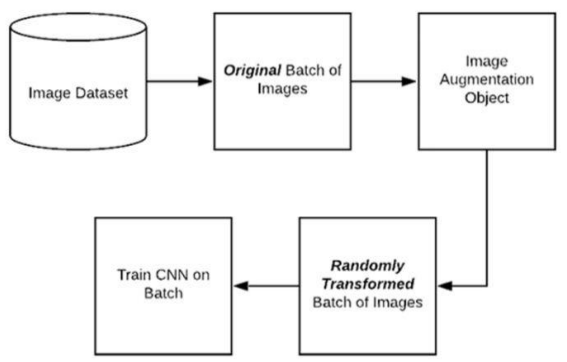

Fig: Dataset Formation using Data Augmentation in Odoo ERP.

Data augmentation in the data analysis are methods used to which are used to enhance the amount of data by addition of slightly modified copies of the already existing data or recently created copied data from the existing data.

With the help of advanced Knowledge driven solutions ,it can be processed problem data as well as it can also got solutions of business problems. This will facilitate the ERP with situation learning, situation planning and problem solving, etc[27].
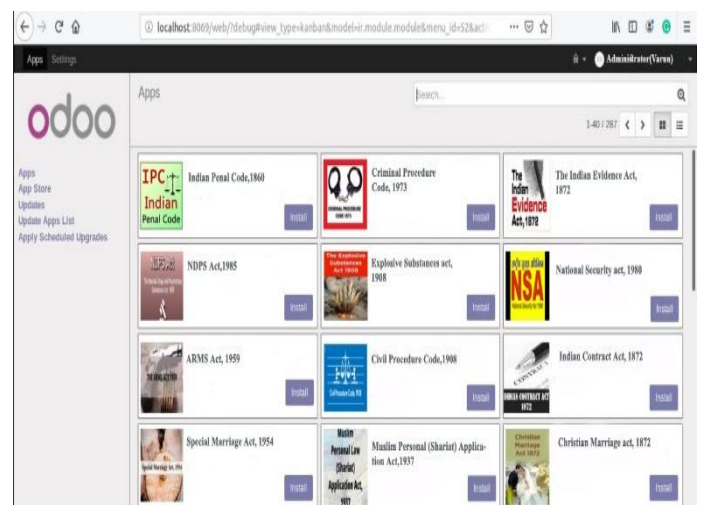

Fig: Block Diagram of Data Augmentation

Fig: An Odoo ERP based integrated judiciary System

Virtual agents are the AI as well as**V.** Knowledge engineering tools that can be used to train the laws to assist in judgement prediction. It assists the judges to take better decisions as well as it will create a boom in the development of Indian judiciary system[18]

The judicial chatbots powered by AI will not only assist judges but also to advocates to generate best process for the justice of people[19].The ERP provides the facility of all in one software in a single package. It ameliorates process efficiency, prediction efficiency, judgement efficiency etc. It reduces the operational cost. It will assist the judges in better decision making with big data available to judges.
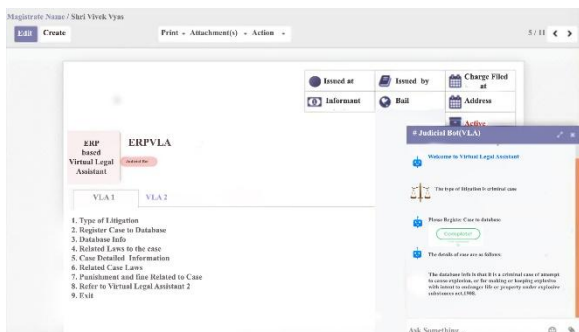

Fig: An Odoo ERP based Judicial Bot

IV.   Advantage of Proposed Approach:

ERP with artificial intelligence provides big data solutions that can manage structured as well as unstructured data. It provides virtual agents to assist Judicial decision process. The ERP with judicial bot will make the feasibility of accurate judgement prediction available to all courts of India. Advanced Knowledge driven solutions can process problem data as well as judges can get solutions of suits filed in courts [20].

CONCLUSION:

In this paper, It has been used the DEDT pre-training model which is used to train embedding vectors of massive legal case fact data, as well as to combine the trained vectors with CNN, LSTM, DPCNN, as well as RCNN deep learning models to finish the legal fact accusation prediction task. In comparison with 6 popular deep learning models which are based on Word2Vec word vector training for text classification, the experimental results will show that the accuracy of application of DEDT to accusation prediction task has been ameliorated, as well as the evaluation indicators would be enhanced by 8%-10%, which completely explains the effectiveness as well as the beed of the DEDT pre-training language model. The experimental results would still have space for improvement. In the future, we would continue to ameliorate the performance of models which would be feasible by using more methodologies for modeling, as well as to conduct more in-depth research from the more analytical perspectives.

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