IMAPGINE: MIND MAP GENERATION TOOL USING AI TECHNOLOGIES.

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Abstract: A mind map is a diagram used to represent words, ideas, or other items linked to and arranged around a central keyword or idea. The propounded idea helps to organize and summarize textual contexts efficiently using Mind Mapping. This tool provides a prospect to transform many literatures automatically into mind maps. Mind maps are used to generate, visualize, structure, and classify ideas, and as an aid in organization, study, project management, problem solving, decision making, and writing. It has been long used in brainstorming and as an effective educational tool. Many students find it easier to follow and remember information presented in the mind map form rather than pure text. Mind map is used in Organizing, meetings, planning, note taking, presentation, and above all, in education. It's much easier to understand well-structured data instead of unstructured. Mind maps can be used as a tool to model semi structured documents, to organize data in a more intuitive way.

This model would bring mind maps with association, back-tracking, comparison and cognitive functionality together with a new way of connecting elements of mind maps. IMAPGINE takes text from the any data sources (doc, docx, pdf, txt, web-page), extract text data from the source document through standard algorithms for document manipulation then it determines position of the text in the code through global code structure Refine text positioning through selective tag encapsulation extract text from the code. IMAPGINE can process images and charts encountered in the documents too. If process models or flow charts present in the source document, it will convert it too into a mind map by extracting focus data in process models and links between them are determined by comparing them based on their names. If a term with the same word base is found, it is then converted to a mind map. Generate titles for mind map.

Index Terms **– Mind Map, text analysis, text mining, text processing,**

I. INTRODUCTION

Mind mapping is a popular brainstorming tool and thinking technique of visually arranging ideas and their interconnections. It is a way of representing associated thoughts with symbols rather than with extraneous words. The human mind forms associations almost instantaneously, and "mapping" allows capturing these ideas quicker than expressing them using only words or phrases. It is fascinating to know how the concept of Mind mapping emerged. In the early 1970s, Tony Buzan realized that every new computer comes with a manual [6]. On the contrary, the human brain with an incomparable power comes with no manual which made him envisage an operative handbook for our brain.

A mind map is a diagram used to represent words, ideas, tasks, or other items linked to and arranged radially around a central keyword. As an example, 0 depicts a mind map of Google tools [4]. Manually constructing mind maps requires thorough reading and good understanding of the text which takes much time and effort [5]. In addition to that not all people are creative enough to draw elegant and expressive mind maps. Therefore, automatically generating mind maps saves much time and effort and serves better and quicker various applications. Mind mapping applications are numerous. Organizing, meetings, planning, note taking, presentation, and above all, in education [10]. Theoretically, the function of the right and left brain vary in the sense that the former referred to as analog brain focusing on creativity, illustrations and artistic senses whereas the latter referred to as digital brain focusing on logical thinking, calculation and language [7]. Moreover, the speed of analog memory is million times faster than digital brain memory. No wonder one can remember one's face but not the name. However, a mind map with a complete imagery incorporating keywords and their association helps to enhance memorizing, recalling and organizing thoughts and ideas. In other words, mind maps empower the left and right brain that radically improves the mind power. Henceforth the brain's potential is utilized to the fullest. More the integration of right and left-brain actions, more the performance of the brain becoming synergetic. It is prompted that higher education institutions ought to promote the learning experience of students through research and inquiry. This research is expected to result in a creative/innovative contribution to the discipline of study [8]. Most international universities encourage students to become good researchers. Developing research culture within students is difficult. It has been observed that most students find difficulty in completing research-based assessments successfully. Pictures being the brain language [11], mind maps would aid students in understanding and associating the key elements involved in doing research. This software helps the user in drawing the mind map and have some ready designs and diagrams which can be used. But the user must read, understand the text well and come up with a design for the mind map himself. Automatically generating mindmaps [1] out of pure text requires many stages of text processing. In the following sections, we provide details of the main modules of the tool and the stages used to produce the final mind map.

II. LITERATURE SURVEY

a. Direct Automatic Generation of Mind Maps from text with M2Gen

Mind mapping is a popular brainstorming tool and thinking technique of visually arranging ideas and their interconnections. It is a way of representing associated thoughts with symbols rather than with extraneous words. In the market some tools are available but these are editing tools which are very slow to draw [1].

b. A brain friendly tool to facilitate research-teaching nexus: Mind Maps

This paper shows the importance of mind maps in the education sector. to generate a mind map from we need an algorithm that will parse the text and extract useful structured data [11].

c. Mind Map and Business Process Model: Specification support by model transformation

In this paper, two approaches are presented: one's Mind Map to BPM transformation in that the mind map captures the main concepts of the domain and also connects the individual concepts that are related. It also creates a hierarchy of these terms based on how they relate to each other. And another is BPM to mind map transformation [12].

d. Mind Map Generator Software Model with Text Mining Algorithm

This paper presented a model to generate mind map. To generate a mind map text- mining algorithm is used. to generate a mind map from in this paper used an algorithm that will parse the text and extract useful structured data [13].

e. Mind Mapping Tools

A google search with the keyword 'mind mapping tool' would result in numerous mind mapping tools; each tool having its own merits and demerits. Some of them are free with limited features or available with free trial versions. Here is a quick reference of few mind mapping tools for those interested in exploring the e-tools. XMind [20], Mind42 [21] mindmeister [22], mindMup [23], FreeMind [24], Coggle [25], Mind Map Maker [26], Mind map in word [27], iMindMap [28], mindjet [29]. Among these, XMind has been chosen in this academic practice due the following reasons: visually attractive and availability of numerous useful features in the free version.

III. PROBLEM STATEMENT

The propounded idea helps to organize and summarize textual contexts efficiently using Mind Mapping. This tool provides a prospect to transform many literatures automatically into mind maps. One significant application of this tool is education. Many students find it easier to follow and remember information presented in the mind map form rather than pure text. A mind map is a diagram used to represent words, ideas, tasks, or other items linked to and arranged radially around a central keyword. Mind map is used in Organizing, meetings, planning, note taking, presentation, and above all, in education. It's much easier to understand well-structured data instead of unstructured. Mind maps can be used as a tool to model semi structured documents, to organize data in a more intuitive way. This model would bring mind maps with association, back-tracking, comparison and cognitive functionality together with new way of connecting elements of mind maps. Imapgine takes text from the any data sources (doc, docx, pdf, web-page), extract text data from the source document through standard algorithms for document manipulation then it determines position of the text in the code through global code structure Refine text positioning through selective tag encapsulation extract text from the code. Imapgine can process images and charts encounter in the documents too. If process models or flow charts present in the source document, it will convert it too into mind map by extracting focus data I process models and links between them are determined by comparing them based on their names. If a term with the same word base is found, it is then converting to mind map. Generate titles for mind map.

IV. PROPOSED SYSTEM

In our proposed system, we have come up with idea of A mind map is a diagram that represents thoughts, ideas, information and items links and arranged in a single diagram. The mind map is mostly used to help studying, organizing information, solving problems and making decisions. There are many "tools" that aid in making mind maps but those tools are just mind map editors [7]. Using text processing [1], analysis [1] and natural language processing [1] we will develop a system which will generate mind map from text. We first take the data in text format as input to generate mind map automatically. Then we extract the grammatical information from input text using morphological analysis [1]. After that determine the syntactic structure for parsing the data for processing. After that discourse analysis for Uncovering linguistic structures at multiple levels [10], determining contextual information [10] and centering theory and pronoun references. Then identify the sense of words from the sentence for disambiguation the word sense. In meaning representation generating the semantic model then do image classification using convolutional neural network (CNN) algorithm [18].

[1] METHODOLOGY

This project we will develop using python and web technology. For backend we are using python. Using the flask framework, we will develop this system. Initially the user gives the input as text in a textbox and then we preprocess it using a text analysis algorithm after the analysis system will convert in mind map and show it to the user. we will classify the image using algorithms. These all-purpose we are using python as a backend, MySQL is a database and for frontend html, CSS, JavaScript etc.

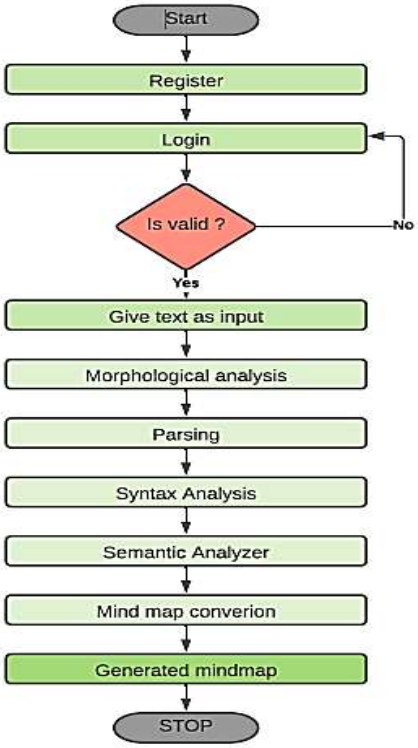


Figure .1. Flowchart of the System

[2] IMAGE CONVOLUTION:

CNN models to train and test, each input image will pass it through a series of convolution layers with filters (Kernels), Pooling, fully connected layers (FC) and apply SoftMax function to classify an object with probabilistic values between 0 and 1. The below figure is a complete flow of CNN to process an input image and classifies the objects based on values [18].

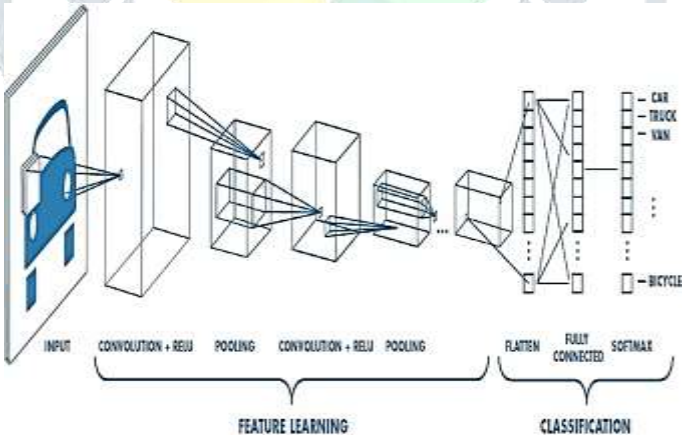


Figure 2. Convolution Process

[3] CONVOLUTION LAYER

Convolution is the primary layer to extract features from an input image. Convolution preserves the connection between pixels by learning image features using small squares of input files. It is a mathematical process that takes two inputs like an image matrix and a filter or kernel [18].

- An image matrix (volume) of dimension **(h x w x d)**
- A filter **(f_h x f_w x d)**
- Outputs a volume dimension **(h - f_h + 1) x (w - f_w + 1) x 1**

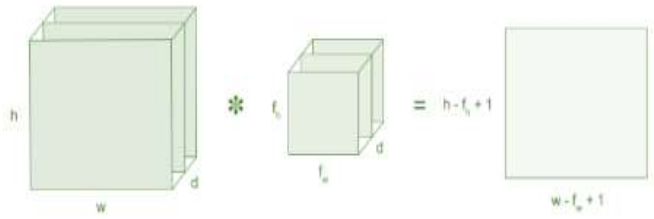
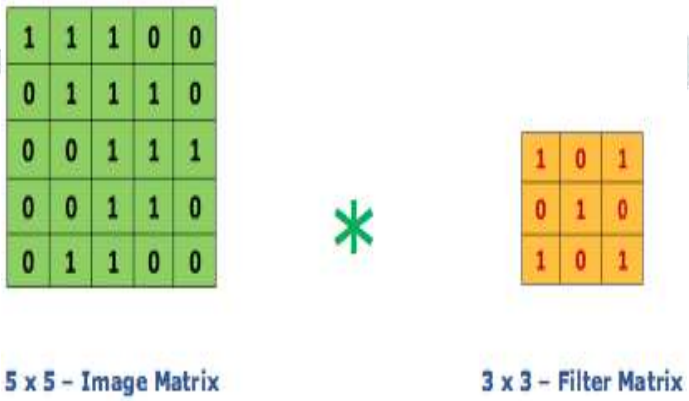


Figure.3. Consider a 5 x 5 whose image pixel values are 0, 1

Consider a 5 x 5 whose image pixel values are 0, 1 and filter matrix 3 x 3 as shown in below,



.

Then the convolution of a 5 x 5 image matrix multiplied with a 3 x 3 filter matrix which is called a **"Feature Map"** as output [18]. Convolution of an image with different filters can perform operations such as edge detection, blur and sharpen by applying filters. The below example shows various convolution images after applying different types of filters (Kernels) [18].

Operation	Filter	Convolved Image
Identity	$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$	
Edge detection	$\begin{bmatrix} 1 & 0 & -1 \\ 0 & 0 & 0 \\ -1 & 0 & 1 \end{bmatrix}$	
	$\begin{bmatrix} 0 & 1 & 0 \\ 1 & -4 & 1 \\ 0 & 1 & 0 \end{bmatrix}$	
	$\begin{bmatrix} -1 & -1 & -1 \\ -1 & 8 & -1 \\ -1 & -1 & -1 \end{bmatrix}$	
Sharpen	$\begin{bmatrix} 0 & -1 & 0 \\ -1 & 5 & -1 \\ 0 & -1 & 0 \end{bmatrix}$	
Box blur (normalized)	$\frac{1}{9}\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$	
Gaussian blur (approximation)	$\frac{1}{16}\begin{bmatrix} 1 & 2 & 1 \\ 2 & 4 & 2 \\ 1 & 2 & 1 \end{bmatrix}$	

Figure. 5. Convolved Images

V. DESIGN AND ANALYSIS

Modules of IMAPGINE:

1) Morphological Analyser:

The Morphological Analyzer [10] is concerned by how words are constructed from more basic units called morphemes. It returns all possible morphemes for each word in the text. For example: Friendly (Adjective) = friend (noun) + ly (suffix)

2) Parser:

The parser [10] returns all possible parse trees for each sentence in the text according to the English grammar rules in effect. A filtering process takes place in which the grammatically correct parse trees are chosen for each sentence.

3) Syntax analyser:

The Syntax Analyzer is the module which produces the final correct parse trees of the input text.

4) Semantic analyser:

The Semantic Analyzer [10] receives correct parse trees of the text, selects correct meaning for each word and produces a new Text Meaning Representation (TMR) or uses it to update an existing one.

5) Analyser consists of three sub-modules:

a) The Discourse Analyser:

It is concerned with assigning each pronoun to the noun which this pronoun refers to.

b) Word Sense Disambiguation:

It is concerned with assigning the most proper sense for each word according to the formulation of the sentence.

c) The Text Meaning Representation:

It is concerned with putting the text in a form which best represents its meaning.

6) mind map conversion module:

It obtains candidate pictures by performing a search with the name of each noun (including adjectives) and each verb in the text and retrieving the first picture found, thereby drawing the mind map.

7) Text to speech:

Natural Reader is a professional text to speech program that converts any mind map text into spoken words. User can download an audio file also for future use.

VI. RESULT

In existing system, the computer-based mind-mapping tools are much slower to use than pen and paper because users are distracted by tool operations such as finding and arranging widgets. It very difficult to use the tools for new users. In our proposed system, we first take the data in text format as input to generate mind map automatically. Then we extract the grammatical information from input text using morphological analysis. After that determine the syntactic structure for parse the data for processing.

After that discourse analysis for Uncovering linguistic structures at multiple levels, determining contextual information and centering theory and pronoun references. Then identify the sense of words from sentence for disambiguation the word sense. In meaning representation generating the sematic model then do image classification using convolution neural network (CNN) algorithm.

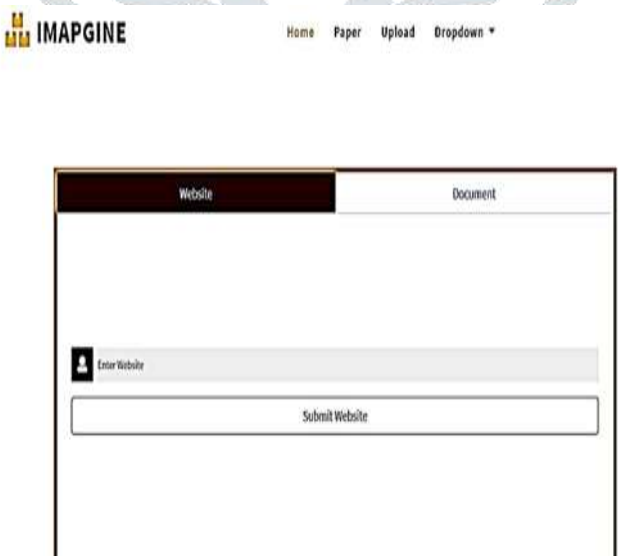


Figure 6: Upload website URL

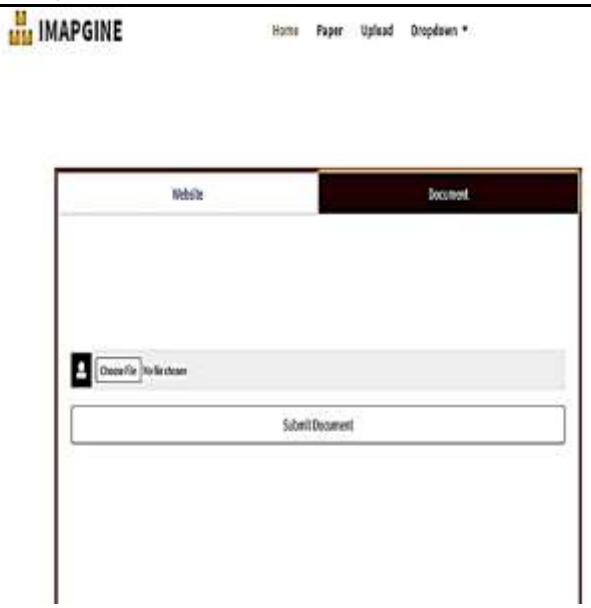


Figure 7: Upload Source document

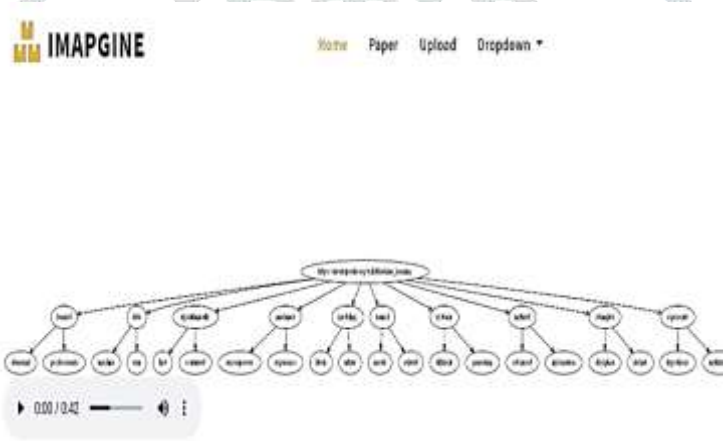


Figure 8: Mind Map with text to speech system (Narrate the mind map)

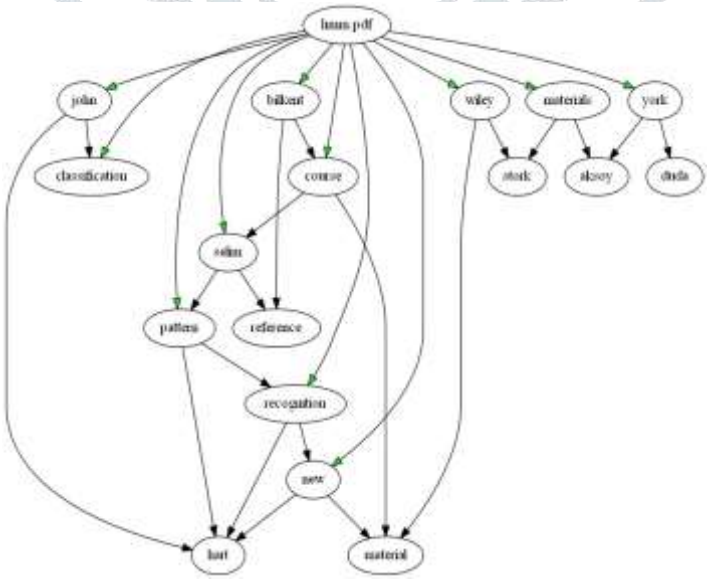


Figure 7: Downloaded mind map image

VII. FUTURE MODIFICATIONS

In future it is intended to improve the system developed by making it more accurate. Will improve the text mining of synonym words which will generate more accurate mind maps. Use another text mining algorithm to make the system improve performance to get results.

VIII. CONCLUSION

Mind maps are very useful in different fields, like learning, memorizing, structuring data and speeding up the search process; we could process much more information in less time etc. The process of creating a mind map is slow, and all the tools today are just editors that help us create mind maps. So, if we generate mind maps from plain text, that reduces much of the time required to make mind maps and then we could focus on using them. In this project we are going to develop a system that is based on this model which generates the mind map. In this project text- mining algorithm will be used and output of this will be sent to the mind map generator. Development of such a system will popularize mind maps and we believe that it would be increased in many areas and then creating information and new knowledge from them is very useful in knowledge management.

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