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EXTENDED ABSTRACT

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International Jasin Multimedia & Computer Science Invention and Innovation Exhibition
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Tomoe : Topic Modelling Web Application

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***Abstract*— Text data is becoming a very valuable asset in digital era in various fields. However, managing and analyzing text data becomes increasingly impossible as information continues to grow. Therefore, NLP methods can be applied. One of the application of NLP is Topic Modeling, which is a method that can find and identify hidden topics in text documents. The method of Topic Modeling that is often used is LDA. LDA is an unattended AI model using a soft fuzzy clustering approach. The assumption built from this model is that the document consists of topics composed of lists of words. Unfortunately in its implementation, doing data analysis with Topic Modeling requires quite a lot of time and deeper learning. So that an AI Web Application was created based on the Topic Modeling method called Tomoe (Topic Modelling Web Application) to facilitate the summarization of text documents. In using this application users do not need to worry about data theft, because this application does not use a database system. The results of the analysis of this application are in the form of an Initial Word Cloud that shows the most frequently appearing words based on their font size, Topics in Text is the result of topic modeling based on the LDA model and Word Cloud from Topics is a visualization of Topics in Text. So that the use of Tomoe can certainly make it easier for users to model topics or see the subject matter of one text document more quickly and easily.**

Keywords*— *Natural Lenguage Preprocessing, Latent Diriclet Allocation, Topic Modeling

I. INTRODUCTION

Text data is becoming a very valuable asset in this increasingly advanced digital era. Most of the information we have is stored in text form, including books, articles, messages, and more. The management and extraction of knowledge from this data has become very important in many fields, including academic research, business, and government. On the other hand, managing and analyzing text data with becomes increasingly impossible as the amount of information becomes available. Therefore, an approach is needed by applying Natural Lenguage Preprocessing (NLP) to understand and manage text data.

Natural Language Processing (NLP) is an application of computer science, specifically computational linguistics, which is used to study the interaction between human (natural) language and computers [1]. NLP is intended so that computers can understand and reason human language so that computers can process human language automatically [2]. One application of NLP is topic discovery and modeling which can also be referred to as Topic Modeling, which is a method that can find and identify topics hidden in text documents. One method of Topic Modeling that is quite often used is Latent Diriclet Allocation (LDA).

LDA is an unattended Artificial Intelligence model using a soft fuzzy clustering approach. The assumption built from this model is that the document consists of topics composed of lists of words [3]. Unfortunately in its implementation, doing data analysis with Topic Modeling requires quite a lot of time, and deeper learning. So that the creation of an Artificial Intelligence Web Application based on the Topic Modeling method named Tomoe (Topic Modelling Web Application) to facilitate the summarization of text documents.

II. MATERIALS

A. Artificial Intellegence

A contemporary hot technology is artificial intelligence, or AI. This technology has been applied in numerous industrial sectors, beginning with the health, financial, and other sectors. A computer system that is capable of doing activities that typically require human intelligence is known as artificial intelligence. The system's data can be analyzed and used by this technology to make judgments. Learning, reasoning, and self-correction are among the activities that take place in artificial intelligence. This procedure is comparable to how people think things through before making a choice [4].

B. Natural Lenguage Processing (NLP)

The development of software with the capacity to comprehend human language is known as natural language processing. Natural language, in theory, represents the messages that people use to communicate [5]. Numerous scientific fields, including computer and information science, linguistics, mathematics, electrical and electronic engineering, psychology, etc., contain the foundational concepts of NLP. Machine translation, natural language text processing and summarization, user interfaces, multilingual and cross-linguistic information retrieval (CLIR), speech recognition, artificial intelligence, and expert systems, and others are just a few of the topics covered by NLP applications [6].

C. Topic Modelling

Topic Modeling is a statistical algorithm that examines the original text's words to identify the themes that surround a given document, how those themes are connected to one another, and how those themes evolve over time [7].

Clustering, a technique used in unsupervised learning, is further developed by topic modeling. Unsupervised learning doesn't have an object label. Hard clustering, hierarchical clustering, and soft/fuzzy clustering are the three main types of clustering techniques. In soft/fuzzy clustering, where each item can have more than one cluster at a particular level, topic modeling is included [8].

III. METHODS

A. Text Preprocessing

In the stages of topic modeling, the first stage carried out is pre-processing the text, changing the raw, unstructured and original format into a structured format that can be processed at the next stage [9]. The preprocessing stages carried out include Case Folding, Remove Punctuation, Stopword Removal and Tokenizing.

B. Latent Diriclet Allocation (LDA)

LDA is a probabilistic generative model for a group of discrete data such as a corpus. A document is provided as a probability distribution over numerous themes by latent (hidden) topics identified by LDA, with each subject shown as a probability distribution over a number of words [10]. LDA model representation can be depicted in a diagram as in Fig.1 below.

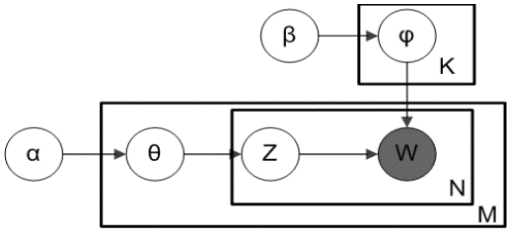

Fig. 1. LDA Model Representation.

This Web Application is composed of Text Preprocessing Functions and LDA Models, so that this Application can process and created topics model from entered text documents automatically.

IV. RESULTS AND FINDINGS

This Tomoe application is divided into two pages, namely Page 1: Home, a page that contains everything about this application and Page 2: Topic Modelling, a page that can help users to see the topic of the inserted text document.

A. Home Page

The Home Page is the first page seen by users when opening this application. So, on this page, a brief explanation is given about this application, who can use it, and how to use it. The appearance of the Home Page can be seen in Fig. 2 Home Page.

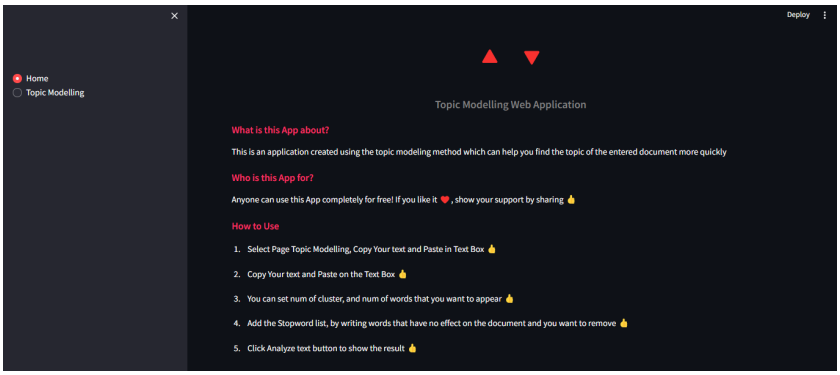

Fig. 2. Home Page

B. Topic Modelling Page

The initial appearance of this page is composed of several features that will help the topic modeling process. Among them there is a text box that is used as a source of text data to be analyzed. So, users must enter the text document to be analyzed into the text box by copying and pasting. Users also do not need to be afraid of data theft from this application, because this application does not use a database system. The initial view of the Topic Modeling Page can be seen in Fig.3 Topic Modeling Features.

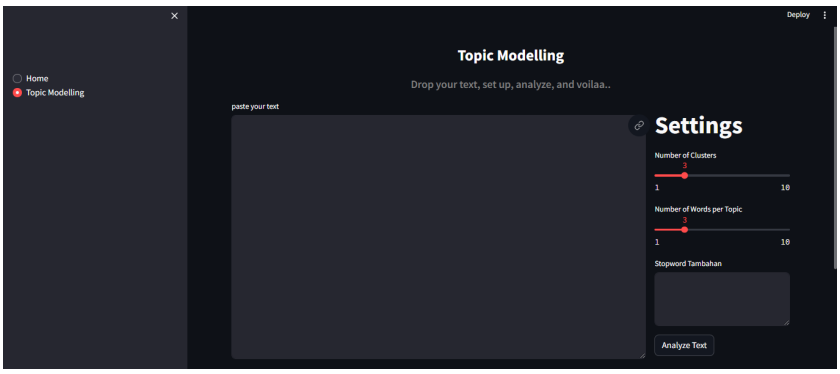

Fig. 3. Topic Modeling Page

After the user enters the text data, sets the number of clusters, the number of words that will come out, and enters a stopword if there is something to enter, and presses the Analyze Text button, it will automatically come out visualization in the form of Initial Word Cloud, Topics in Text and Word Cloud from topics as in Fig. 4 Visualization and Analysis Results.

Fig. 4. Visualization and Analysis Results

At this stage, users can already see the topic of the text data entered. In the Initial Word Cloud, you can see the words that appear most often based on their font size. Then in Topics in Text is the result of Topic Modeling based on the LDA model, and Word Cloud from Topics is a visualization of Topics in text.

V. CONCLUSIONS

Tomoe (Topic Modelling Web Applications) are created using the Latent Dirichlet Allocation (LDA) model and Text Preprocessing to optimize the resulting model. This application can certainly make it easier for users to model topics or see the subject matter of a text document more quickly and easily. Tomoe can be used by accessing the link : https://tomoee.streamlit.app/.

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