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EXTENDED ABSTRACT

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International Jasin Multimedia & Computer Science Invention and Innovation Exhibition
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TextCrunch: An Interactive Text Mining Application

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***Abstract*— TextCrunch, a web application, enhances teaching and learning in text mining analysis. It benefits educators, researchers, and learners. Operating on the Shiny framework, it simplifies text data analysis with its user-friendly interface. Key features include real-time results from uploaded text data and various visualizations. This empowers users to draw accurate conclusions. Whether you're a novice or an expert, TextCrunch accommodates all levels of expertise. In summary, TextCrunch is a valuable tool for educators, researchers, and learners involved in text mining, promising to revolutionize the field and advance knowledge.**

Keywords—shiny apps, text mining, web app

I. INTRODUCTION

The practice of text mining analysis has gained growing prominence for the examination of textual content, encompassing data derived from social media. The abundance of textual content available, spanning academic journals, research papers, news articles, online discussions, and even social media platforms, offers opportunities and challenges for educators and students [1][2].

In an era defined by information overload, extracting valuable insights from textual data is crucial across various academic, professional, and research domains. However, the complex nature of text mining often acts as a barrier, deterring students and researchers with no coding background. Coupling text mining with web-based applications provides a compelling platform to deliver these insights to learners and educators in a user-friendly and interactive manner [3]. Among the various tools available for creating such applications, Shiny by RStudio stands out for its ability to effortlessly transform data analyses into interactive apps without requiring extensive web development expertise [3]. "TextCrunch" is an innovative solution in the form of a user-friendly Shiny application, designed to empower non-coders to effortlessly conduct advanced text mining analysis. It provides valuable support for those who struggle to grasp coding concepts while simultaneously anticipating the desired output.

II. MATERIALS

A. R Language Programming

All pertinent analyses are conducted utilizing the integrated function and package within R Studio. The analyses encompassed in this study include (1) Data Cleaning, (2) Word Cloud Analysis, (3) Word Frequency Analysis, (4) Topic Modelling, (5) Sentiment Analysis, and (6) Cluster Analysis.

B. Shiny web application

Shiny package is an open-source framework for web application development using R. TextCrunch in Shiny consists of two main components: the user interface (UI) and the server logic. The UI defines the visual layout of the application, encompassing elements such as input controls, plots, tables, and text. The server logic, on the other hand, handles the data processing, calculations, and reactive behavior in response to user interactions.

III. METHODS

The creation of this web application progressed through three phases, which are (1) literature and related work search and review, (2) apps design and testing, and (3) evaluation.

A. Literature and related work search and review

An internet search about similar shiny web applications that are already been developed and available publicly.

B. Apps design and testing

The process in Shiny application involved several key stages, including data preprocessing, user interface design, backend logic, and interactivity.

C. Evaluation

The pilot survey was conducted and asked about users general understanding about Text Mining analysis in specific. Users rate their level of understanding about Text Mining topics before using TextCrunch (Section A) and after using TextCrunch (Section B). In section C, users were asked to rate six (6) elements about TextCrunch. Users rate the items using a 5-rating scale. The list of items asked is specified in Table 1.

TABLE 1. ITEM RESPOSNE FOR USERS' EVALUATION

Section	Item	No. of items	Scale
Section A	Understanding level about Text Mining topics (BEFORE)	3 items	5-Rating Scale (1) Poor (2) Fair (3) Satisfactory (4) Very good (5) Excellent
Section B	Understanding level about Text Mining topics (AFTER)	3 items	
Section C	Ratings for product Ease of use Interactive apps Time saver Support teaching and learning Contents Design		
Section D	Recommend to other user.		Yes No

All users' responses in the pilot survey were reviewed for evaluation purposes and recommendation for further improvement of TextCrunch.

IV. RESULTS AND FINDINGS

The following is the final version of TextCrunch that is ready to be used. Responses gathered from users are summarized in the following.

A. TextCrunch web application user interface

The application user interface can be seen as in Figure 1. The user can upload the data file in .txt or .csv format and process the text to proceed with the text analysis.

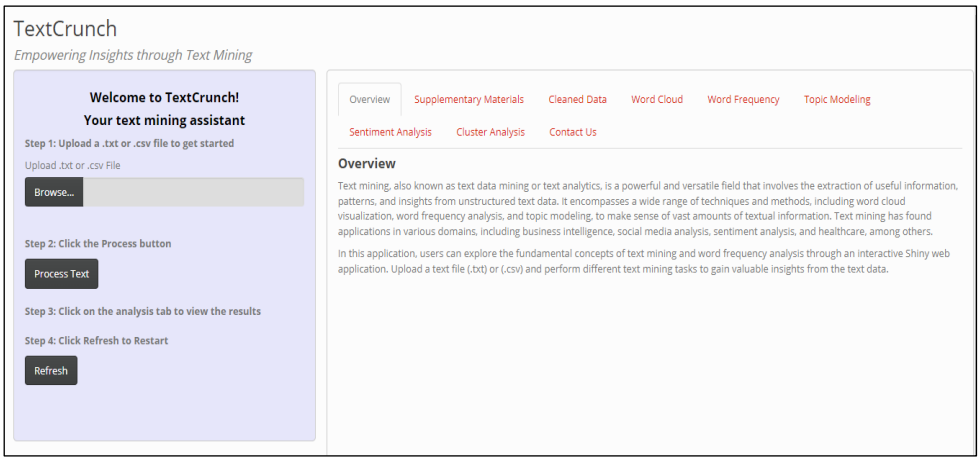


Fig. 1. TextCrunch user interface

The analyses presented in the TextCrunch application are Word Cloud and Word Frequency where the frequent word that appears in the text are determined and displayed using word cloud and bar chart as shown in Figure 2 and Figure 3. The topic modelling is conducted by classifying the words according to their similarities as in Figure 4. Figure 5 shows the output of sentiment analysis based on the text data and finally is cluster analysis where the relationship among words is visualized using dendrogram as depicted in Figure 6.

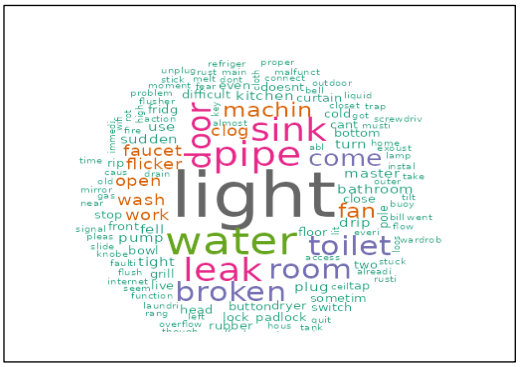


Fig. 2 Word Cloud

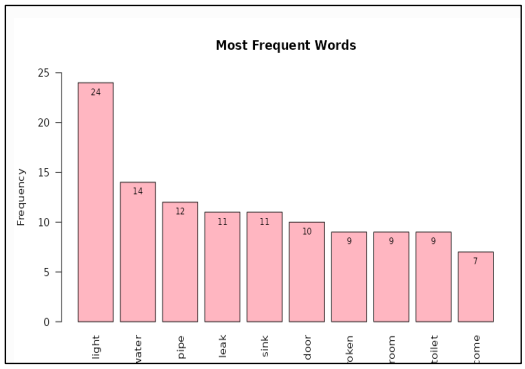


Fig. 3 Word Frequency

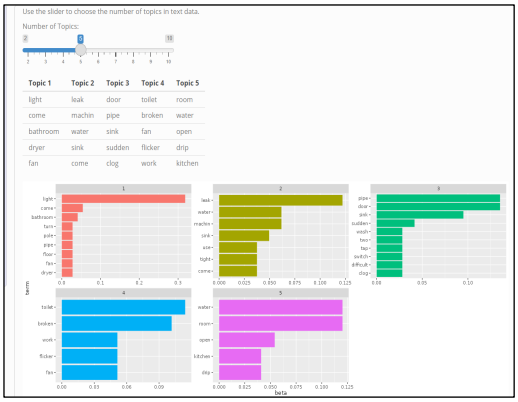


Fig. 4 Topic Modelling

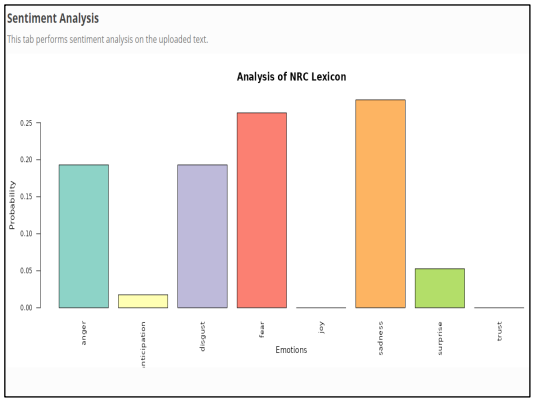


Fig. 5 Sentiment Analysis

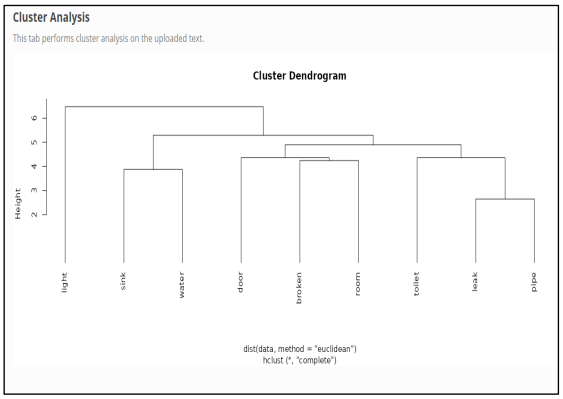
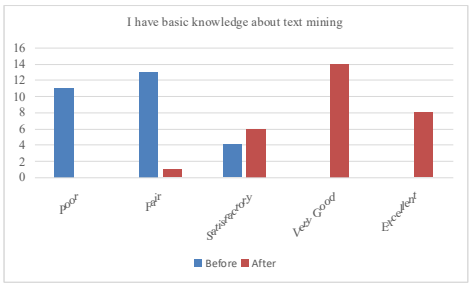


Fig.6 Cluster Analysis

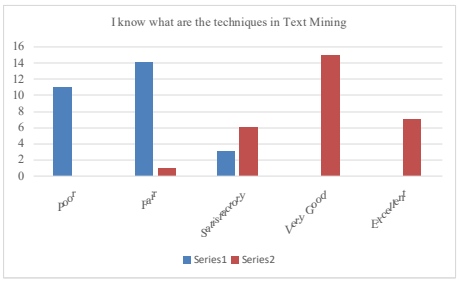
B. Users' feedback about TextCrunch (Evalution)

The utility of the applications is ascertained by soliciting feedback from the users. The collected information includes the level of understanding and prior experience. The questionnaire was distributed to the respondents.

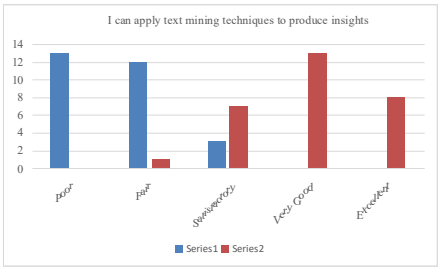
1) Users's Level of Understanding about Text Mining Topics



(a) Distribution of answers from users on 'I have basic knowledge about text mining'



(b) Distribution of response from users on 'I know what the techniques in Text Mining are'



(c) Distribution of response from users on 'I can apply text mining techniques to produce insight'

Fig.7 Users' level of understanding about Text Mining Topics

Fig. 7 (a), (b) and (c) depict the level of understanding among users prior to use TextCrunch and after experienced it once. Before the users were introduced to TextCrunch, most of them were at a poor and fair level. After experiencing TextCrunch once, their level improved to very good and excellent. There are only a few users who feel at fair and satisfactory level.

2) Users' Rating for TextCrunch

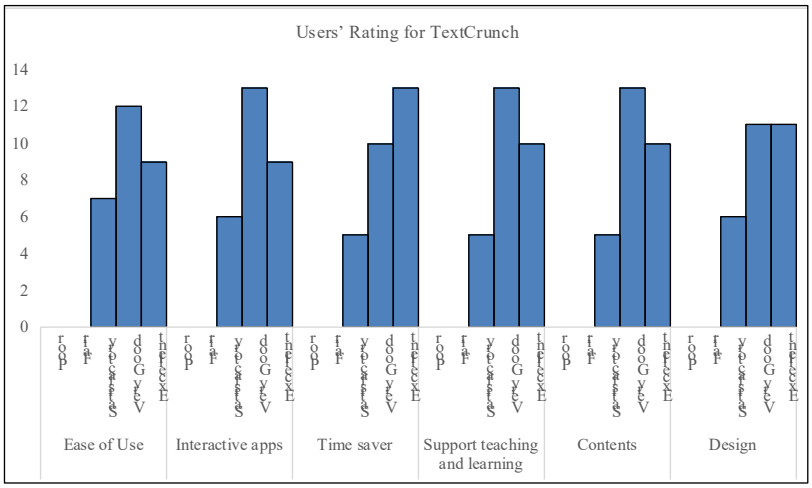


Fig 8. Distribution of rating's level for TextCrunch among users

Fig. 8 depicts the ratings among users after experiencing using TextCrunch. The majority rate as very good and excellent for all elements and all users recommend TextCrunch to all others.

C. Users' opinion for future improvement

Response received from users about the design of the apps. Suggestion to design the apps with more colors and enhancement on the usability to allow for collaboration.

V. CONCLUSIONS

In the near future, TextCrunch promises significant commercial value as it becomes available for wider use. Educators and students alike will benefit from its valuable capabilities for teaching and research. Its user-friendly design ensures accessibility for users of all levels, making it a versatile tool for professionals. As TextCrunch evolves and gains users, it has the potential to enhance learning and become an asset in educational and industrial settings, marking the beginning of a journey toward wider adoption and recognition.

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