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EXPORTINGORGANIZED TEACHING DOCUMENTS FROM MINDMANAGER

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Keywords: mind map, macro, document, Latex, mind manager.

ABSTRACT

Mind map application can be utilized into a multi-document content editor by extending its functionality. Thus, authoring documents and their content can be done as easy as putting ideas on a mind map. Many studies use mind maps to deliver teaching materials or use it as a tool to learn materials, but the contents that already in the mind map are rarely to be maintained as a formal document. In this paper, steps to export organized teaching documents from MindManager by using macro and Latex class is explained. After extending mind map functionalities, creating course structures, contents, and materials is as easy as creating a mind map and its notes.

Keywords: mind map, macro, document, Latex, mindmanager.

1. INTRODUCTION

It is feasible to export a mind map document into another file format. But mind map is rarely to be used to author formal documents. This paper explains the steps to export teaching document from MindManager into pdf file. Although it is not direct conversion to other formats, the capability to create organized documents expandsthe possibility of using mind map application to organize such documents.

Many studies use mind maps to deliver teaching materials[1, 2, 3, 4, 5]or use it as a tool for students to understand teaching materials on guided study sessions[6, 7, 8, 9]. But the contents that already in the mind map are rarely to be maintained as formal documents[10].Generally, any mind map application helps to put ideas, visualizations, domains, and relations of thought to be easy to manageable into topics in a hierarchical structure. Many of them allow us to add notes on each topic. This is how the document can be put into topics and can be easily reorganized based on its scope or domain. Since the notes are linear text-based information, the workflow of making

documents is equal, at least on each topic note.A hierarchical structure on mind mapsbecame an advantage whenediting documents.
MindManager comes with VBA macro support. This can be used to extend its functionality, including on exporting its notes and save it into another file. Since VBA macro has limited capability,itis not possible to export notes directlyinto a .pdf file. Latex is then being used to make the export possible. Since the Latex file is a plain text document, topic notes can be used as indirect content editor of Latex file.So, there is a needs to have less code distraction when creating contents of topic notes with Latex formatting.The main flow of exporting map from MindManager is by executing a macro to create .tex file, then compile .tex file into .pdf file.The templating and the Latex formatting must be maintained as well.

2. METHODS

First, create a mechanism to read and recall variables on topic notes. The idea is to enable variable definitions on topic notes. Having a variable in the content can ease the editing of atomic information, such as course title, faculty, program, and document code, so the editing of such information can be done in one place. The defined variables then can be recalled into other topic notes. There is a need to differentiate common Latex content and mechanism. Thus, we suggest the use of angle bracket (‘>’) on the first character in line to be used as a sign character to tell the current line is to be processed when exporting the map. And by using sign character as separator, the line can easily be split into arrays in the programming part. Of course, the first empty element of the array is skipped. The second element is used to define variable name, and the last element is the value of the variable. Dictionary data type can be used to store variables and their value (see codes below). To recall a variable, we suggest the use of square brackets as an enclosure. Overall, we suggest the syntax of defining and recalling variable that is like on the following codes.

```
> COURSENAME > Multimedia

My course is [COURSENAME]
```

Second, create simpler syntaxes to accommodate image, table, and list instead using plain Latex.As the splitting mechanism by using sign character is easier to implement, the syntax is reused to store other content types as well. The second element of the array can be used to identify the type of content insertion. For example, `fig` isa tag to define a figure, and `tab` isa tag to define a table. Each type of insertion tag must be unique. If the second element other than the defined tags, the line is considered as variable definition syntax, and the tag is the variable name.

As tables and lists contain items, the pipe character (‘|’) is used as a sign character and separator of items. Lines of item syntax can be defined below the table or list syntax. Each line of item syntax defines a single row or item.An empty line or having first character other than pipe character means the end of the table or list, so there is no end syntax. The complete format we used is shown in Table 1.

Table 1. Content Insertion Formats

Insertion	Format
variable	`> {VARNAME} > {CONTENT}`
image	`> fig > {TITLE} > {FILEPATH}`

<table>
<tr><td>table</td><td>&gt; tab > {TITLE} > {TBLFORMAT}
| {ITEM1} | {NEXTCOL1}
| {ITEM2} | {NEXTCOL2}
…
| {ITEMN} | {NEXTCOLN}</td></tr>
<tr><td>numbered items</td><td>&gt; num [> {VARNAME}]
| {ITEM1}
| {ITEM2}
…
| {ITEMN}</td></tr>
<tr><td>unnumbered items</td><td>&gt; item [> {VARNAME}]
| {ITEM1}
| {ITEM2}
…
| {ITEMN}</td></tr>
<tr><td>bibliography list</td><td>&gt; bib
| {id1} | {CONTENT1}
| {id2} | {CONTENT2}
…
| {idN} | {CONTENTN}</td></tr>
</table>

The `TBLFORMAT`part of table syntax can be used to define which table style and header to be used. It is required since tables can havetheir own style and headers, probably a complex one. There is alsoa mechanism to accommodate filling table fields with a list. By adding variable names after num or item, the list is collected and saved into a variable. This mechanism is required for easy filling table field with a list without breaking down the Latex table syntax.

The first and second steps are required to be done in MindManager macro. In MindManager's VBA macro, the current active document can be accessed from`ActiveDocument`object. The current selected topic can be accessed from `PrimaryTopic`, and all subtopics can be accessed from `AllSubTopics`.The sample code below shows our main routine of exporting the map into a file.

```
Set Doc = ActiveDocument
Set PrimaryTopic = Doc.Selection.PrimaryTopic
Set Dic = CreateObject("Scripting.Dictionary")
Dic.CompareMode = TextMode

HandleTopicPrimaryTopic

For Each ATopic In PrimaryTopic.AllSubTopics
HandleTopicATopic
For Each BTopic In ATopic.AllSubTopics
HandleTopicBTopic
For Each CTopic In BTopic.AllSubTopics
HandleTopicCTopic
Next
Next
Next

ProcessReplace

SaveToFile
```

`HandleTopic` is a subroutine to process each topic notes. The content form topic notes simply processed if the mark icon is attached to the topic.We use `mmStockIconNote` icon to mark the topic. If the topic is not marked or hidden in the map, the topic will not be processed. This mechanism enables map editor to include or exclude topics when exporting maps.

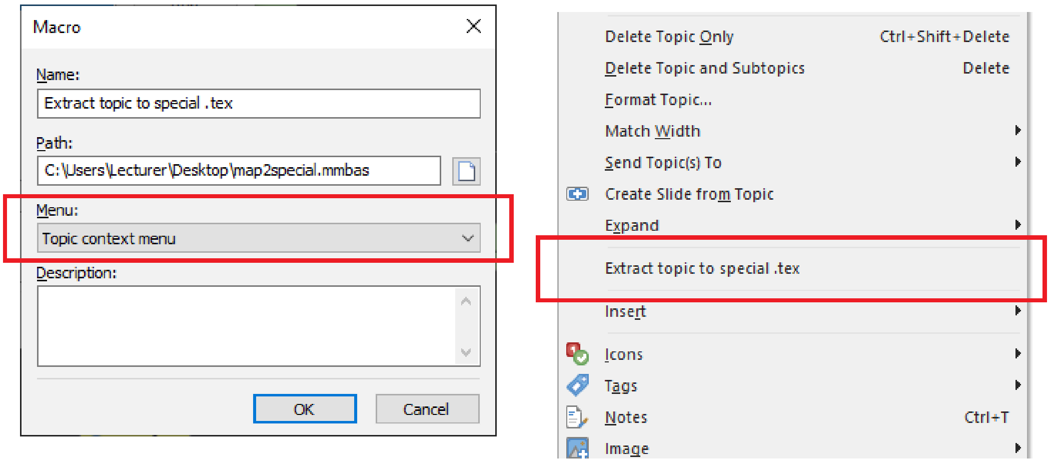
```
Sub HandleTopic(ATopic As Topic)

       If Not ATopic.IsVisible Then Exit Sub

       If ATopic.AllIcons.HasStockIcon(mmStockIconNote) Then
              If 0 < Len(ATopic.Notes.Text) Then
ProcessContentATopic.Notes.Text&vbNewLine
       End If

End Sub
```

A macro button can be put into topic context menu for easy access. Below shows our macro once has been setup on macro manager. A single left-click on any topic showsa macro button that callsour macro to start exporting topic notes.



Macro

Name: Extract topic to special .tex

Path: C:\Users\Lecturer\Desktop\map2special.mmbas

Menu: Topic context menu

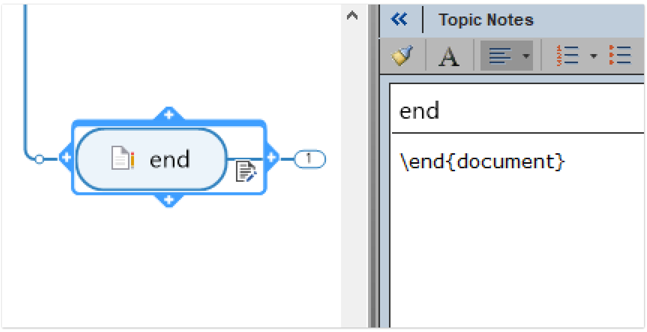
Description:

Figure 1. Macro setting and macro button on topic context menu.

Third, create a Latex class and document style template. The Latex format when working on topic notes must be less complex, so overall editing experience of documents and modules can be less code distracting. By creating simpler Latex commands that hide complex codes is welcoming more people to edit the document together using the same application workflow.Latex commands must handle the styling of the overall document, such as paper size, margin, and orientation. For each document type, it is better to have other commands to define different styles and layouts, if any.

```
\documentclass{teachingdoc}
\start{Multimedia}{May 2020}{2.0}
```

When usingLatex formats in the topic notes, the Latex preamble and closing can be put into separate topics that placed on top and on the bottom of the hierarchy of the map, respectfully. Otherwise, the structure of the exported .tex file is broke. Embed it into another topic note is not good either. Notice on the code above, we use `\start`to call `\begin{document}`andto define course name, editing date, and version info to put into each document cover, so it is easier to understand and less technical. Code above and figure below are examples of topmost and bottommost topic notes that is implemented.



```
end
\end{document}
```

Figure 2. End of document.

For easy understanding, it is better to name commands that begins any document type with a ‘new’ as the prefix. In our case, many documents are table-formatted content, so the implementation of document template is easier. Below is the list of commands that we used.

Table 1. Created Latex commands.

Command name	Function
\start	Set general document layout
\newsyllabus	Set layout for syllabus document
\newclassmeeting	Set layout for single class meeting document
\newteachingguide	Set layout for teaching guide document
\newskillsyllabi	Set layout for skill development document
\newrubric	Set layout for rubric evaluation document
\newmodule	Set layout for module document

Forth, create course identity information, course templates, and course contents. At this step, the document templates and contentswere created.Since the variable mechanism has been implemented, any atomic identity information of the course is required to write once in each course, so it is better to put all general information into a single topic. By doing so, that information became more manageable since it has only one place to define or change the data. Below is the example of how variables of multimedia courses are defined in a topic note.

```
>FACULTY>Engineering
>PROGRAM>Informatics Engineering
>COURSE>Multimedia
>COURSEID>06070809
…
```

Each template of document type must be made separately on different topics. By doing so, the template and the content are split, so building contents that exist in several documents can be done in a single topic via variable definitions. Below is an example of a topic note to create a template of a syllabus document.

```
\newsyllabus
```

```
>tab>>syllabushead
|1. FACULTY|:|[FACULTY]
|2. PROGRAM|:|[PROGRAM]
|3. COURSE|:|[COURSE]
|4. COURSEID|:|[COURSEID]
…
```

Course modules are split and distributed by each class schedule or meeting. Since each module has its own target skill or learning progress, it is better to make separate a topic for each module. Each module can have its own document style and layout. In our case, the module has a header, a footer, and a subject title on each module. Those module styles and layouts were accommodated on `\newmodule` command. In each module, variables can be written on the same topic. It is better to write sub contents on its child in the related topic module. Below is an example of a module that is being set.

```
\newmodule{Introduction}

>01-TARGETSKILL>Enable to explain digital multimedia and its elements
>01-INDICATOR>Explains digital multimedia's elements and its functions well
>01-CONTENT>Introductory to digital multimedia and multimedia elements
…
```

Fifth, export map into .tex file and then compile it into a .pdf file. This last step is the actual step to extract topic notes into the final .pdf file. Exporting the document can be done through a running macro that was made in the first step. And compiling .tex file into .pdf file can be done using any Latex compiler.

3. RESULTS

Stepsexplainedare workflow to build feature extension via macro and Latex class from scratch using recommended syntaxes and mechanisms. Only the last two steps are required to use the workflow as a tool. Although the macro and Latex class programming must be done first before creating any content, the programming part is not hard to do since it requires only basic programming knowledge.

For those who only want to use the prepared workflow, they can do only two last steps.The variables and simpler command for embedding tables and images lead to less distraction of the Latex codes when editing modules.So, editing on variables and adding contents of modules are became less complicated. Course modules and submodules can be added and edited in each own topic. They can be repositioned on the map visually. Enabling or disabling the content to be exported can be done only by attaching or deleting the note icon or by hiding the topic when exporting a map.

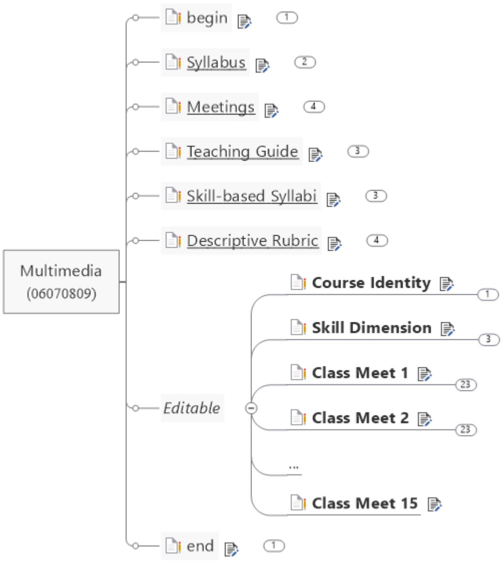


Figure 3. Final course mind map structure.

Figure 3 shows our hierarchy of overall documents that implemented using a mind map. The very top and bottom topics are the required topic to put open and close document of Latex syntaxes that is not visually intimidating. Five document templates were made, starting with the Syllabus document until Rubric document. Every editable context in the template was bound to a related variable. So, other lecturers or teachers can fill the variablesandtheir course contents only on the scope of the 'Editable' topic.

After extending mind map functionalities, creating course structures, contents, and materials is as easy as creating a mindmap and their notes. This method can open other mechanisms of how to develop complete documents using mind map software. It also helpsin creating a series of course documents in the same field. There is also a potential application of using this method on creating mind maps in a collaboration environment, such as team lecturers or teachers.

4. CONCLUSIONS

Mind map application can be utilized into a multi document content editor by extending its functionality. Thus, authoring documents and their content can be done as easily as putting ideas on a mind map.This paper explains steps to export teaching documents from MindManager. The export mechanism can be enabled byusing MindManager macro and Latex class.Topic notes can be exported into a single .tex file by using Latex format on topic notes. Creating content is easier by utilizing simpler Latex commands and using simpler syntaxes to create common content, such as table, figure, and list. Creating templates and defining coordinated content identity are doable by having a mechanism to put and recall variables in notes. Thus, teaching documents can be organized and developed using a mind map application.

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