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The Harold & Inge Marcus Department of

Industrial & Manufacturing Engineering



Study Booklet for Keyboard Users

Task with a keyboard to use key-based commands
(Declarative Knowledge Retrieval Driven Procedural Cognitive Task)

User's Guide for the Dismal Spreadsheet: Normalization Task

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About Dismal

Dismal is a spreadsheet application that runs under the GNU Emacs text editor. Dismal provides an instrumented and accessible interface for HCI studies and designs.

Terminology

Here are some terms you will encounter throughout this Dismal study booklet.

- Minibuffer

Dismal asks you to type the file name or other expressions. What you type appears on the bottom line of the screen in a subwindow. The bottom line is called “minibuffer”.

IMPORTANT: If you mistype a command in the minibuffer, press Ctrl-g several times (usually two times). The minibuffer says “Quit”. Then, you can retype the correct command in the minibuffer.

- Ruler

Dismal supports putting up a ruler at the top of the window indicating the contents of columns. (e.g., +---+-+---+)

- Range

In Dismal, this indicates the region of the cells between point and mark. This region can be used to copy and paste.

- Mark

This is a text position in GNU Emacs for selecting text. In Dismal, it is now the marked cell. Typing “m”, “C-space”, or “C-@” will set the mark.

- Point

In Emacs, the current position of the cursor is called “point”.

Task with a keyboard

Summary of the Task Procedures in the Dismal Spreadsheet

- (a) Open a file, named normalization.dis under the “experiment” folder
- (b) Save as the file with your initials
- (c) Calculate and fill in the frequency column (B6 to B10)
- (d) Calculate the total frequency in B13
- (e) Calculate and fill in the normalization column (C1 to C5)
- (f) Calculate the total normalization in C13
- (g) Calculate the length column (D1 to D10)
- (h) Calculate the total of the “Length” column in D13
- (i) Calculate the Typed Characters column (E1 to E10)
- (j) Calculate the total of the “Typed Characters” column in E13
- (k) Insert two rows at A0 cell
- (l) Type in your name in A0
- (m) Fill in the current date in A1 using the command
- (n) Save your work as a printable format

Detailed knowledge and skills start from the next page.

First of all, you need to keep in mind a few things as follows:

- You are only allowed to use key-based commands (e.g., open a file or save buffer as).
- Do not use the menu bar with a mouse.
- When moving around cells in the Dismal spreadsheet, you cannot use the mouse. You need to use only corresponding key-based commands to move around cells.

Important: After reading this manual, you will do the given tasks in the Dismal spreadsheet. Your performance (e.g., key-strokes, mouse clicks, and mouse locations) will be recorded by a tool called RUI (Recording User Input, developed at the ACS Lab, IST).

Two hot-keys are reserved for RUI. One is Ctrl + r and the other is Ctrl + s.

Ctrl + r : this hot key enables RUI to start recording.

Ctrl + s: this hot key enables RUI to stop recording.

When you are ready to start your spreadsheet task, please press Ctrl + r.

When you are done the task, please press Ctrl + s.

Please, do not use those reserved hot-keys, while you are performing the task in Dismal.

1 Normalization Task in Dismal

The task is to normalize data that were obtained from an automatically generated tabbed log file of various people who have been working with a computer interface. Normalization is to compute what percent of each command was used from the total.

Figure 1 shows the Dismal task window of data normalization. When you perform the given task, you are only allowed to use key-based commands. For instance, the key-based command for “Open (or find) a file” is **C-x C-f** (C indicates a control key on the keyboard). **C-x** indicates holding down “CONTROL key” when you press “x”.

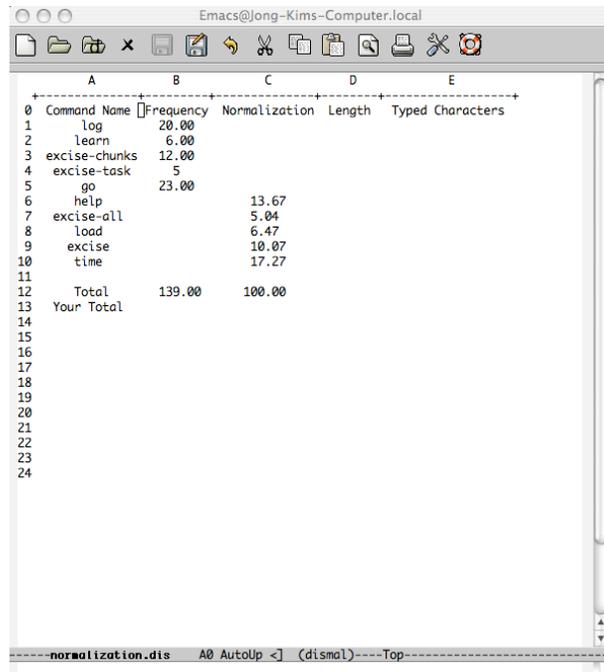


Figure 1. A Dismal window of the normalization task.

In the column A, various command names are listed such as the “log” command in the A1 cell or “help” command in the A6 cell. In the column B, the frequencies of each command are provided in the cells from B1 to B5. This frequency number indicates how many times a command was used by a user.

1.1 Handling Files

- Open a file
By pressing **C-x C-f**, you can find and open a file. When you type the key-based command, you will see **Find file: ~/** with a blinking point in the minibuffer. Then, you can type a filename in the minibuffer. For this task, you need to find a file named **normalization.dis**. This file is located under “experiment” folder. Thus, type **experiment/normalization.dis**, and press “return”. You can open and save a file using key-based commands below:
- Save as another name
You can save your work as another name using the command, **C-x C-w**.

1.2 Moving around cells

To move around cells, you need to use the following key-based commands.

- **C-p** to the above cell
- **C-n** to the below cell
- **C-f** to the right cell
- **C-b** to the left cell

1.3 Enter data into cells

To enter any expressions (e.g., function names for calculations or numbers) into a cell, you need to move your point to a cell. The minibuffer shows the location where your point is currently located.

To insert an expression (e.g. **dis-sum**) or numbers into the cell, you need to press “**e**”. Then, you will see “**Enter expression:**” in the minibuffer. Now, you can type your expression in the minibuffer and press return key. This delivers the typed information into the cell.

1.4 Function names for basic calculations

These are the commands for basic arithmetic calculations for this task. Note that you need to put the command into parentheses, when you type it in the minibuffer.

You are required to use the functions of “**dis-sum**”, “**dis-mean**”, and “**dis-product**”, if there are more than two cells to calculate.

- **dis-sum**
It computes the sum of the designated range.
e.g., (**dis-sum b1:b10**) – this computes the sum of the designated cells (the range from B1 to B10).
- **dis-mean**
It computes the mean of the designated range from B1 to B10.
e.g., (**dis-mean b1:b10**)
- **dis-product**
It computes the product of the designated range from B1 to B3.
e.g., (**dis-product b1:b3**)

For the arithmetic calculations of two cell,

- **+**
It sums two numbers or cells.
e.g., (**+ b1 b2**)
- **/**
It computes the quotient of two numbers or cells.
e.g., (**/ b1 b2**)
- *****
It computes the product of two numbers or cells.
e.g., (*** b1 b2**)
- **-**
It computes the difference of two numbers or cells.
e.g., (**- b1 b2**)

Note: Lower and upper letters to indicate a cell do not matter in Dismal. These are treated as the same expression (a1 and A1).

1.5 Data normalization

To normalize the data of frequencies in the column B, you need to use this equation:

$$\text{Normalization} = ((\text{Frequency} \times 100.0) \div \text{TotalFrequency})$$

For example, to normalize the frequency of the “excise” command in A1, you need to multiply its frequency by 100, and then divide by the total frequencies. Thus, the expression to type in is **(/ (* 100.0 b1) b12)**. Note that, you are required to use 100.0 in order to ensure the numbers are treated as a rational number not an integer.

In the meantime, you need to calculate frequencies from the normalization values provided in the cells from C6 to C10). Fill out the blank cells of the frequency column (B6 to B10). For this calculation, you need this equation:

$$\text{Frequency} = ((\text{Normalization} \times \text{TotalFrequency}) \div 100.0)$$

The total frequency is provided at default in B12.

1.6 Length

For the “Length” column, you need to calculate the number of the characters from each command name in the “A” column. For example, the “log” command contains three characters. To calculate the length of a command name, you can use the Lisp function of “**length**” as shown below. The “**length**” command is case-sensitive. You need to use a lower-case letter. Don’t forget parenthesizing the command when you type it into the minibuffer.

(length a1)

This expression calculates the number of characters of the command in A1.

1.7 Typed characters

In the last column, E, you need to put the total number of typed letters in terms of each command. The total number can be calculated by multiplying “Frequency” and “Length” of a command. For example, sixty letters were typed regarding the command, “log” by a user, assuming that the frequency is 20 and the length is 3.

1.8 Total

Calculate the total of each column (Frequency, Normalization, Length, and Typed Characters) in the last row. Make sure the total number of the normalization column is 100. If not, you made a mistake in the normalization calculations.

1.9 Insert date and your name

To create a report of this spreadsheet work, you are required to insert your name and the current date in the spreadsheet. Particularly, it is desirable to insert name and date before the data begins in the spreadsheet (e.g., name in A0 and date in A1). To do this, place your point at A0 and insert two rows. You can insert one row by pressing **C-u 1 i r**. To insert two rows, you can type **C-u 2 i r**.

1.10 Current Date

Dismal offers a command to insert the current date. You can enter **(dis-current-date)** in the minibuffer. This will give you the current date.

1.11 Save your work and print

To create a nice report from a Dismal spreadsheet, you must save the file as **.dp** or **.dt** files. Please save your work as “**normalization-YourInitials.dp**”.