

Spreadsheets in Gnumeric

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Midterm Information

- ▶ The midterm will be written in class on March 22nd and will cover the following topics:
 - ▶ Problem Solving
 - ▶ User Interface
 - ▶ The Internet
 - ▶ Gnumeric
- ▶ The last lecture covered by the midterm will be the lecture given on Thursday the 16th.
- ▶ This weeks tutorial will be a Midterm Review session.

What is Gnumeric?

Gnumeric is an open source spreadsheet available on CDF. You can find it in the menu under programs,office,spreadsheet. A spreadsheet is a program that is used largely for calculations, graphing and tracking.

What we will do in spreadsheets

- ▶ Would like to be able to use some of our programming skill for spreadsheets (matrices).
- ▶ Analogy: Cells are variables, and everything is done by changing variables
- ▶ Analogy: Whenever we change a variable we can store the new variable elsewhere.
- ▶ Analogy: Difference is less structure and order.. and less convenient looping.

Variable Access

- ▶ A spreadsheet consists of a bunch of cells.
- ▶ The cells are labeled by the identifiers of their row or columns.
- ▶ Can access a cell with a static address ($\$B\4) or a dynamic one ($B4$)
- ▶ Static vs Dynamic only matters if you copy paste.
- ▶ Example: If I type $B4 + C4$ in cell $A2$, and copy paste it to cell $A3$ In $A3$ I get $B5 + C5$
- ▶ Example: If I type $\$B\$4 + \$C\4 in cell $A2$ and copy paste it to cell $A3$ in $A3$ I get the same formula as in $A2$

More Programming: Conditionals

- ▶ What if we want a more nuanced access (conditions).
- ▶ For instance, on an income statement we might want a line to read profit if a number is positive and loss if the number is negative.
- ▶ = $IF(B10 > 0 : "Profit", "Loss")$

More Programming: Loops without running code

- ▶ can do looping by copy/pasting with dynamic addresses
- ▶ For example: If you have an array in cells $B1$ to $B4$, can loop over that array performing an operation by specifying the operation in $C1$ operating on $B1$ then copy pasting it down to $C4$.
- ▶ Some common loops are even easier.
- ▶ = $SUM(B1 : B4)$ can sum our array, can do this over columns or matrices also.

Solving Spreadsheet problems

- ▶ Solving Spreadsheet problems uses the same problem solving ideas as normal problems
- ▶ Step 1: Understand the problem.. what do you need to calculate/present?
- ▶ Step 2: Figure out a strategy to calculate that value
- ▶ Step 3: Execute that strategy
- ▶ Step 4: Reflect and Learn for next time

An Example Spreadsheet Problem

A company wants to use a spreadsheet program to display a simple income statement

- ▶ They would like a top-level statement of total income, total expenses and net income.
- ▶ Net Income should change to Net Loss if expenses are greater than income.
- ▶ They would like to have a flexible sheet where they can list up to 50 income sources and up to 50 expenses.
- ▶ They would also like to be able to type in the names of these expenses or income sources directly to the left of the actual expense or income.
- ▶ Beyond these constraints you have some layout flexibility.

Step 1: Understand the Problem

- ▶ We need to figure out a good way to layout the information that will look reasonable if anywhere from 0 to 50 income sources and 0 to 50 expense sources are used.
- ▶ We need to calculate the income, expenses and profit or loss
- ▶ We need to display Net Income if there is a profit, and Net Loss if there is a loss.

Step 2: Strategies

- ▶ A Vertical layout is going to be awkward because we would have huge amounts of empty space if there are only say 20 items instead of 50.
- ▶ So we should design the layout so that income is on the left and expenses are on the right (Horizontal layout).
- ▶ To calculate the income we can sum the 50 income entries if some of them are blanks then blanks are zero.
- ▶ To calculate the expenses the same strategy applies.
- ▶ Net Income is easy
- ▶ Using a conditional for profit or loss with strings should work

Step 3: Execute the Strategies

- ▶ Demo in gnumeric

Step 4: Learning from the problem

- ▶ Layout approaches: Horizontal vs Vertical
- ▶ Using summation effectively
- ▶ Using conditionals effectively

Other Examples

- ▶ Given a list of pixels (pixel number, red, green, blue), calculate the luminance of each pixel.
- ▶ Given a list of samples (sample number, sample value) calculate the normalized sample values for the sound.