CSC151.02 2013F, Class 27: Other Forms of List Recursion

Overview

- Admin.
- Some notes on yesterday’s lab.
- Questions and answers.
- Some key ideas from the reading.
- Lab.

Admin

- Continue partners from Monday
- New homework assignment! Choose your own partners.
- Today’s writeup: Exercise 5.
- Upcoming EC opportunities
  - Los Llaneros, Tonight 7:30 pm, Herrick
  - Learning from Alumni, 2:15 Thursday, 3821, Eryn O’Neil ’09
  - CS Extras, 4:30 Thursday, Max Mindock
  - CS Table, Noon Friday, TBD
  - Football, 1 pm, Saturday
  - Men’s soccer, 1:30 pm, Saturday
  - Jazz Band Thursday @ 7:30, in Bucksbaum Early Music
  - ...
- Other upcoming stuff
  - Optional review stuff, 1:15 pm Thursday
  - Mentor session 7:30 pm Thursday
  - ...

Some notes on yesterday’s lab

(define rgb-brightest
 (lambda (colors)
  (cond
   ((null? (cdr colors))
    (car colors))
   ((>= (rgb-brightness (car colors))
       (rgb-brightness (rgb-brightest (cdr colors))))
    (car colors))
   (else
    (rgb-brightest (cdr colors)))))
• If the colors are arranged brightest to darkest, the number of recursive calls is the same as the number of colors in the list (+/- 1)
• Takes longer if we order them darkest to lighest.
• Why does the order of the colors matter?
  ○ If the first color is darker, we do two recursive calls, rather than one
• Why isn’t it just twice as bad?
  ○ Because each recursive call does double the work
• How many procedure calls do we do
  ○ On a list of length 1? 1
    • Main call
  ○ On a list of length 2? 3
    • Main call
    • Recursive call on list of length 1
    • Recursive call on list of length 1
  ○ On a list of length 3? 7
    • Main call
    • Recursive call on list of length 2: 3
    • Recursive call on list of length 2: 3
  ○ On a list of length 4? 15
    • Main call
    • Recursive call on list of length 3: 7
    • Recursive call on list of length 3: 7
  ○ On a list of length 5? 31
  ○ On a list of length 6? 63
• So $2^{(\text{length of list})}-1$
• This procedure needs at least one value in the list
• The bad behavior depends on the ordering of values, but we’d like the same behavior independent of the ordering
• When counting procedure calls with a helper, you need to count not just the main procedure, but also the helper

Questions and answers

Some key ideas from the reading

• After you’ve written a few procedures that use a certain approach, see if you can generalize the approach to create a template for what you’re doing
• Many recursive procedures on lists

(define PROC (lambda (lst) (if (null? lst) VALUE (OP (OP1 (car lst)) (PROC (cdr lst))))))
Some procedures expect at least one element in the list

(define PROC (lambda (lst) (if (null? (cdr lst)) (OP1 (car lst)) (COMBINE (OP2 (car lst)) (PROC (cdr lst))))))

Lab

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