

CSE 100: MWTS AND TSTS

Aside

- Professional communication is an important goal of our program
 - When/how do we teach this?

From: mrgoodvibes@yahoo.com

Subject:

Yo bro,
mised the first class I was recovring from a wild party. Omg it was awesome.
CAN YOU TELL ME IF I MISSED ANYTHING IMPORTANT ASAP SO I CAN
PREP FOR EXAM TOMORROW?
L8R
;)

Contacting Professor

- Most questions should be asked on piazza. You'll get a faster response AND you can check if already answered.
- If e-mailing faculty:
 1. Subject line: CSE 100
 2. Open with Dr. or Professor ("Dear" or "Hi", not "Yo" or "Hey")
 3. Do use punctuation and reasonable grammar
 4. Don't use text messaging
 5. Okay to make requests (of course). Not okay to make demands.
 6. Close with your name and PID

Goals for today

- Build Multi-way Tries and Ternary Search Trees
- Analyze the running time of MWTs, and list the advantage of a TST over a MWT

Tries: Efficient way to store/find keys that are sequences of digits/characters

Create the multi-way trie for the following keys:

apple



ape

applet

cape

tall

tap

tape

Does the structure of the trie depend on the order in which you inserted the words?

A. Yes B. No

apple, ape, applet, cape, tall, tap, tape

Tries: Efficient way to store/find keys that are sequences of digits/characters

Does the structure of the trie depend on the order in which you inserted the words?

A. Yes B. No

Properties of tries

Assume you insert 100 keys of length 5 digits into a multi-way trie.
In the worst case, how tall is your trie?

- A. 5 B. 100 C. $\log_2(100)$

Properties of tries

If N is the number of keys you insert in your trie, and D is the length of the longest key, what is the maximum height of your trie in terms of N and/or D in the worse case?

A. N

B. D

C. $\log_2(N)$

Tries Vs. BST

Assume an alphabet of 6 characters, as above. From this alphabet, you can create $6^5 = 7776$ different keys (strings) of length 5. If you insert all 7776 of these strings into a MWT and a BST, which will be shorter? How tall is each? Is this true in general (consider different size alphabets, different length strings)? You can assume the BST is perfectly balanced.

Properties of tries

What is the main drawback of tries compared to BSTs?

- A. They are difficult to implement
- B. They often waste a lot of space
- C. They are slow
- D. There is no drawback of tries

Ternary search trees (tries) to the rescue!

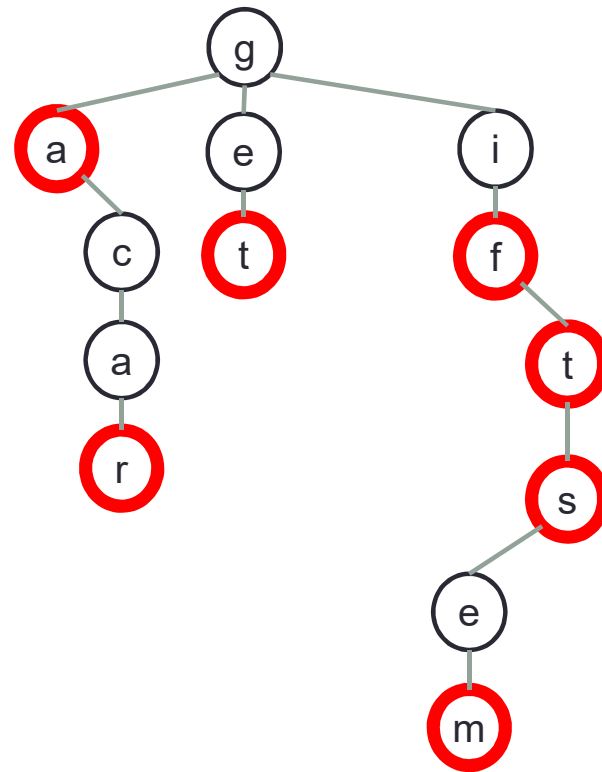
- Tries combine binary search trees with tries.
- Each node contains the following:
 - A key **digit** for search comparison
 - Three pointers:
 - **left** and **right**: for when the digit being considered is less than and greater than (respectively) the digit stored in the node (the BST part)
 - **middle**: for when the digit being considered is equal to the digit stored in the node (the trie part)
 - An **end** bit to indicate we've completed a key stored in the tree.

Ternary search trees (tries)

List all the words (strings) you can find in this TST

Are the following in the tree?
(A=yes, B=no)

- get
- if
- gif
- its
- gacar
- tsem



red is element

Draw the ternary search trie for the following (in this order)

apple, ape, applet, cape, tall, tap, tape

Draw the ternary search trie for the following (in this order)

How many nodes are added if I now add the word "ace"?

A. 0 B. 1 C. 2 D. 3

Draw the ternary search trie for the following (in this order)

Does the structure of the tree depend on the order in which keys were inserted?

A. Yes B. No