T9 and Tries

CSE 303 Homework 4, Autumn 2008

T9 Predictive Text

- What is T9? Demo
- T9onyms:
- 1. **22737: acres, bards, barer, bares, baser, bases, caper, capes, cards, cares, cases**
- 2. **46637: goner, goods, goofs, homer, homes, honer, hones, hoods, hoofs, inner**
- 3. **2273: acre, bard, bare, base, cape, card, care, case**
- 4. **729: paw, pay, Paz, raw, ray, saw, sax, say**
- 5. **76737: pores, poser, poses, roper, ropes, roses, sorer, sores**
- **How does T9 order T9onyms?**
  - **Assignment Requirement: Alphabetical order**
  - **Extra credit options: Frequency, Dynamic Frequency**

Trie

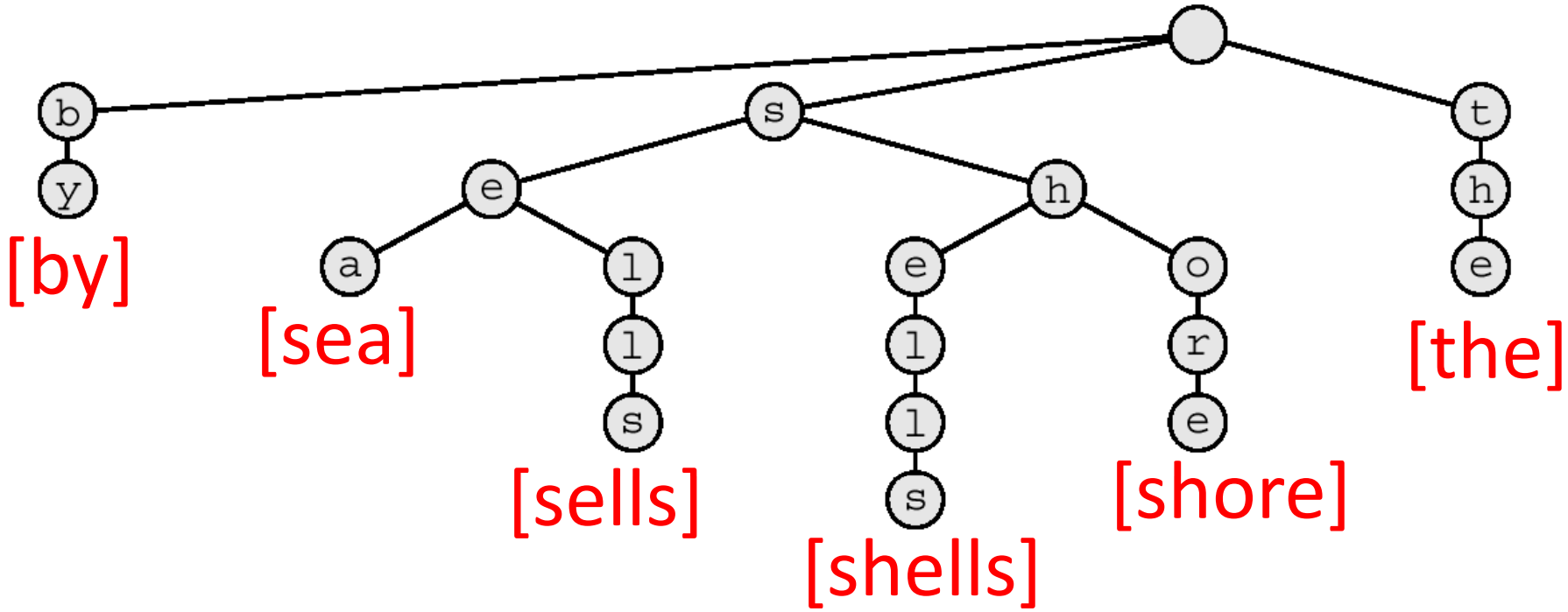
- Tree structure: n-ary tree
- We use a trie to store pieces of data that have a *key* (used to identify the data) from an alphabet
  - Optionally can also hold a *value* (which holds any additional data associated with the key).
- Applications:
  - Spell checkers
  - Auto-complete
  - Data compression
  - T9 predictive text input for cell phones
  - String search

Example: String Search

- Goal:
  - Determine if a given word appears in a block of text.
  - Optimize for multiple searches in the same block of text
- What do we do?
  - Place each word in the block of text into a data structure
  - Use data structure to determine whether a word exists in that block of text
- Which data structure should we use?

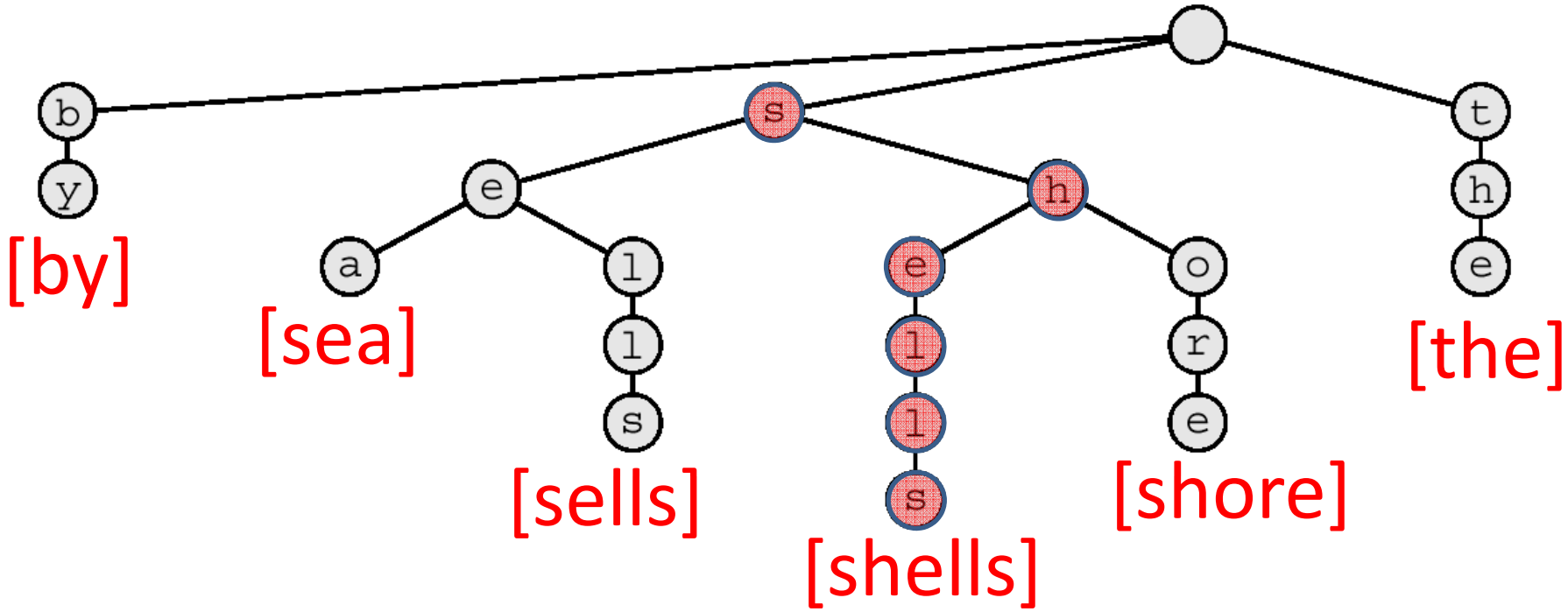
String Search Trie

- Text: sells sea shells by the shore



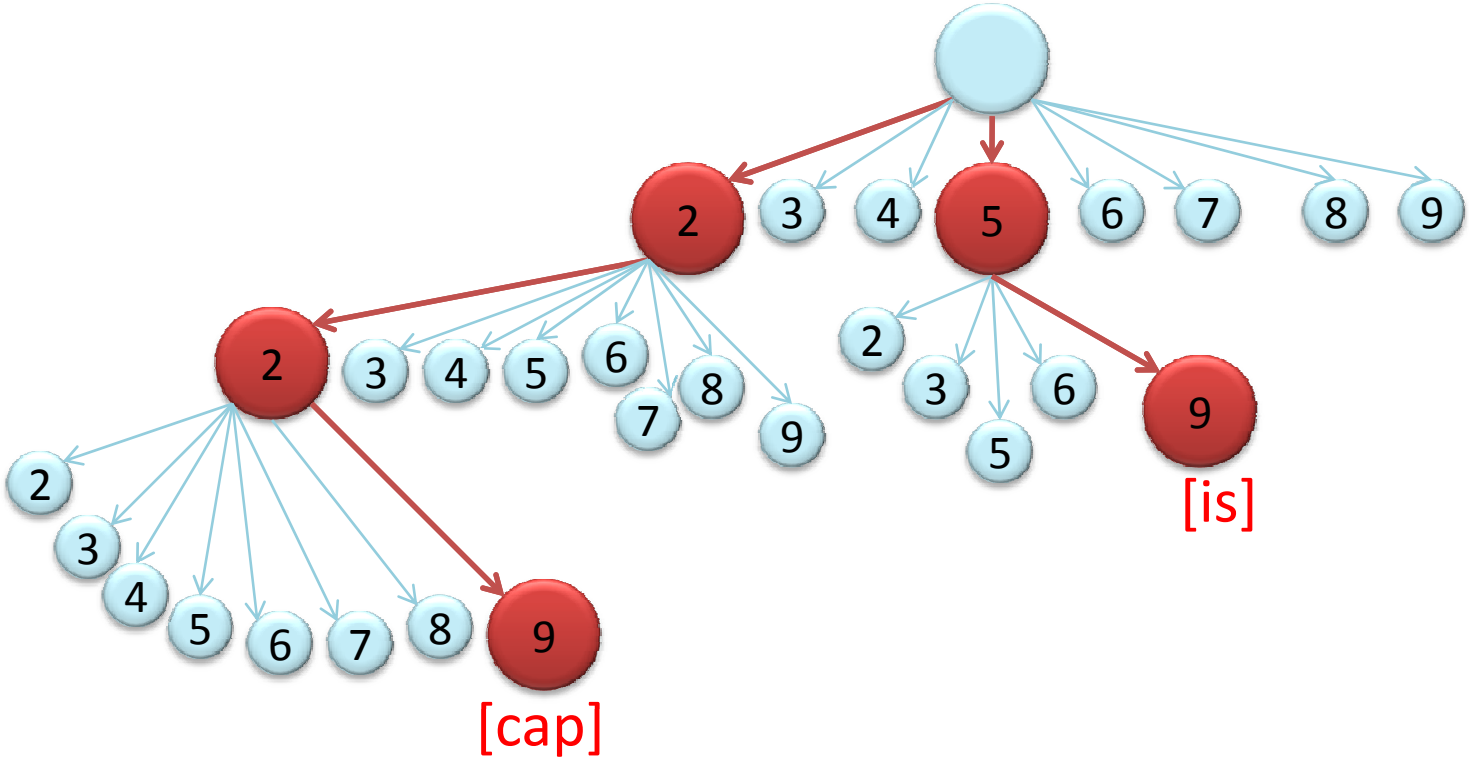
String Search Trie

- Search for: s h e l l s

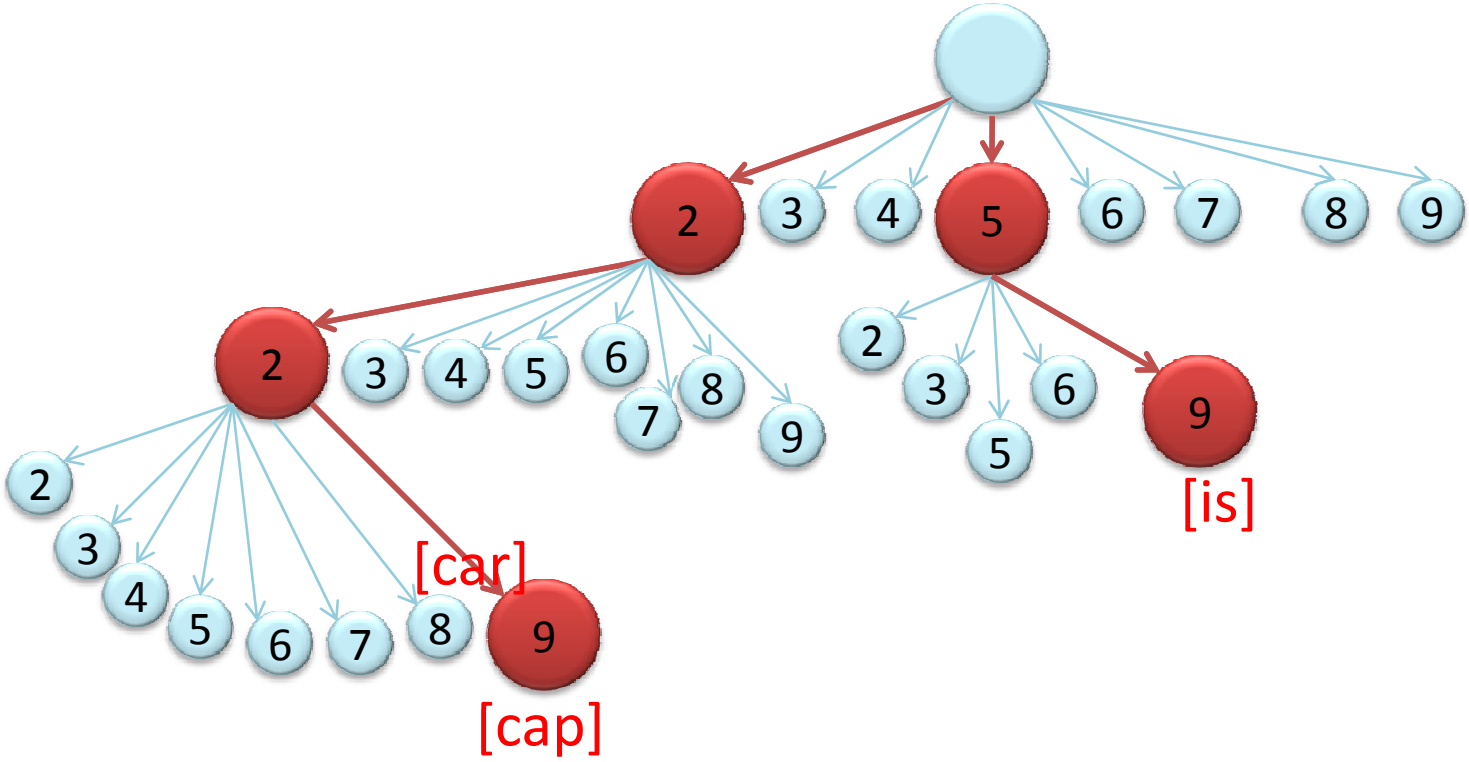


Building a Trie for T9

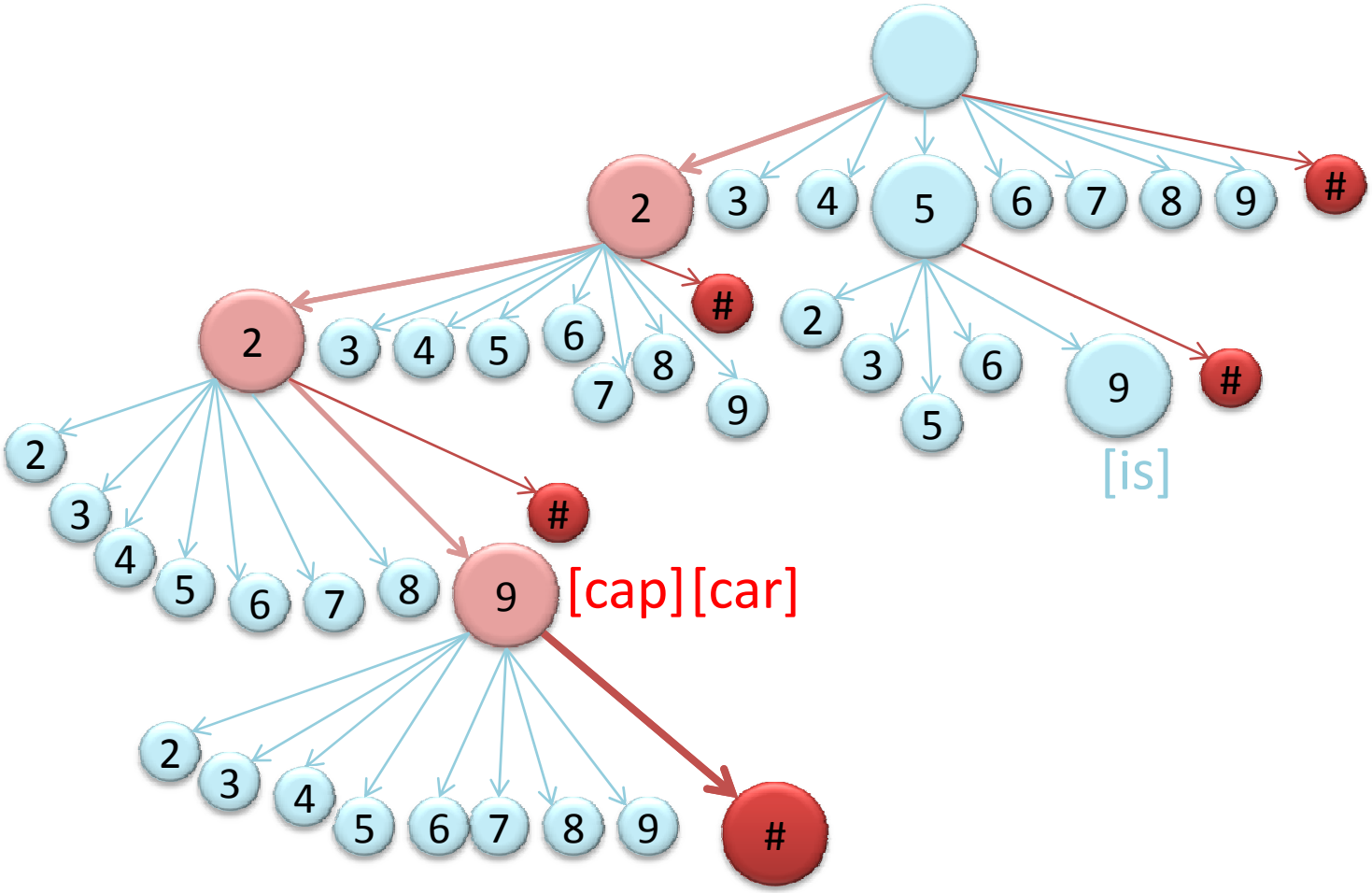
- How is a T9 Trie different?
  - Alphabet: {2-9}



Handling T9onyms



Handling T9onyms



Extra Credit

- More accurately implement T9:
  1. Store the prefix of each word in the text file in the trie—
     - example: foobar- “f”, “fo”, “foo”, “foob”, “fooba”, “foobar”
  2. Order a word in the Trie by its frequency
     -A word with a higher frequency will be predicted before a lower frequency word. In the text file (listed on assignment), the format of an entry will be

     word frequency
  3. Update the frequency of a word
     - Each time a word is used, increment the word’s frequency
     - Prediction of words should use updated frequencies