

T9 and Tries

CSE 374 Homework 5, Spring 2022

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 (i.e., order read from input file)
 - Extra credit options: Frequency, Dynamic Frequency

Trie

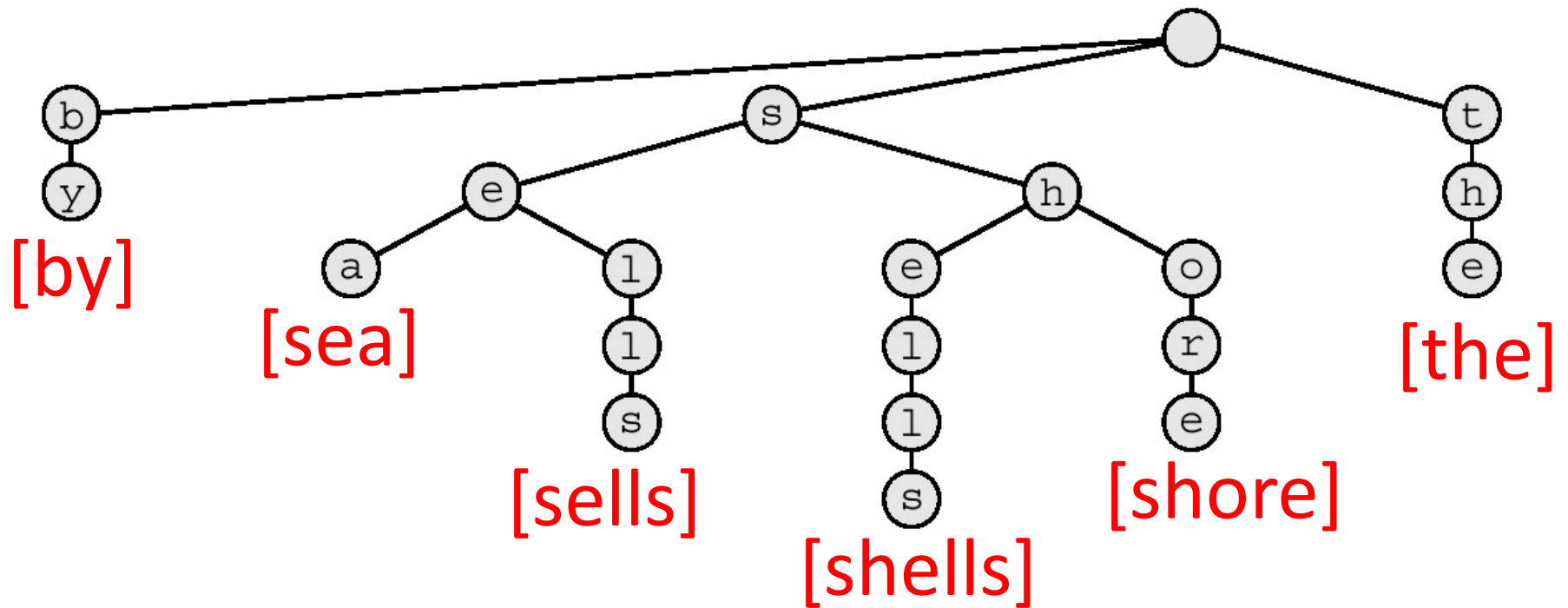
- Tree structure: n-ary tree
- We use a **trie** to store pieces of data that have a *key* (used to identify the data) from an alphabet
 - Optionally can also hold a *value* (which holds any additional data associated with the key).
- Applications:
 - Spell checkers
 - Auto-complete
 - Data compression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

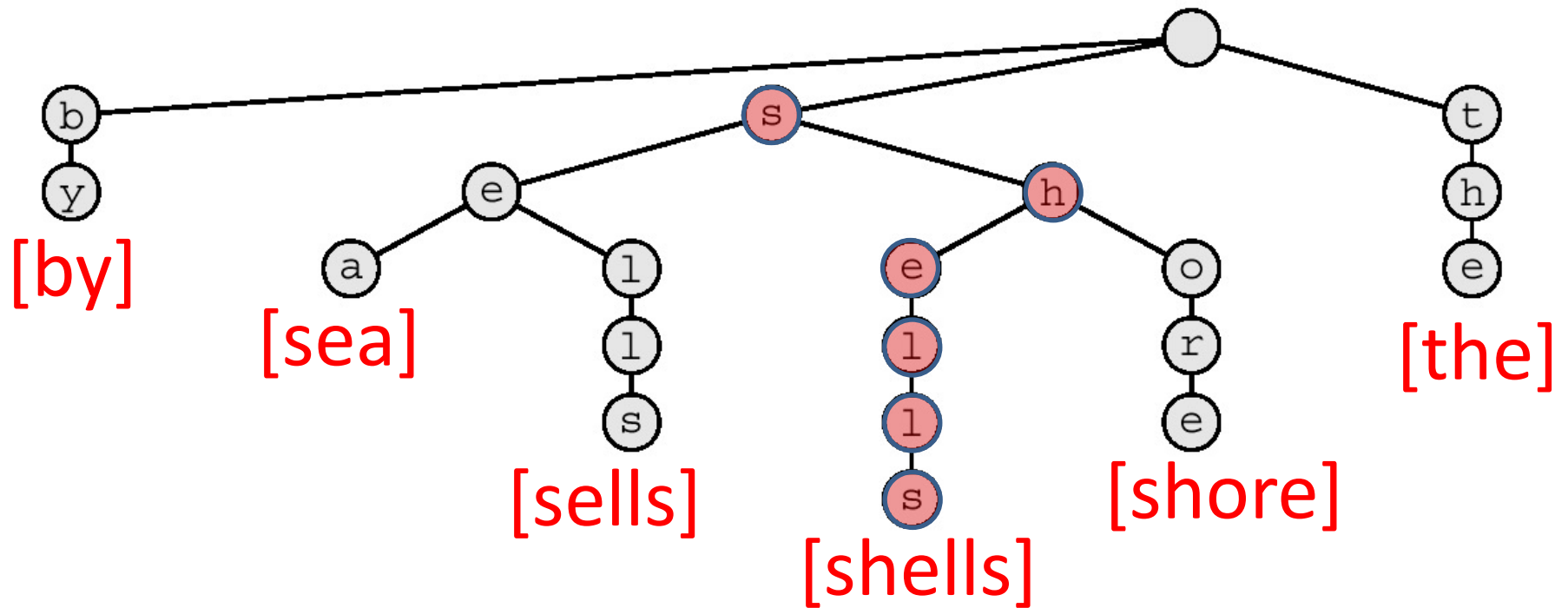
String Search Trie

- Text: sells sea shells by the shore



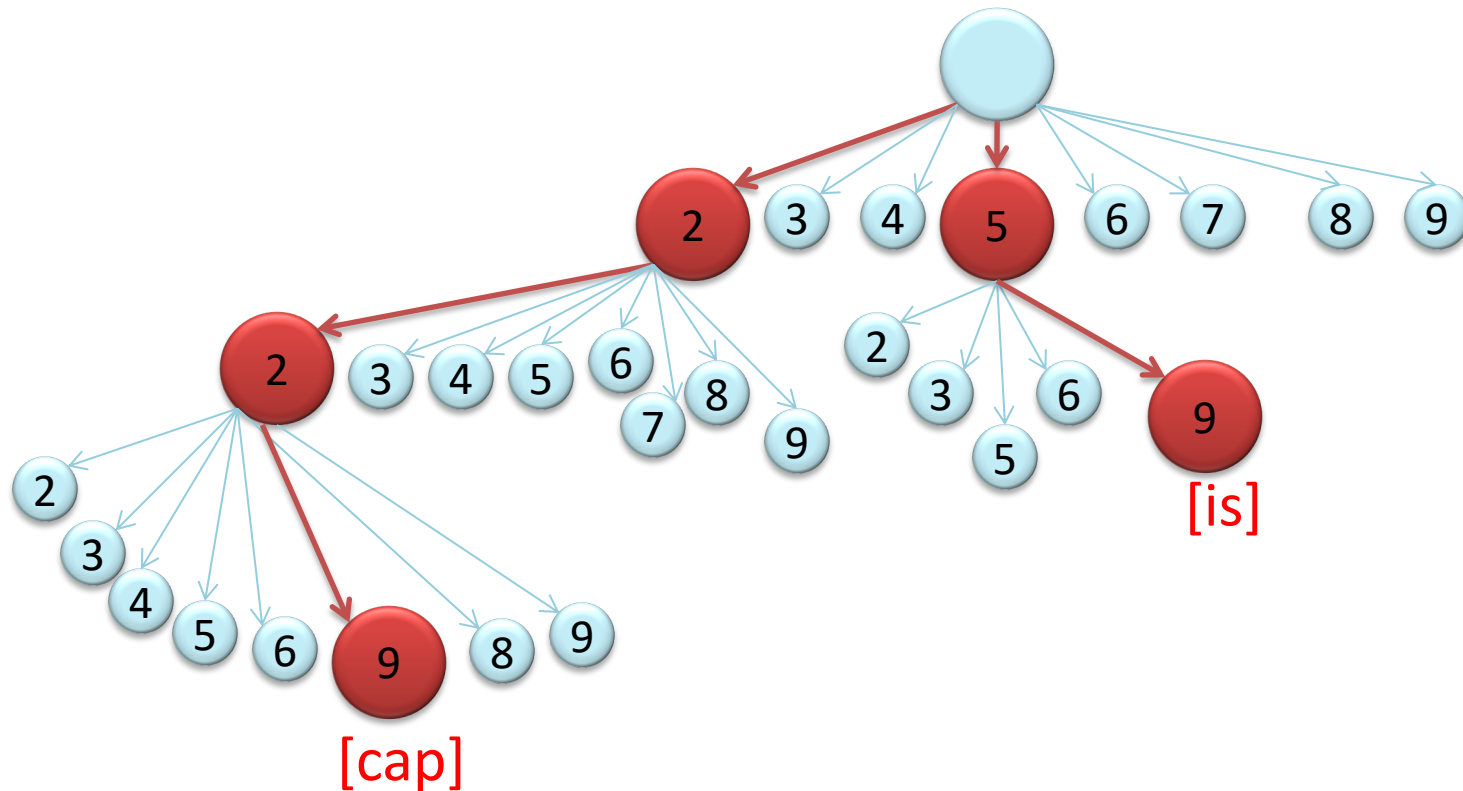
String Search Trie

- Search for: shells

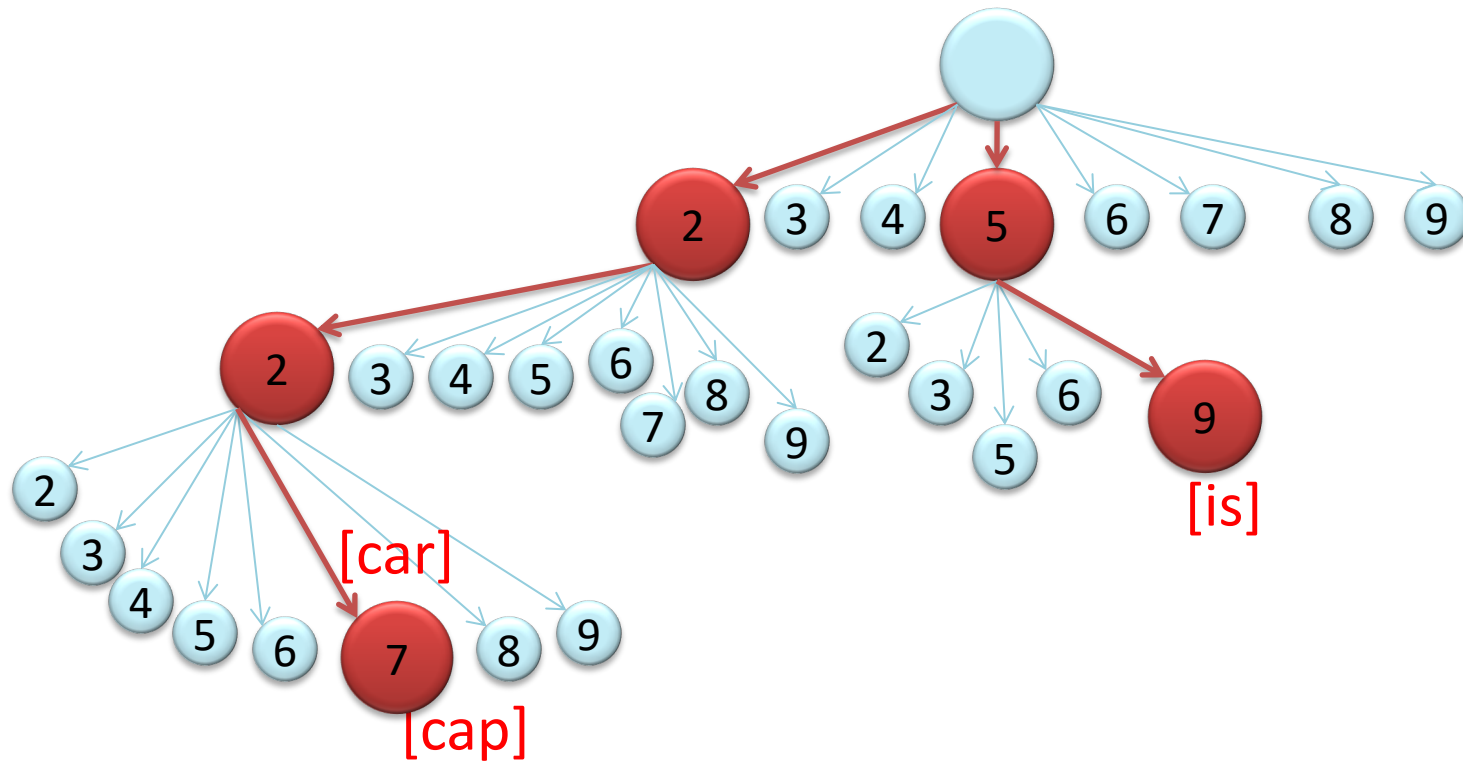


Building a Trie for T9

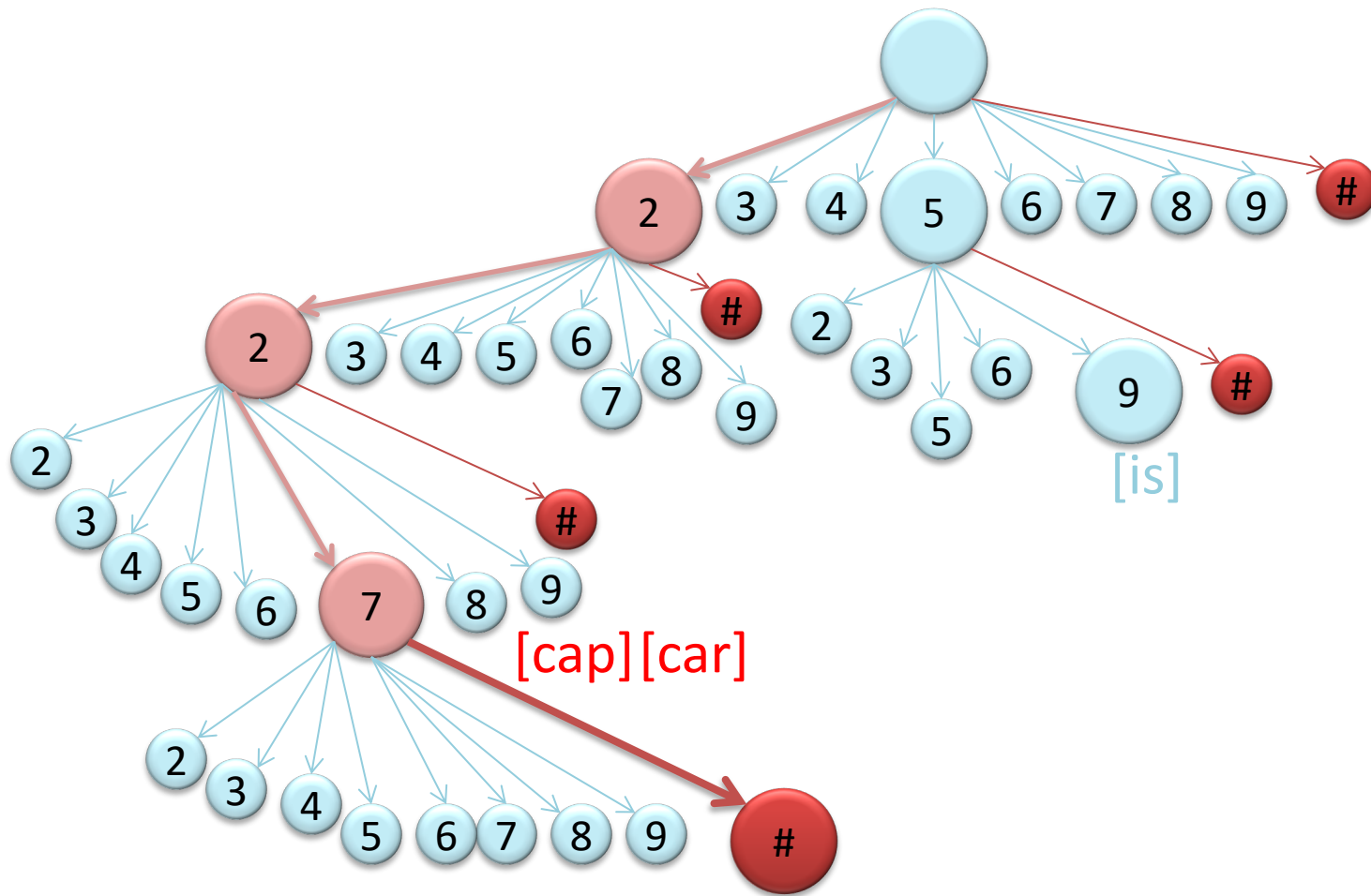
- How is a T9 Trie different?
 - Alphabet: {2-9}



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