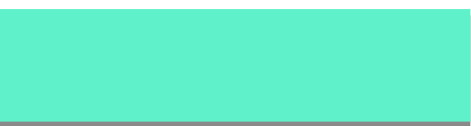


WORD LADDER PROBLEM



Section Overview

- Learn about the Word Ladder Problem
- Solve problem with Graph
- Implementation of solution in Python
- Begin thinking about Graph Traversal

Word Ladder

- Consider the following puzzle called a word ladder.
- Transform the word “FOOL” into the word “SAGE”.
- In a word ladder puzzle you must make the change occur gradually by changing one letter at a time.
- At each step you must transform one word into another word, you are not allowed to transform a word into a non-word.

Word Ladder

- FOOL
- POOL
- POLL
- POLE
- PALE
- SALE
- SAGE

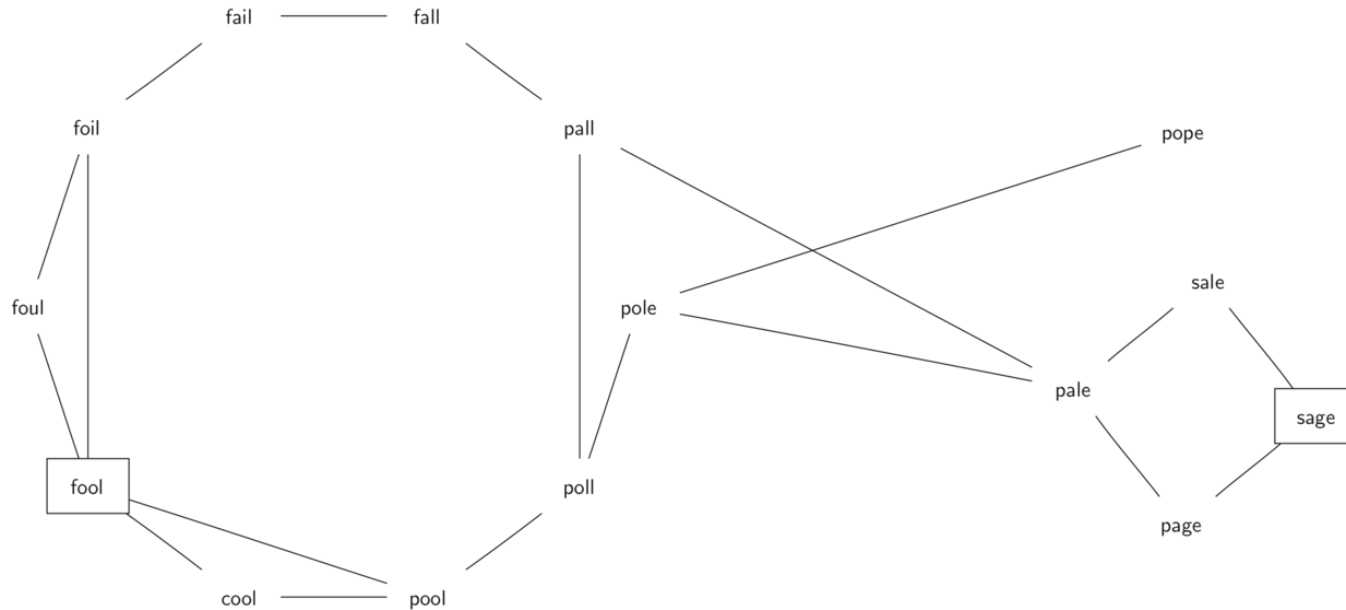
Word Ladder

- We can solve this problem using a graph algorithm.
 - Represent the relationships between the words as a graph.
 - Use the graph algorithm known as breadth first search to find an efficient path from the starting word to the ending word.

Word Ladder

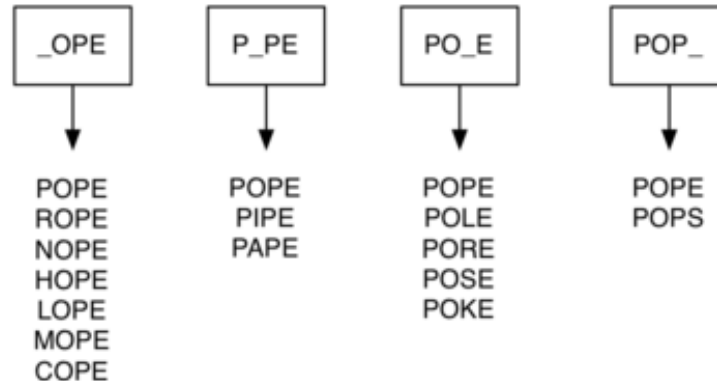
- Figure out how to turn a large collection of words into a graph.
- What we would like is to have an edge from one word to another if the two words are only different by a single letter.
- Then any path from one word to another is a solution to the word ladder puzzle.

Word Ladder



Word Ladder

- Suppose that we have a huge number of buckets, each of them with a four-letter word on the outside, except that one of the letters in the label has been replaced by an und



Word Ladder

- We can implement the scheme we have just described by using a dictionary.
- The labels on the buckets we have just described are the keys in our dictionary.
- The value stored for that key is a list of words.

Word Ladder

- Once we have the dictionary built we can create the graph.
- We start our graph by creating a vertex for each word in the graph.
- Then we create edges between all the vertices we find for words found under the same key in the dictionary.

Word Ladder

- Let's see the implementation in Python!