COL333:
Assignment1

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Report on Automatic Speech Recognition (ASR) Correction Algorithm

Introduction:

The ASR correction algorithm is designed to correct errors in speech recognition systems. The algorithm takes a phoneme table and vocabulary as input and outputs the corrected string.

Algorithm:

The algorithm used is a variant of the Hill Climbing search algorithm. Hill Climbing is a heuristic search algorithm that starts with an initial solution and iteratively applies small changes to find a better solution.

Why Hill Climbing?

Hill Climbing was chosen over other search algorithms like Beam Search for several reasons:

- Simplicity: Hill Climbing is a simple and intuitive algorithm, easy to implement and understand.
- Effectiveness: Hill Climbing is effective for finding local optima, which is sufficient for ASR correction.
- Flexibility: Hill Climbing allows for easy incorporation of domain-specific knowledge, such as phoneme tables and vocabulary.
- Computational Efficiency: Hill Climbing is computationally efficient, especially for smaller search spaces.

Why not Beam Search?

Beam Search was not chosen because:

- Complexity: Beam Search is more complex to implement and requires careful tuning of parameters.
- Computational Cost: Beam Search can be computationally expensive, especially for larger search spaces.
- Limited Improvement: Beam Search may not find significantly better solutions than Hill Climbing for ASR correction.

While adding words at start and end instead of O(n^2) algoritm checking all combination we took only O(n) algorithm that is we first iterate over the all the words adding it to the first one and then we will take best form here and then we iterate over all the words in vocabulary and add backwards to check the score again and ick best from it.

Conclusion:

The ASR correction algorithm using Hill Climbing has proven effective in correcting errors in speech recognition systems. Its simplicity, effectiveness, flexibility, and computational efficiency make it a suitable choice for this task. While Beam Search may be more effective in some cases, Hill Climbing provides a good balance of quality and efficiency for ASR correction.