



CPT212 – Design & Analysis of Algorithms
Semester 2, Academic Year 2023/2024

Assignment 2

Students' declaration:

We declare that we understand what is meant by plagiarism. This assignment is all our own work and we have acknowledged any use of the published or unpublished works of other people. We hold a copy of this assignment. We can produce if the original is lost or damaged.

Student Name	Signature

Lecturer has, and may exercise, the right NOT TO MARK this assignment if the above declaration has NOT BEEN SIGNED and if the above declaration is FOUND TO BE FALSE, appropriate action will be taken which would lead to ZERO marks being awarded for this assignment

This **GROUP** assignment shall contribute **15%** of the overall evaluation. For this assignment, each group is required to complete the following tasks in THREE (3) weeks.

Assignment instructions/background

The Boyer-Moore algorithm, developed by Robert S. Boyer and J Strother Moore in 1977, is a highly efficient string searching algorithm. It's a benchmark for practical string searching due to the clever approach that leverages information from the pattern itself to skip unnecessary comparisons during the search process.

Tasks:

- i. Briefly explain the concept of string matching and its applications.
- ii. Choose a programming language of your choice (e.g., Python, Java, C++) and implement the Boyer-Moore algorithm to search for a pattern within a given text. Analyse the results and discuss the strengths and weaknesses.
- iii. Include clear comments within your code to explain each step of the algorithm.
- iv. Select a variation of the Boyer-Moore algorithm (e.g., Boyer-Moore-Horspool algorithm, which uses a simplified bad character table).
- v. Briefly explain the key differences between the original Boyer-Moore and the chosen variation.
- vi. Briefly explain the Knuth-Morris-Pratt (KMP) algorithm (another string-matching algorithm).
- vii. Compare and contrast the Boyer-Moore algorithm with the KMP algorithm in terms of their time and space complexity, strengths, and weaknesses.
- viii. Discuss scenarios where one algorithm might be preferable over the other.

Document the tasks in a report.

Requirements:

Online Submission

- Upload the assignment to eLearning portal. Only one submission per group is required. The submission due date is **21st June 2024** (latest by 11.59 PM).

Report Format

- The FORMAT of the assignment should be Font Name/Size: Times New Roman, 12pt; Line spacing of 1.5; Justified (Alignment); Page Number should be typed.

Important Note

- Plagiarism is not tolerated. Materials taken directly from internet or other sources is not acceptable. You must show this is your own work, created using your own effort. For late submission, marks shall be deducted accordingly.

Group: (Max 4 persons). Everyone in the group must contribute.

Contribution: 15% of coursework.

Due date: 21st June 2024 (11.59pm)

Grading Rubric

Criteria	Poor (0-40%)	Average (40-60%)	Good (60-80%)	Excellent (80-100%)
String matching and its applications (5 marks)				
Implementation of Boyer-Moore algorithm. (10 marks)				
Discussions on the algorithm and code comments (10 marks)				
Discussions on the differences between Boyer-Moore and Boyer-Moore-Horspool (5 marks)				
Discussions on the differences between Boyer-Moore and Knuth-Morris-Pratt (KMP) algorithm (5 marks)				
Scenario Discussion and additional information. (5 marks)				
Total (/30)				
Total (/100)				