Tecnológico de Monterrey

ReflexActInt1_A01639373

Santiago Alonzo Aguilar A01639373

September 12, 2025

Analysis and Design of Advanced Algorithms

Gildardo Sanchez-Ante

Tecnológico de Monterrey

For this integrated activity we were tasked with analysing transmissions and finding malicious snippets of code inside of them. The malicious code was always a mirrored set of characters (palindrome) written in hexadecimal code. Due to the nature of the problem we set our sight on 2 algorithms.

KMP is a substring search algorithm with O(n) complexity, and Manacher is a palindrome-finding algorithm with O(n) complexity. While both are efficient our task requires detecting malicious codes that will always be palindromes. Using KMP would require running the algorithm separately for each malicious code in every transmission, being a total of 6 times for 3 malicious code in 2 transmissions. In contrast, Manacher allows us to compute all palindromes in a single pass, after which we can compare them against known malicious code lengths in semi constant time. This makes Manacher a more natural and efficient choice for our specific problem.

Our program could be used on real world applications such as malware detection for commonly known malicious patterns when scanning files or before executing them. Obviously on cybersecurity aspects, as what we were testing with were transmissions, analyzing flowing data packets for attacks.