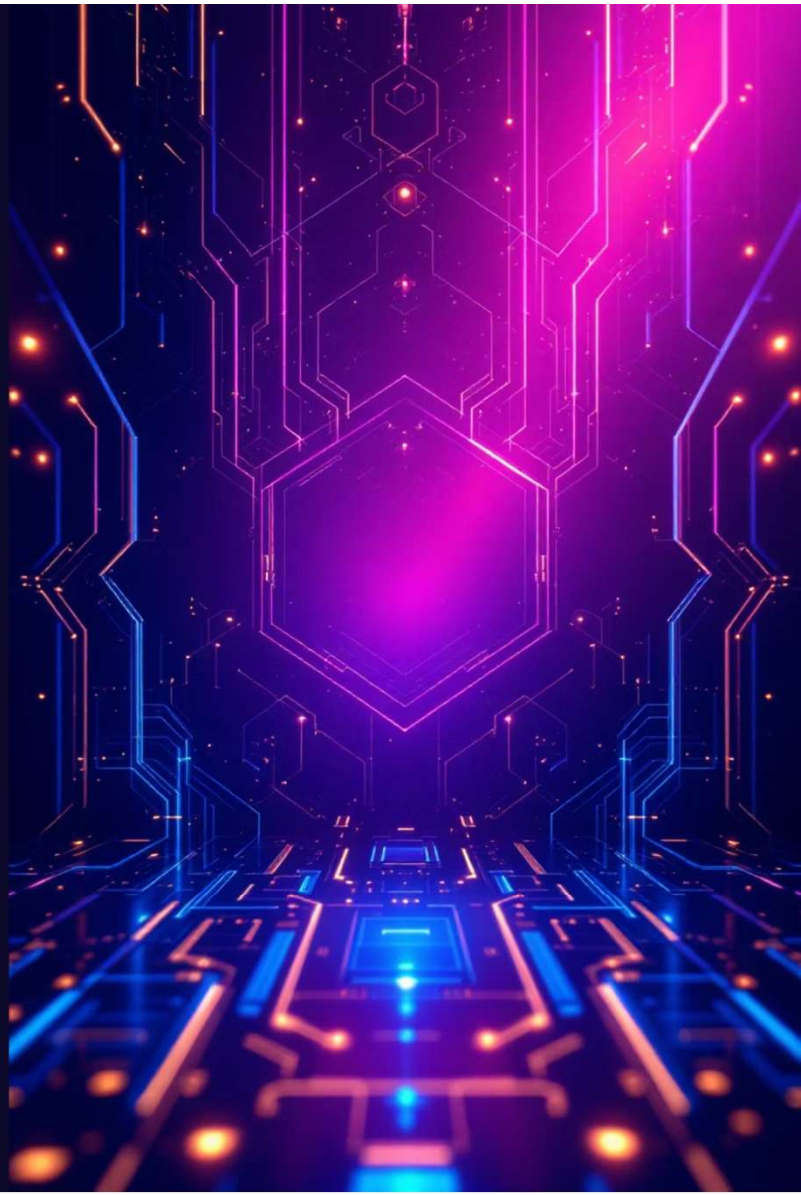
Palindromic String Analyzer

Project by ***Satyam Kumar***

Guided by Ms Naina Devi



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Understanding Palindromic Strings

What is a Palindrome?

A palindrome is a sequence that reads identically forwards and backwards, creating perfect symmetry in text patterns.

Classic Examples:

- "racecar" - same from both ends
- "level" - perfectly mirrored
- "madam" - symmetrical structure

Why It Matters

Our analyzer efficiently detects and counts palindromic substrings within any given text input.

Key Applications:

- Advanced text analysis and pattern recognition
- DNA sequencing in bioinformatics research
- Data validation and integrity verification

Tools & Technologies

GitHub

Version control integration for collaborative development and code management

C Programming

Efficient low-level implementation for performance-critical palindrome checking operations

Project Working: Core Logic Explained

Character Comparison

Compare characters from start and end positions, moving inward until meeting at center

Reverse Method

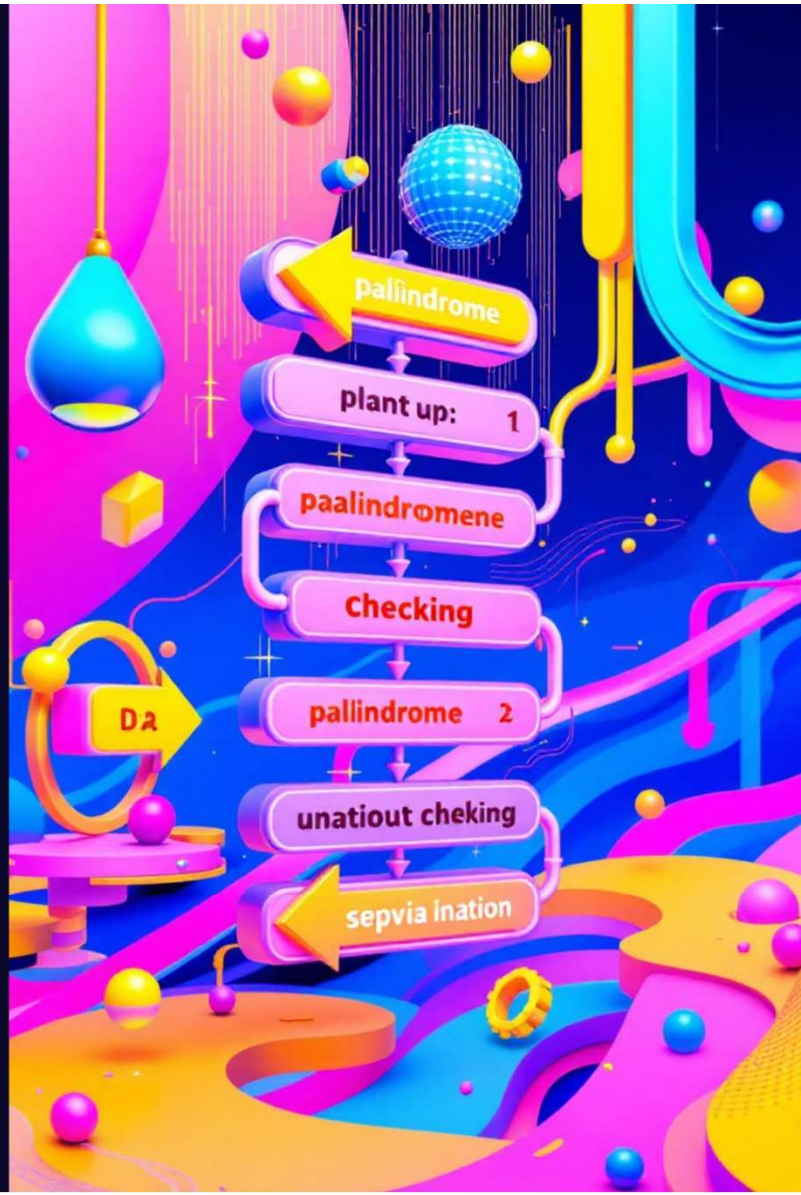
Use StringBuilder.reverse() to create reversed string and check equality ignoring case

Center Expansion

Efficient substring counting by expanding from each possible center point outward

Recursive Approach

Educational implementation demonstrating recursive problem-solving techniques



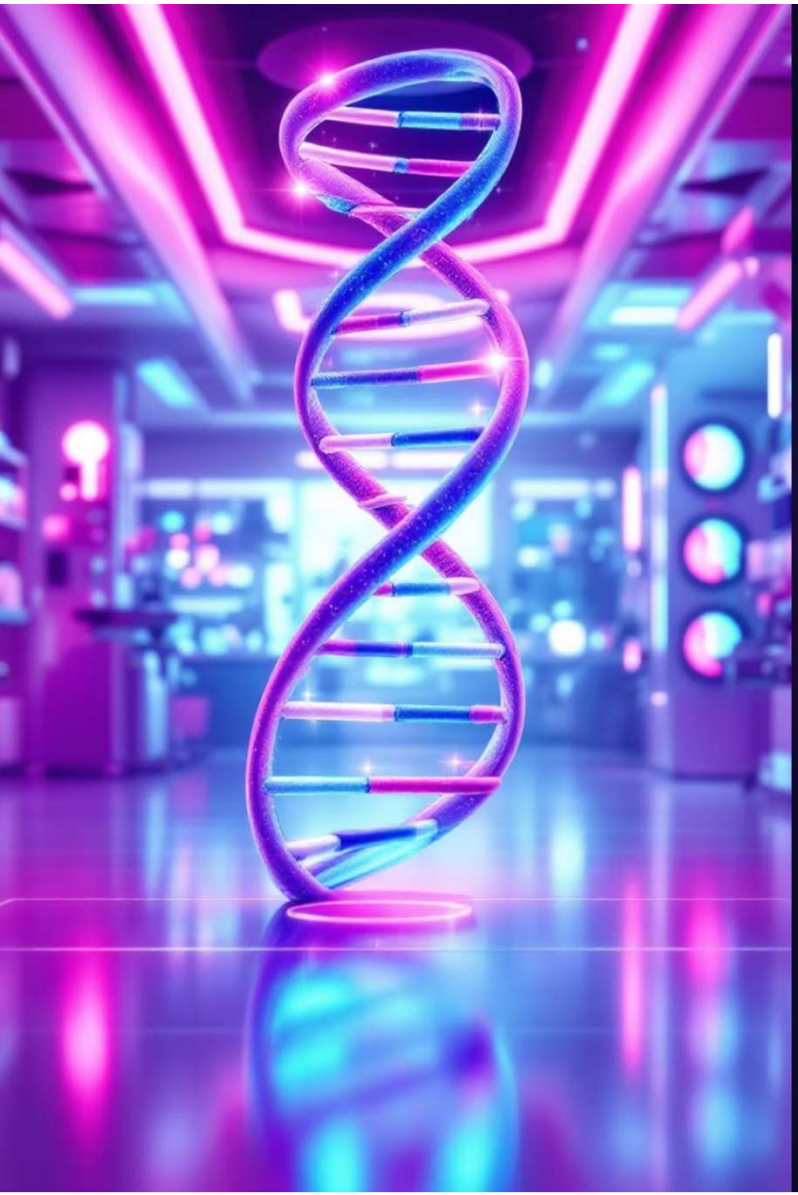
Screenshots

Satyam > C Palindrom_string_analizer.c > main()

```c
#include <stdio.h>
#include <string.h>

int main() {
    char str[100], rev[100];
    int i, len, flag = 1;

    printf("Enter a string: ");
    scanf("%s", str);

    len = strlen(str);

    // Reverse the string
    for (i = 0; i < len; i++) {
        rev[i] = str[len - i - 1];
    }
    rev[len] = '\0';

    // Check palindrome
    for (i = 0; i < len; i++) {
        if (str[i] != rev[i]) {
            flag = 0;
            break;
        }
    }

    // Output
    printf("\nOriginal String: %s", str);
    printf("\nReversed String: %s", rev);

    if (flag)
        printf("\nResult: The string is a Palindrome.");
    else
        printf("\nResult: The string is NOT a Palindrome.");

    return 0;
}
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
PS C:\Users\satya\OneDrive\Desktop\C project> cd "c:\Users\satya\O
if ($?) { .\Palindrom_string_analizer }
Enter a string: RADAR

Original String: RADAR
Reversed String: RADAR
Result: The string is a Palindrome.
PS C:\Users\satya\OneDrive\Desktop\C project\Satyam>
```



Applications of Palindromic String Analyzer

Bioinformatics Research

Detect palindromic DNA sequences that serve as genetic markers and restriction enzyme recognition sites crucial for molecular biology studies

Text Processing & Analysis

Identify symmetrical patterns in literature, poetry analysis, and cryptographic applications for pattern recognition and data security

Software Quality Assurance

Validate input strings and perform comprehensive data integrity checks as part of automated testing frameworks

Educational Tool

Demonstrate fundamental computer science concepts including recursion, string manipulation, and algorithmic thinking to students

Advantages of Our Approach

Dual Algorithm Support

Flexibility through both iterative and recursive methods, allowing developers to choose the most appropriate approach for their specific use case

User-Friendly Interface

Both CLI and GUI options available to accommodate diverse user preferences from developers to end-users

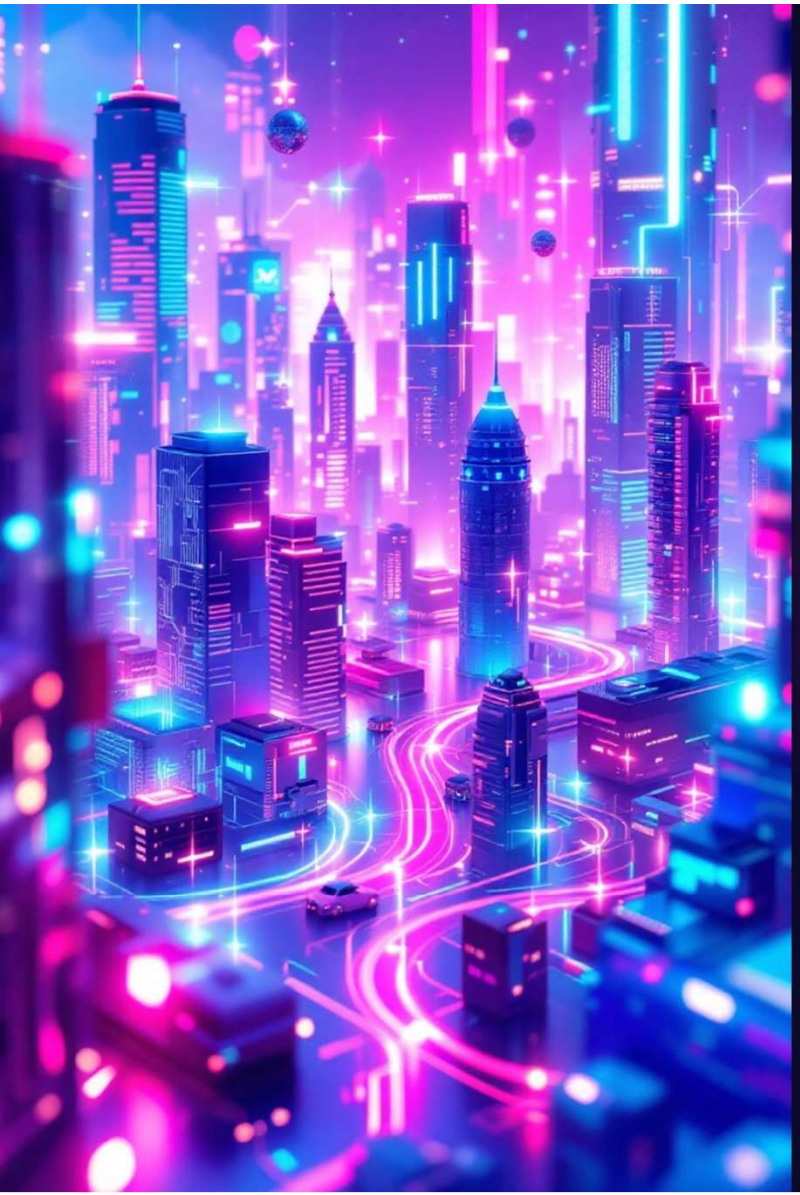
High Accuracy

Case-insensitive and punctuation-agnostic checks ensure reliable detection across varied input formats

Modular Design

Clean architecture allows seamless integration into larger systems and enterprise applications

> "The combination of multiple algorithmic approaches with flexible interface options makes this analyzer adaptable for both educational and production environments."



Future Scope & Enhancements

Multi-Language Support

Extend detection capabilities to Unicode characters, enabling palindrome analysis across international languages and scripts

Machine Learning Integration

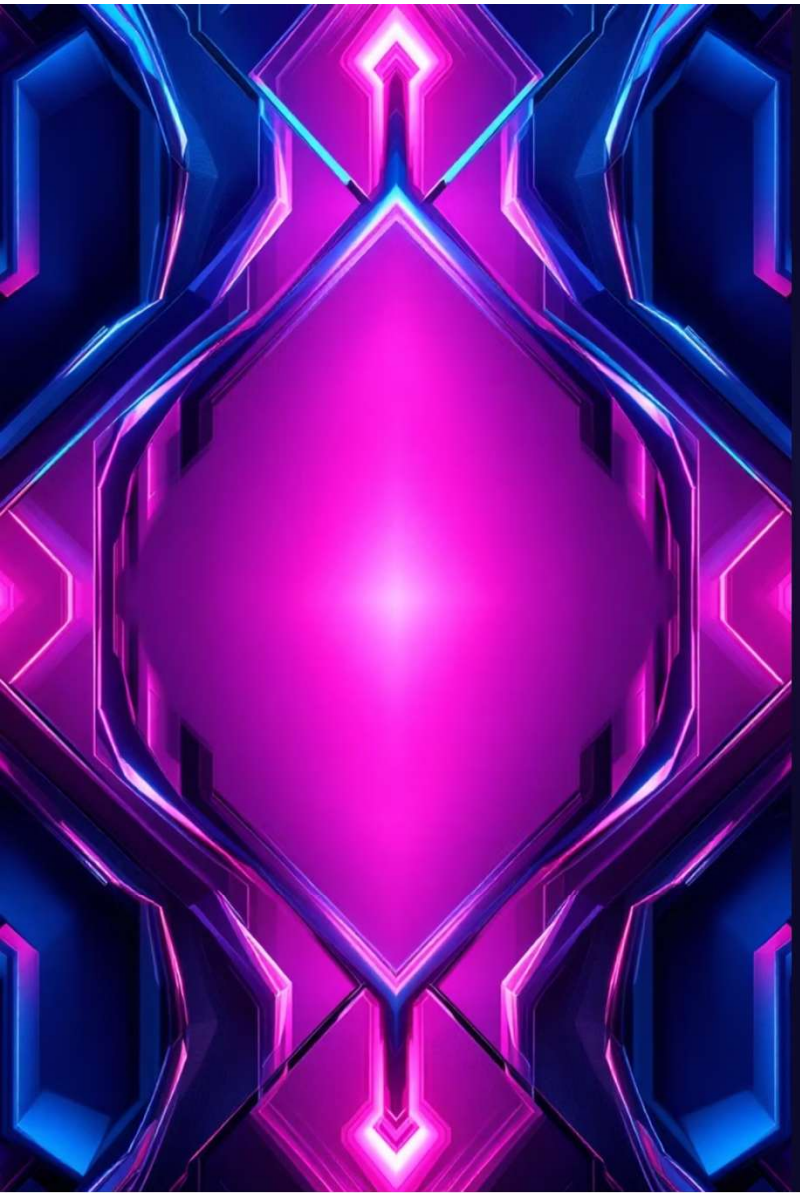
Implement predictive models to assess palindrome likelihood in large text corpora and optimize search algorithms

Interactive Visualization

Develop a web-based dashboard with real-time visual representations and interactive palindrome exploration tools

Big Data Optimization

Implement parallel processing and cloud deployment for analyzing massive datasets with enhanced performance



Thank You!

Project Developer

Satyam Kumar

Project Guide

Ms. Naina Devi