

Tugas Bonus IF2211 Strategi Algoritma
Penyelesaian Travelling Salesman Problem Menggunakan Rust
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Disusun oleh

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BAB I : Source Code

```
1 use std::cmp;
2 use std::fs::File;
3 use std::io::{self, BufRead};
4 use std::path::Path;
5
6 // Fungsi untuk membaca matriks dari file
7 fn read_file(filename: &str) -> io::Result<Vec<Vec<i32>>> {
8     let path = Path::new(filename); // Buat path dari nama file
9     let file = File::open(&path)?; // Buka file, jika gagal return error
10    let mut matrix = Vec::new(); // Inisialisasi matriks sebagai vector
11
12    // Baca file baris demi baris
13    for line in io::BufReader::new(file).lines() {
14        let line = line?;
15        let row: Vec<i32> = line
16            .split_whitespace()
17            .map(|s| s.parse().expect("Failed to parse"))
18            .collect();
19        matrix.push(row);
20    }
21    Ok(matrix)
22 }
23
24 // Fungsi untuk menyelesaikan masalah TSP
25 fn tsp(
26     mark: usize,
27     position: usize,
28     n: usize,
29     distan: &Vec<Vec<i32>>,
30     dp: &mut Vec<Vec<i32>>,
31 ) -> i32 {
32     let completed_visit = (1 << n) - 1;
33     if mark == completed_visit {
34         return distan[position][0]; // Jika semua kota sudah dikunjungi, kembali ke kota awal
35     }
36     if dp[mark][position] != -1 {
37         return dp[mark][position]; // Jika sudah dihitung sebelumnya, gunakan nilai yang sudah ada
38     }
39     let mut answer = i32::MAX; // Inisialisasi jawaban dengan nilai maksimum
40     for city in 0..n {
41         // Hitung jarak baru dan rekursif untuk mencari jarak minimal
42         if (mark & (1 << city)) == 0 {
43             let new_answer = distan[position][city] + tsp(mark | (1 << city), city, n, distan, dp);
44             answer = cmp::min(answer, new_answer);
45         }
46     }
47     dp[mark][position] = answer;
48     answer
49 }
50
51 fn main() {
52     // Meminta input nama file dari user
53     println!("Masukkan path file dari graf: ");
54     let mut filename = String::new();
55     io::stdin()
56         .read_line(&mut filename)
57         .expect("Gagal membaca input");
58     let filename = filename.trim();
59
60     let distan = read_file(filename).expect("Gagal membaca file");
61
62     let n = distan.len();
63     let mut dp = vec![vec![-1; n]; 1 << n];
64
65     let min_distance = tsp(1, 0, n, &distan, &mut dp);
66     println!("Jarak minimum: {}", min_distance);
67 }
68
```

BAB II : Test Case

1	
Input	 <pre> 1 0 10 15 20 2 5 0 9 10 3 6 13 0 12 4 8 8 9 0 </pre>
Output	 <pre> (rvans@Shafiq)-[/mnt/c/Users/Shafi/Documents/Works/Informatika/Semester 4/Stima/Tucil 4/Tugas Mini] \$ cargo run Compiling hello_world v0.1.0 (/mnt/c/Users/Shafi/Documents/Works/Informatika/Semester 4/Stima/Tucil 4/Tugas Mini) Finished `dev` profile [unoptimized + debuginfo] target(s) in 1.77s Running `target/debug/hello_world` Masukkan path file dari graf: tc1.txt Jarak minimum: 35 </pre>

2	
Input	 <pre> 1 9999 20 30 10 11 2 15 9999 16 4 2 3 3 5 9999 2 4 4 19 6 18 9999 3 5 16 4 7 16 9999 </pre>
Output	 <pre> (rvans@Shafiq)-[/mnt/c/Users/Shafi/Documents/Works/Informatika/Semester 4/Stima/Tucil 4/Tugas Mini] \$ cargo run Finished `dev` profile [unoptimized + debuginfo] target(s) in 0.03s Running `target/debug/hello_world` Masukkan path file dari graf: tc2.txt Jarak minimum: 28 </pre>

3	
Input	 <pre> 1 9999 20 30 10 11 2 15 9999 16 4 2 3 3 5 9999 2 4 4 19 6 18 9999 3 5 16 4 7 16 9999 </pre>
Output	 <pre> (rvans@Shafiq)-[/mnt/c/Users/Shafi/Documents/Works/Informatika/Semester 4/Stima/Tucil 4/Tugas Mini] \$ cargo run Finished `dev` profile [unoptimized + debuginfo] target(s) in 0.03s Running `target/debug/hello_world` Masukkan path file dari graf: tc3.txt Jarak minimum: 63 </pre>

BAB III : Lampiran

- https://github.com/shafiqIrv/Tumin1_13522003