Practical 2

#include <stdio.h>

#include <stdlib.h>

#include <stdbool.h>

#define MAX\_STATES 100

#define MAX\_SYMBOLS 100

void finite\_automata() {

int num\_inputs, num\_states, initial\_state, num\_accepting\_states;

int accepting\_states[MAX\_STATES];

char input\_symbols[MAX\_SYMBOLS];

int transition\_table[MAX\_STATES][MAX\_SYMBOLS];

char input\_string[100];

printf("Finite Automata Setup\n");

// Step 1: Take inputs

printf("Number of input symbols: ");

scanf("%d", &num\_inputs);

printf("Enter the input symbols (space-separated): ");

for (int i = 0; i < num\_inputs; i++) {

scanf(" %c", &input\_symbols[i]);

}

printf("Number of states: ");

scanf("%d", &num\_states);

printf("Initial state: ");

scanf("%d", &initial\_state);

printf("Number of accepting states: ");

scanf("%d", &num\_accepting\_states);

printf("Enter the accepting states (space-separated): ");

for (int i = 0; i < num\_accepting\_states; i++) {

scanf("%d", &accepting\_states[i]);

}

printf("\nEnter the transition table:\n");

for (int i = 1; i <= num\_states; i++) {

for (int j = 0; j < num\_inputs; j++) {

printf("State %d on input '%c' transitions to: ", i, input\_symbols[j]);

scanf("%d", &transition\_table[i][j]);

}

}

while (1) {

printf("\nEnter input string: ");

scanf("%s", input\_string);

int current\_state = initial\_state;

bool valid = true;

// Step 3: Traverse the automaton

for (int i = 0; input\_string[i] != '\0'; i++) {

char input\_char = input\_string[i];

int symbol\_index = -1;

// Find the symbol index

for (int j = 0; j < num\_inputs; j++) {

if (input\_symbols[j] == input\_char) {

symbol\_index = j;

break;

}

}

if (symbol\_index == -1) {

printf("Invalid symbol '%c' in input string.\n", input\_char);

valid = false;

break;

}

current\_state = transition\_table[current\_state][symbol\_index];

}

if (valid) {

bool accepted = false;

for (int i = 0; i < num\_accepting\_states; i++) {

if (current\_state == accepting\_states[i]) {

accepted = true;

break;

}

}

if (accepted) {

printf("\nInput string is ACCEPTED by the finite automaton.\n");

} else {

printf("\nInput string is REJECTED by the finite automaton.\n");

}

}

printf("\nDo you want to test another string? Press 1 for Yes or 0 for Exit: ");

int choice;

scanf("%d", &choice);

if (choice != 1) {

printf("Exiting...\n");

break;

}

}

}

int main() {

finite\_automata();

return 0;

}