A SYNOPSIS REPORT

ON NUMBER SHIFTING GAME USING C- LANGUAGE

Submitted in partial fulfillment of the requirements for the mini project of the degree of

BACHELORS OF TECHNOLOGY

in

COMPUTER SCEINCE & ENGINEERING

UNDER THE GUIDENCE OF :

Mr. Gyanendra Kumar Hansh
(Project Guide)

Assistant Professor

SUBMITTED BY :

Rohit Patwa (2203610100136)
Pawan Prajapati (2203610100113)
Khushi Agarwal(2203610100086)
Saniya Bano (2203610100142)

R.R. INSTITUTE OF MODERN TECHNOLOGY

DEPARTMANT OF COMPUTER SCEINCE & ENGINEERING

LUCKNOW, UTTAR PRADESH

CERTIFICATE

This is certified that the project entitled

"NUMBER SHIFTING GAME USING C- LANGUAGE" is submitted by the group members named < Rohit Patwa, Pawan Prajapati, Khushi Agrawal, Saniya Bano > in the partial fulfillment of the requirement for the award of the degree of B.tech in Computer Science and Engineering of AKTU, is a record student 'own work carried under our supervision and guidance'. The project report embodies result of original work and studies out by student and the content do not form the basis for the award of any other degree to the candidate or to anybody else.

Mr. Gyanendra Kumar Hansh
(Project Guide)
Assistant Professor

Mrs. Neha Singh
(Head Of department)
(Department Of CSE)

ACKNOWLEDGEMENT

We would like to thanks our Project Guide Mr. Gyanendra Kumar Hansh and our HOD, Ms. Neha Singh for their support and guidance in completing our project on the topic NUMBER SHIFTING GAME USING-C LANGUAGE . It was a great learning experience.

I would like to thank my dear group members who have made their best efforts to make this project successful. At last, I would like to extend my heartfelt thanks to my parents because without their help this project would not have been successful.

Rohit Patwa (2203610100136)
Pawan Prajapati (2203610100113)
Khushi Agrawal (2203610100086)
Saniya Bano (2203610100142)

DECLARATION

We hereby declare that we are student of B.tech in Computer Science and Engineering R.R. INSTITUTE OF MODERN TECNOLOGY, LUCKNOW. We are working on project under the guidance of Mr. Gyanendra Kumar Hansh. Further, this work has been submitted in full to obtain degree of B.tech that the studies described in the report entitled "NUMBER SHIFTING GAME USING C LANGUAGE" in subject CSE is carried out by us.

Rohit Patwa (2203610100136)
Pawan Prajapati (2203610100113)
Khushi Agarwal (2203610100086)
Saniya Bano (2203610100142)

Table Of Content

Abstract

The Matrix Puzzle Game represents an innovative and engaging approach to interactive entertainment, blending cognitive stimulation with a classic number-shifting puzzle. Developed as a console-based mini project using the C programming language, this game challenges players to rearrange numbers within a 4x4 matrix in ascending order, employing strategic moves and logical thinking. The abstract delves into the game's design, objectives, features, and the educational benefits it offers to players of all ages.

This project aims to create a dynamic and entertaining experience by harnessing the power of C programming and leveraging fundamental game development concepts. The Matrix Puzzle Game revolves around a 4x4 matrix containing numbers randomly arranged from 1 to 15, with one empty slot that allows players to shift numbers into it. The game utilizes the Fisher-Yates shuffle algorithm for generating diverse puzzles, ensuring that each gaming session provides a unique challenge.

The primary objective of the Matrix Puzzle Game is to engage players in a mentally stimulating activity that fosters problem-solving skills, spatial awareness, and critical thinking. The game is designed to be accessible to individuals of all ages, offering a blend of entertainment and educational value. Through a combination of user-friendly controls, interactive game rules, and engaging visuals, the Matrix Puzzle Game aims to create a memorable gaming experience.

The key features of the Matrix Puzzle Game contribute to its uniqueness and appeal. The dynamic matrix generation ensures that players face different puzzles in each gameplay session, preventing monotony and promoting replayability. User input handling is efficient and intuitive, allowing players to interact seamlessly with the game using arrow keys. The integration of ASCII art and alert sounds enhances the game's aesthetics and provides auditory feedback for each move, enriching the overall gaming experience.

One notable feature is the inclusion of a guessing component, where players predict the number of moves they will take to solve the puzzle. This adds an element of strategy to the game, encouraging players to think ahead and plan their moves. The interactive game rules presented at the beginning of each session provide a comprehensive understanding of the gameplay, controls, and winning conditions, ensuring that players can jump into the game with ease.

The benefits of playing the Matrix Puzzle Game extend beyond mere entertainment. The cognitive stimulation offered by the game contributes to the development of crucial skills such as problem-solving, critical thinking, and spatial reasoning. By challenging players to arrange numbers in a specific order, the game exercises their mental faculties and promotes a strategic approach to puzzle-solving. The educational value of the Matrix Puzzle Game positions it as a versatile tool for enhancing cognitive development.

The source code for the Matrix Puzzle Game is written in the C programming language, emphasizing modularity and efficiency. The code is organized into functions, each serving a specific purpose, promoting readability, maintainability, and future development. The use of the Fisher-Yates shuffle algorithm showcases a thoughtful approach to puzzle generation, ensuring randomness and diversity in each game session.

While the Matrix Puzzle Game boasts several advantages, it is essential to acknowledge some limitations. The console-based design restricts the inclusion of high-quality graphics, limiting the visual appeal compared to graphical games. Additionally, the current version operates as a single-player experience, lacking multiplayer options. These limitations, however, do not diminish the game's fundamental strengths in providing an engaging and educational experience.

In conclusion, the Matrix Puzzle Game stands as a testament to the fusion of entertainment and education within the realm of game development. Through the use of the C programming language, dynamic matrix generation, and interactive features, this mini project succeeds in creating a captivating and mentally stimulating experience. The game's design considerations, user-friendly interface, and emphasis on cognitive development position it as a valuable addition to college coursework, offering a practical exploration of programming concepts and game development principles.

Introduction

In the realm of interactive entertainment and game development, the Matrix Puzzle Game emerges as a unique and engaging endeavor, designed to captivate players while simultaneously challenging their cognitive prowess. Developed using the C programming language, this console-based mini project introduces a classic number-shifting puzzle within a 4x4 matrix, where players navigate through strategic moves and logical thinking to arrange numbers in ascending order. This introduction delves into the motivation behind the project, its significance, the intricacies of the game, and the overarching educational and entertainment goals.

2.1 Significance:

The significance of the Matrix Puzzle Game lies in its potential to cater to a diverse audience, from gaming enthusiasts seeking a mental challenge to individuals looking for a pastime that combines entertainment with cognitive benefits. The game's console-based design is intentional, providing a minimalist yet effective platform that allows players to focus on the essence of the puzzle-solving experience. This project serves as a testament to the idea that simplicity can be profoundly engaging and intellectually rewarding.

Moreover, the Matrix Puzzle Game aligns with the broader shift towards gamified learning experiences. By challenging players to arrange numbers strategically, the game contributes to the development of critical skills such as problem-solving, logical thinking, and spatial reasoning. The decision to create a puzzle-solving game is rooted in the understanding that games can be powerful tools for education, offering a dynamic and interactive medium to stimulate the mind.

2.2 Educational and Entertainment Goals:

At its core, the Matrix Puzzle Game seeks to achieve a delicate balance between education and entertainment. On the educational front, the game serves as a cognitive workout, challenging players to think strategically and logically. The emphasis on spatial awareness and problem-solving aligns with the broader goals of gamified learning, where the boundaries between education and entertainment blur to create a holistic and engaging experience.

In terms of entertainment, the Matrix Puzzle Game offers a nostalgic journey for those who appreciate classic puzzles. The dynamic matrix generation ensures that each gameplay session presents a fresh challenge, preventing monotony and promoting replayability. The integration of user-friendly controls, interactive game rules, and a guessing feature adds layers of enjoyment, making the game accessible and appealing to players of varying skill levels.

What is Number Shifting Game ?

The Number Shifting Game is a captivating and intellectually stimulating puzzle designed to challenge players' problem-solving skills. Presented as a 4x4 matrix with numbers randomly arranged from 1 to 15 and an empty slot, the game's objective is to rearrange the numbers in ascending order. Players achieve this by strategically shifting numbers into the empty slot using arrow keys.

The game employs the Fisher-Yates shuffle algorithm for dynamic matrix generation, ensuring a unique puzzle in each session. With a console-based interface, ASCII art, and alert sounds, the Number Shifting Game provides an engaging visual and auditory experience. Its simplicity and focus on logical thinking make it accessible to players of all ages, offering a nostalgic yet intellectually rewarding gaming journey.

The game's significance lies in its ability to blend entertainment with cognitive development, fostering skills such as critical thinking and spatial awareness in an interactive and enjoyable manner.

How it Works ?

The Number Shifting Game operates as a classic yet dynamic puzzle designed to engage players in a stimulating intellectual challenge. The game, implemented in the C programming language, revolves around a 4x4 matrix initially populated with numbers randomly arranged from 1 to 15, leaving one slot vacant for maneuvering. The underlying algorithm that orchestrates the puzzle's generation and manipulation is the well-known Fisher-Yates shuffle.

Upon initiation, the game employs the Fisher-Yates shuffle algorithm to dynamically generate a diverse and unpredictable matrix arrangement. This ensures that each gaming session presents players with a unique puzzle, preventing repetition and enhancing the game's replayability. The algorithm achieves this by iteratively selecting a random element from the remaining unshuffled numbers and swapping it with the last unprocessed element. The result is a matrix with a random distribution of numbers, challenging players to solve different puzzles in each attempt.

The game's interface, presented in the console, provides a minimalist yet effective platform for players to interact with the matrix. Utilizing the C programming language's capabilities, the game incorporates ASCII art and alert sounds to enhance the visual and auditory aspects of the gaming experience. These elements contribute to creating an engaging and immersive environment that transcends the simplicity of the console interface.

The core mechanics of the game involve players using arrow keys to shift numbers within the matrix. The objective is to strategically move numbers into the empty slot, progressively arranging them in ascending order. This simple yet challenging gameplay mechanic requires players to think critically, plan their moves, and consider the spatial relationships between the numbers in the matrix.

The game's logic is grounded in the swap function, a fundamental component of the number-shifting process. This function efficiently swaps the positions of two numbers within the matrix, allowing players to maneuver the numbers toward the desired arrangement. The swap function is essential to the game's flow, enabling players to make precise and strategic moves as they work towards solving the puzzle.

User input handling is another critical aspect of how the game operates. The C programming language is leveraged to efficiently capture user input, particularly arrow keys, distinguishing them from regular characters. This ensures a seamless and intuitive interaction with the game, as players navigate through the matrix with ease.

The algorithmic complexity of the Fisher-Yates shuffle, coupled with the strategic depth of the number-shifting mechanics, contributes to the game's educational value. As players engage in the puzzle-solving process, they exercise cognitive skills such as critical thinking, problem-solving, and spatial awareness. The game serves as an interactive tool for intellectual stimulation, making it not only an entertaining pastime but also a valuable resource for cognitive development.

In essence, the Number Shifting Game encapsulates a synergy of programming logic, algorithmic complexity, and cognitive engagement. Through its dynamic matrix generation, interactive user interface, and strategic gameplay, the game stands as a testament to the potential of simplicity in delivering a rich and intellectually rewarding gaming experience.

Who Can Play Number Shifting Game ?

The Number Shifting Game is designed to cater to a diverse audience, welcoming individuals of all ages and skill levels. Its accessible yet intellectually stimulating nature makes it an ideal pastime for anyone seeking a blend of entertainment and mental challenge. Whether you are a seasoned gamer looking for a nostalgic puzzle-solving experience or someone new to the world of interactive entertainment, the game provides an inclusive and engaging platform.

For children and adolescents, the Number Shifting Game offers an educational journey disguised as play. It serves as an effective tool for developing critical cognitive skills such as problem-solving, logical thinking, and spatial awareness. Parents and educators can appreciate its ability to engage young minds in a playful manner while fostering intellectual growth.

For adults, the game provides a refreshing break from daily routines, offering a mentally stimulating escape. Whether you have a penchant for puzzles or simply enjoy strategic challenges, the Number Shifting Game provides a satisfying experience. Its minimalist design and straightforward mechanics make it accessible to players with varying levels of gaming expertise, making it a versatile and inclusive source of entertainment.

Importance

The Number Shifting Game holds paramount importance as it encapsulates a multifaceted approach to entertainment and intellectual stimulation. In an era dominated by visually intensive and graphically rich games, this classic yet dynamic puzzle game brings forth several key facets of significance.

Firstly, the game contributes to cognitive development, serving as a valuable educational tool. Through its strategic gameplay and emphasis on problem-solving, the Number Shifting Game engages players in a mental exercise that stimulates critical thinking and spatial awareness. This cognitive engagement is particularly crucial for children and adolescents, aiding in the development of essential skills that extend beyond the gaming environment.

Secondly, the game offers a unique blend of simplicity and complexity, making it accessible to a wide audience. Its minimalist design and user-friendly controls make it an ideal choice for individuals who may not be avid gamers but seek an intellectually stimulating and enjoyable experience. The Number Shifting Game, therefore, bridges the gap between gaming enthusiasts and casual players, creating an inclusive space for entertainment.

Furthermore, the game's significance lies in its ability to provide a nostalgic journey for those who appreciate classic puzzles. In a world dominated by advanced gaming technologies, the Number Shifting Game offers a return to the fundamental pleasures of puzzles and brainteasers. This nostalgic value adds an extra layer of appeal, attracting individuals who seek the simplicity and charm of traditional games.

Moreover, the project holds relevance within the educational landscape, showcasing the practical application of programming concepts. By implementing the Fisher-Yates shuffle algorithm and user input handling, the Number Shifting Game serves as an illustrative example for students learning programming languages, demonstrating how theoretical knowledge can be transformed into a tangible, interactive product.

In conclusion, the importance of the Number Shifting Game lies in its ability to cater to a broad spectrum of players, fostering cognitive development, providing nostalgic enjoyment, and serving as an educational showcase. By intertwining simplicity with intellectual challenge, this game stands as a testament to the enduring appeal of classic puzzles and their potential to transcend generational boundaries.

Objective

The primary objective of the Number Shifting Game is to provide an engaging and intellectually stimulating gaming experience that caters to a diverse audience. The project seeks to blend entertainment with education, offering players a classic yet dynamic puzzle-solving challenge.

One of the key objectives is to create a game accessible to individuals of all ages, transcending the barriers often associated with complex or visually intense games. The Number Shifting Game aims to be a user-friendly and inclusive platform, welcoming both seasoned gamers and those new to interactive entertainment. Through its minimalist design and straightforward mechanics, the game intends to make puzzle-solving enjoyable and approachable.

Another crucial objective is to contribute to cognitive development, particularly in children and adolescents. By incorporating strategic gameplay, logical thinking, and spatial awareness, the game serves as an educational tool. The objective is to engage players in a mental exercise that stimulates critical thinking, problem-solving skills, and enhances overall cognitive abilities.

Additionally, the project aims to showcase the practical application of programming concepts. By implementing the Fisher-Yates shuffle algorithm for dynamic matrix generation and efficient user input handling, the Number Shifting Game serves as a demonstrative example for students learning programming languages. The objective is to illustrate how theoretical knowledge in programming can be translated into a tangible and interactive product.

The overarching goal is to create a game that not only entertains but also enriches the player's cognitive skills. Through a carefully crafted balance of simplicity, nostalgia, and intellectual challenge, the Number Shifting Game strives to deliver an experience that goes beyond mere recreation, contributing positively to the player's mental engagement and growth.

Features

8.1 Dynamic Matrix Generation:

- The game dynamically generates a 4x4 matrix with numbers randomly arranged from 1 to 15 using the Fisher-Yates shuffle algorithm.
- Ensures a diverse and unique puzzle in each gaming session.

8.2 User-Friendly Interface:

- The console-based interface is designed for simplicity and ease of navigation.
- Provides a minimalist yet effective platform for players to interact with the game.

8.3 ASCII Art and Animation:

- Integrates ASCII art to enhance the visual appeal of the console-based game.
- Utilizes alert sounds for auditory feedback, creating an engaging and immersive environment.

8.4 Strategic Gameplay:

- Players use arrow keys to shift numbers within the matrix, aiming to arrange them in ascending order.
- Requires critical thinking, spatial awareness, and strategic planning.

8.5 Guessing Feature:

- Players have the option to make predictions about the number of moves they will take to solve the puzzle.
- Adds an element of strategy and prediction to the gaming experience.

8.6 Interactive Game Rules:

- Presents detailed instructions about game rules, controls, and winning conditions at the beginning of each session.
- Enhances player understanding and provides a smooth entry into the game.

8.7 Educational Value:

- Contributes to cognitive development by challenging players to exercise critical thinking and problem-solving skills.

- Serves as an interactive tool for intellectual stimulation, particularly for children and adolescents.

8.8 Source Code Organization:

- Written in the C programming language.

- Code is organized into functions for modularity, readability, and maintainability.

- Demonstrates practical application of programming concepts.

8.9 Nostalgic Appeal:

- Offers a nostalgic journey for players who appreciate classic puzzles.

- Balances modern programming techniques with the enduring charm of traditional games.

8.10 Inclusive Audience:

- Designed to cater to individuals of all ages and skill levels.

- Bridges the gap between gaming enthusiasts and casual players, providing an inclusive space for entertainment.

8.11 Balance of Complexity and Simplicity:

- Blends simplicity in design and mechanics with the complexity of strategic gameplay.

- Creates an intellectually rewarding gaming experience without overwhelming players.

8.12 Replayability:

- Dynamic matrix generation ensures that each gameplay session presents a fresh and challenging puzzle.

- Encourages players to revisit the game for continued enjoyment.

These features collectively contribute to the uniqueness and appeal of the Number Shifting Game, offering a well-rounded and engaging gaming experience.

Source Code

The source code for the Number Shifting Game is written in C programming language. It includes functions for matrix creation, display, user input handling, and game rules.

```c
#include <stdio.h>
#include <stdlib.h>
#include <math.h>
#include <time.h>
#include <string.h>
#include <windows.h>

#define ANSI_COLOR_RED "\x1b[31m"
#define ANSI_COLOR_GREEN "\x1b[32m"
#define ANSI_COLOR_YELLOW "\x1b[33m"
#define ANSI_COLOR_BLUE "\x1b[34m"
#define ANSI_COLOR_MAGENTA "\x1b[35m"
#define ANSI_COLOR_CYAN "\x1b[36m"
#define ANSI_COLOR_RESET "\x1b[0m"

// create matrix 4*4
void createMatrix(int arr[][4])
{
    int n = 15;
    int num[n], i, j;
    for (i = 0; i < 15; i++) // These 1-15 number will be in th matrix for cheak your arranged matrix
        num[i] = i + 1;

    srand(time(NULL)); // for random number generation

    int lastIndex = n - 1, index;

    for (i = 0; i < 4; i++)
        for (j = 0; j < 4; j++)
        {
            if (lastIndex >= 0)
            {
                index = rand() % (lastIndex + 1); // idea : performing % operation by (lastIndex+1)
                arr[i][j] = num[index];           // will give index , so put that num[index] number in matrix
                num[index] = num[lastIndex--];    // and replace last number with this indexed positioned number
            }                                     // and finally lastIndex--
        }
    arr[i - 1][j - 1] = 0; // last number is zero
```

```c
}

// showing matrix
void showMatrix(int arr[][4])
{
    int i, j;
    printf("--------------------\n");
    for (i = 0; i < 4; i++)
    {
        printf("|");
        for (j = 0; j < 4; j++)
        {
            if (arr[i][j] != 0)
                printf("%2d | ", arr[i][j]);
            else
                printf("   | ");
        }
        printf("\n");
    }

    printf("--------------------\n");
}

// winning check by this function
int winner(int arr[][4])
{
    int i, j, k = 1;
    for (i = 0; i < 4; i++)
    {
        for (j = 0; j < 4; j++, k++)
        {
            if (arr[i][j] != k && k != 16)
                break;
        }
        if (j < 4)
            break;
    }

    if (j < 4)
        return 0;
    return 1;
}

// swap function to swap two numbers
void swap(int *x, int *y)
{
    *x = *x + *y;
    *y = *x - *y;
    *x = *x - *y;
```

```
    printf("");
}

// Reads the user input character and return ascii value of that
int readEnteredKey()
{
    char c;
    c = getch();
    if (c == -32)
        c = getch();

    return c;
}

// shift up function
int shiftUp(int arr[][4])
{
    int i, j;
    for (i = 0; i < 4; i++)
    {
        for (j = 0; j < 4; j++)
            if (arr[i][j] == 0)
                break;
        if (j < 4)
            break;
    }
    if (i == 3) // shifting not possible
        return 0;

    // Successfully swapped two numbers !
    swap(&arr[i][j], &arr[i + 1][j]);
    return 1; // Success
}

int shiftDown(int arr[][4])
{
    int i, j;
    for (i = 0; i < 4; i++)
    {
        for (j = 0; j < 4; j++)
            if (arr[i][j] == 0)
                break;
        if (j < 4)
            break;
    }
    if (i == 0) // shifting not possible
        return 0;
    swap(&arr[i][j], &arr[i - 1][j]); // swap numbers
```

```
    return 1; // shift up success
}

int shiftRight(int arr[][4])
{
    int i, j;
    for (i = 0; i < 4; i++)
    {
        for (j = 0; j < 4; j++)
            if (arr[i][j] == 0)
                break;
        if (j < 4)
            break;
    }
    if (j == 0) // shifting not possible
        return 0;

    swap(&arr[i][j], &arr[i][j - 1]);

    return 1; // shift up success
}

int shiftLeft(int arr[][4])
{
    int i, j;
    for (i = 0; i < 4; i++)
    {
        for (j = 0; j < 4; j++)
            if (arr[i][j] == 0)
                break;
        if (j < 4)
            break;
    }

    if (j == 3) // shifting not possible
        return 0;

    swap(&arr[i][j], &arr[i][j + 1]);
    return 1; // shift up success
}

// Game rules
void gameRule(int arr[][4])
{
    system("cls");

    int i, j,  k = 1;

    printf("\t\t\t\t\t\t\t\t\t\t  MATRIX PUZZLE\n");
```

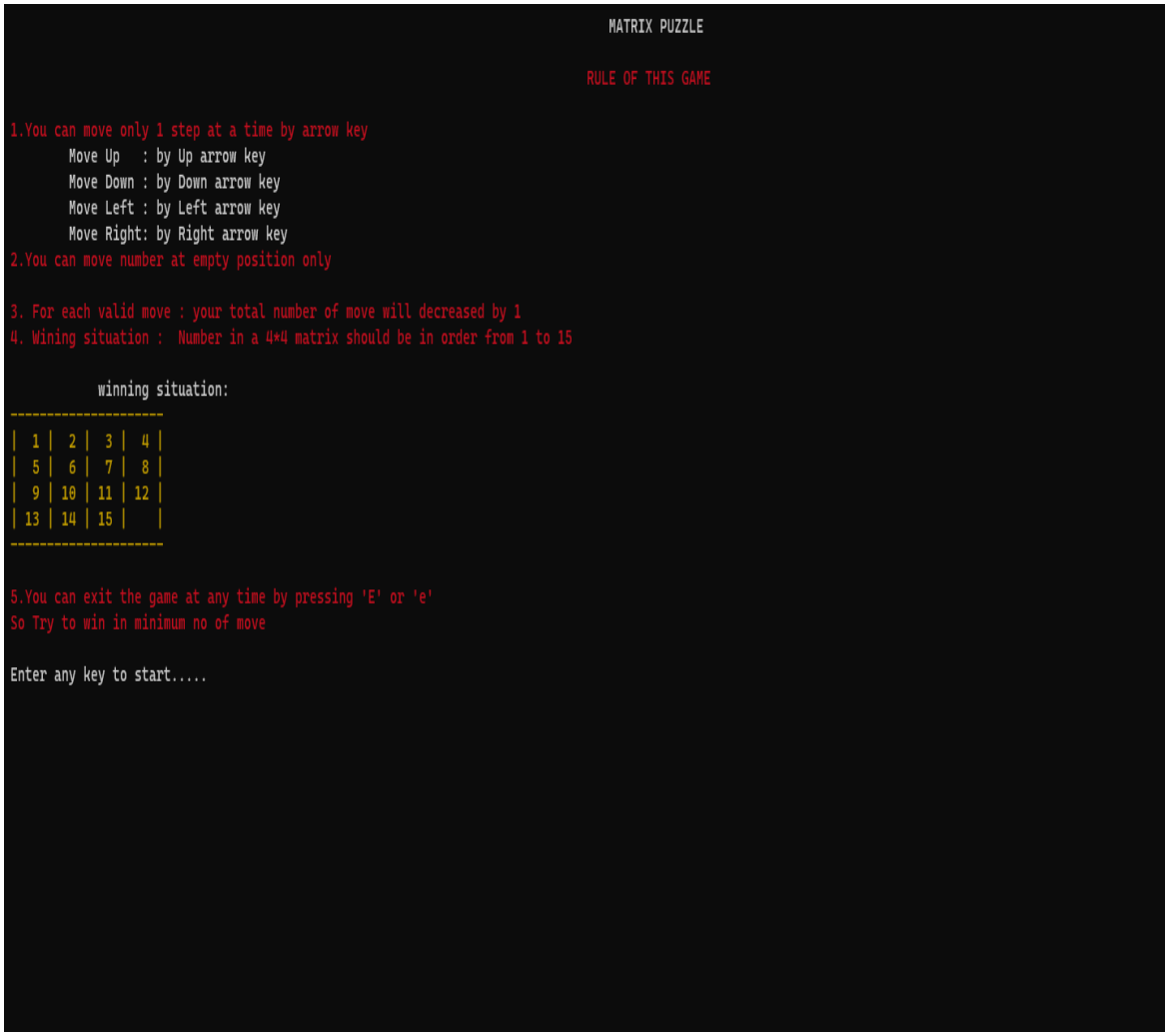
```
    printf("\n");
    printf(ANSI_COLOR_RED "\t\t\t\t\t\t\t\t              RULE OF THIS
GAME                \n" ANSI_COLOR_RESET);
    printf(ANSI_COLOR_RED "\n1.You can move only 1 step at a time by arrow
key " ANSI_COLOR_RESET);
    printf("\n\tMove Up   : by Up arrow key ");
    printf("\n\tMove Down : by Down arrow key");
    printf("\n\tMove Left : by Left arrow key");
    printf("\n\tMove Right: by Right arrow key");

    printf(ANSI_COLOR_RED "\n2.You can move number at empty position only
" ANSI_COLOR_RESET);
    printf("\n");
    printf(ANSI_COLOR_RED "\n3. For each valid move : your total number of
move will decreased by 1 \n" ANSI_COLOR_RESET);
    printf(ANSI_COLOR_RED "4. Wining situation : " ANSI_COLOR_RESET);
    printf(ANSI_COLOR_RED " Number in a 4*4 matrix should be in order from
1 to 15 " ANSI_COLOR_RESET);
    printf("\n\n            winning situation:         \n");

    printf(ANSI_COLOR_YELLOW "---------------------\n" ANSI_COLOR_RESET);

    for (i = 0; i < 4; i++)
    {
        printf(ANSI_COLOR_YELLOW "| " ANSI_COLOR_RESET);
        for (j = 0; j < 4; j++)
        {
            if (arr[i][j] != 0)
                printf(ANSI_COLOR_YELLOW "%2d | " ANSI_COLOR_RESET, 4 * i
+ j + 1);
            else
                printf(ANSI_COLOR_YELLOW "   |" ANSI_COLOR_RESET);
        }
        printf("\n");
    }

    printf(ANSI_COLOR_YELLOW "---------------------\n" ANSI_COLOR_RESET);
    printf(ANSI_COLOR_RED"\n5.You can exit the game at any time by
pressing 'E' or 'e' " ANSI_COLOR_RESET);

    printf(ANSI_COLOR_RED"\nSo Try to win in minimum no of move \n"
ANSI_COLOR_RESET);

    printf("\nEnter any key to start.....   ");

    int x = readEnteredKey();
}

// main function
```

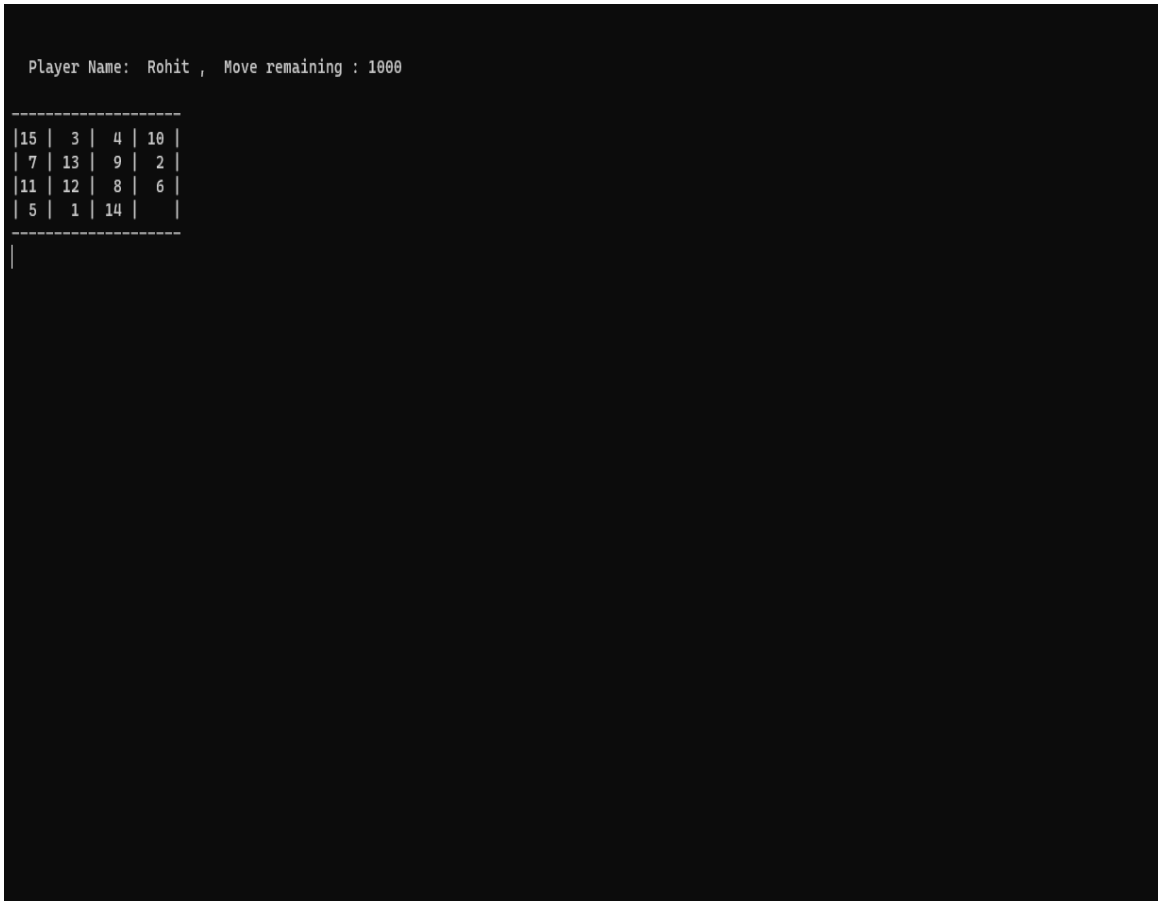
```c
int main()
{
    int arr[4][4];    // matrix
    int maxTry = 1000; // maximum move
    char name[20];
    for (int k = 0; k < 3; k++)
        printf("\n");
    printf("Player Name: ");
    scanf("%s", name);

    system("cls"); // to clear screen

    while (1)
    {
        createMatrix(arr); // calling function to create  matrix
        gameRule(arr);     // game rule function calling

        while (!winner(arr))  // checking for winning situation
        {
            system("cls");
            if (!maxTry) // for remaining zero move
                break;

            printf("\n\n  Player Name:  %s ,  Move remaining : %d \n\n",
name, maxTry);

            showMatrix(arr); // show matrix

            int key = readEnteredKey(); // this will return ascii code of
user entered key

            switch (key) // maping
            {
            case 101: // ascii of E

            case 69: // ascii of e
                printf("\a\a\a\a\a\a\n     Thanks for Playing ! \n\a");
                printf("\nHit 'Enter' to exit the game \n");
                key = readEnteredKey();
                return 0;

            case 72: // arrow up
                if (shiftUp(arr))
                    maxTry--;
                break;
            case 80: // arrow down
                if (shiftDown(arr))
                    maxTry--;
                break;
```

```
            case 77: // arrow  right
                if (shiftRight(arr))
                    maxTry--;
                break;
            case 75: // arrow left
                if (shiftLeft(arr))
                    maxTry--;
                break;
            default:

                printf("\n\n      \a\a Not Allowed \a");
            }

        }

        if (!maxTry)
            printf(ANSI_COLOR_RED "\n\a          YOU LOSE
!          \a\a\n" ANSI_COLOR_RESET);
        else
            printf(ANSI_COLOR_GREEN "\n\a!!!!!!!!!!!!!Congratulations  %s
for winning this game !!!!!!!!!!!!!\n\a" ANSI_COLOR_RESET, name);

        fflush(stdin); // Will clear the buffer
        char check;
        printf(ANSI_COLOR_GREEN "\nWant to play again ? \n"
ANSI_COLOR_RESET);
        printf("enter 'y' to play again:  ");
        scanf("%c", &check);

        // Leave the game here itself !
        if((check!='y')&&(check!="Y"))
        break;



        maxTry=1000;
    }
    return 0;
}
```

Snaps


Player Name:


MATRIX PUZZLE
RULE OF THIS GAME
1.You can move only 1 step at a time by arrow key
Move Up : by Up arrow key
Move Down : by Down arrow key
Move Left : by Left arrow key
Move Right: by Right arrow key
2.You can move number at empty position only
3. For each valid move : your total number of move will decreased by 1
4. Wining situation : Number in a 4*4 matrix should be in order from 1 to 15
winning situation:
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	
5.You can exit the game at any time by pressing 'E' or 'e'
So Try to win in minimum no of move
Enter any key to start.....


Player Name: Rohit , Move remaining : 1000
15	3	4	10
7	13	9	2
11	12	8	6
5	1	14	

\

Benefits of Number Shifting Game

1. Cognitive Stimulation: Challenges and stimulates cognitive skills.

2. Entertainment: Provides an enjoyable pastime for users of all ages.

3. Educational Value: Promotes logical thinking and strategic planning.

Advantages

1. Promotes Cognitive Skills: The game enhances problem-solving and critical thinking.

2. User-Friendly Interface: The console-based interface is accessible and easy to navigate.

3. Educational Value: Acts as an entertaining tool for promoting cognitive development.

Disadvantages

1. Limited Graphics: The console-based design restricts the inclusion of high-quality graphics.

2. Lack of Multiplayer: The game currently operates as a single-player experience without multiplayer options.

Conclusion

In conclusion, the Number Shifting Game implemented in C stands as a testament to the fusion of entertainment and cognitive development within the realm of puzzle-based games. Its simplicity in design belies its effectiveness in challenging and enhancing logical reasoning and problem-solving skills. As players engage in the strategic rearrangement of numbers within the 4x4 matrix, they inadvertently exercise critical cognitive functions such as memory, attention, and analytical thinking.

The game's significance extends beyond mere amusement, serving as a versatile tool accessible to individuals of all ages. While it may lack the sophisticated graphics and immersive experiences of contemporary video games, its charm lies in its accessibility and the mental stimulation it provides. The Number Shifting Game caters to a diverse audience, offering a valuable pastime that can be both relaxing and intellectually rewarding.

One notable advantage of the game is its adaptability to different skill levels. Whether played by students seeking a break from academic endeavors or professionals looking for a mental challenge, the game accommodates various levels of expertise. Its console-based nature ensures ease of access, requiring no advanced technology for an individual to enjoy the cognitive benefits it offers.

However, it is essential to acknowledge the limitations of the Number Shifting Game. Its simplicity, while advantageous for accessibility, may not appeal to those seeking more graphically immersive and complex gaming experiences. The absence of advanced visuals and intricate storylines may deter individuals accustomed to the sophistication of modern video games.

In summary, the Number Shifting Game, though humble in its design, contributes positively to the landscape of puzzle games. Its value lies in the balance it strikes between entertainment and cognitive development, making it a valuable addition to the gaming world. As we navigate the increasingly complex and visually-driven realm of digital entertainment, projects like the Number Shifting Game serve as a reminder that sometimes, the most straightforward experiences can offer profound benefits for the mind.

Reference

www.google.com