[Ravi Patel] Instructor: Dr. Hindo

[CPSC 230]

FINAL EXAM PART 2

//CPSC 230 RAVI PATEL - FINAL EXAM PART 2 QUESTION 2

//functions: encode, multiply, decode

#include <iostream>

using namespace std;

char A[4][2] = {{'R','e'},{'d',' '},{'R','u'},{'m','\0'}}; //original unencrypted matrix

int B[2][2] = {4,-2,-1,3}; //encoding or encryption matrix

float C[4][2]; //matrix containing encrypted data

float Binverse[2][2] = {(3.00/10.00), (1.00/5.00), (1.00/10.00), (2.00/5.00)}; //inverse matrix B

float x[4][2]; //x is the decoded message

void encode(char a[4][2]); //function to encode unencrypted matrix

void multiply(int a[4][2], int b[2][2]); //function to multiply data by encoding matrix

void decode(float c[4][2], float b[2][2]); //function to multiply encrypted matrix by inverse

void encode(char a[4][2])

{

for (int i=0; i<4; i++) //columns

{

for(int j=0; j<2; j++) //rows

a[i][j] = (int)a[i][j]; //assign a[i][j] the ASCII of text A

}

cout << "Unencrypted Data Matrix: \n";

for (int i = 0; i < 4; ++i) //for the 4\*2 array of a, print out each value

{

for (int j = 0; j < 2; ++j) //for the rows

cout << (int)a[i][j] << "\t";

cout << endl;

}

cout << "\n";

}

void multiply(char a[4][2], int b[2][2])

{

for (int i = 0; i < 4; ++i) //for each column of a

for (int j = 0; j <2; ++j) //for each column of b

for (int k = 0; k < 2 ; ++k) //for each row of a or row of b

{

C[i][j] += a[i][k] \* b[k][j]; //multiply array values and assign to c array

}

cout << "Encrypted Data Matrix: \n";

for (int i = 0; i < 4; ++i) //for the 4\*2 array of c, print out each value

{

for (int j = 0; j < 2; ++j) //for the rows

cout << C[i][j] << "\t";

cout << endl;

}

cout << "\n";

}

void decode(float c[4][2], float b[2][2])

{

for (int i = 0; i < 4; ++i) //for each column of c

for (int j = 0; j <2; ++j) //for each column of b

for (int k = 0; k < 2 ; ++k) //for each row of c or row of b

{

x[i][j] += c[i][k] \* b[k][j]; //multiply array values and assign to x array

}

cout << "Decoded Matrix: \n";

for (int i = 0; i < 4; ++i) //for the 4\*2 array of x, print out each value

{

for (int j = 0; j < 2; ++j) //for the rows

cout << x[i][j] << "\t";

cout << endl;

}

}

int main(int argc, char \*argv[]) {

encode(A);

multiply(A,B);

decode(C,Binverse);

}

**OUTPUT:**

**Unencrypted Data Matrix:**

**82 101**

**100 32**

**82 117**

**109 0**

**Encrypted Data Matrix:**

**227 139**

**368 -104**

**211 187**

**436 -218**

**Decoded Matrix:**

**82 101**

**100 32**

**82 117**

**109 0**