实验题目：广度优先搜索

实现广度优先搜索算法解决八数码等问题。

**代码**

#include <iostream>

#include <cstring>

using namespace std;

const int M = 8;

const int A = 363000;

int k[M] = {1};

char a[A][9];

bool visit[A];

char target[9];

int dis[A];

int dir[4][2]={{-1,0},{1,0},{0,1},{0,-1}};

void Init()

{

cout<<"请输入开始状态："<<endl;

for(int i=0; i<9; ++i)

cin >> a[0][i];

cout<<"请输入目标状态："<<endl;

for( i=0; i<9; ++i)

cin >> target[i];

for( i=1; i<M; ++i)

k[i] = k[i-1] \* i;

}

int kang(char\* s)

{

int sum = 0, c;

for(int i=0; i<9; ++i)

{

c = 0;

for(int j=i+1; j<9; ++j)

if(s[j] < s[i]) ++c;

sum += c \* k[M-i];

}

return sum;

}

inline bool check(int p)

{

for(int i=0; i<9; ++i){

if(a[p][i] != target[i])

return false;

}

return true;

}

int bfs(){

int p = 0, q = 1;

int x, y, z, nx, ny, nz;

while(p < q){

if(check(p)) return dis[p];

for(int i=0; i<9; ++i){

if(a[p][i] == '0'){

x = i / 3;

y = i % 3;

z = i;

break;

}

}

for( i=0; i<4; ++i){

nx = x + dir[i][0];

ny = y + dir[i][1];

nz = 3\*nx + ny;

if(nx<0 || ny<0 || nx>2 || ny>2)

continue;

for(int i=0; i<9; ++i)

a[q][i] = a[p][i];

a[q][z] = a[q][nz];

a[q][nz] = '0';

int t = kang(a[q]);

if(!visit[t]){

visit[t] = true;

dis[q] = dis[p] + 1;

++q;

}

}

++p;

}

}

int main()

{

Init();

int m = bfs();

if(m == -1) cout << "No answers!" << endl;

else cout << "需要走"<<m<<"步" << endl;

return 0;

}

}

**运行结果：：**

