# Programming report

## 1. Coding Details

Restrctions are as follows:

Variables： $\{X_1 \ldots X_n\}$, n=unfilled blanks

Values:$\{ D_1 \ldots D_n\}$, $X_i \in D_i = \{1,2,3,4\}$

Restricitons:$\{((x_{i1} \ldots x_{i4}, x_{ij} \neq 0)$,All diff), $((x_{1j} \ldots x_{4j}, x_{ij} \neq 0)$,All diff),$((x_{ij}, x_{(i+k1)j}, x_{i(j+k2)}, x_{i(i+k1)(j+k2)}, k_1=(-1)_i$ $k_2=(-1)_j$ ), All diff)$\}$

First the algorithm searches for the coordinate of the blanks to be filled, the fill in the blanks with the all diff restrictions. Throughout the process when encountering contradiction, the program will return to the prior state and fill in with another number. When the program regress back to the first blank and no numbers can be filled in, the program returns a failure, stating no solution.

## 2. Results

**Test_case_1**

```
| 2 | 3 | 0 | 0 |
| 0 | 0 | 3 | 2 |
| 3 | 0 | 0 | 4 |
| 0 | 4 | 2 | 3 |
求解成功!
| 2 | 3 | 4 | 1 |
| 4 | 1 | 3 | 2 |
| 3 | 2 | 1 | 4 |
| 1 | 4 | 2 | 3 |
```

**Test_case_2**

```
| 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 3 |
| 3 | 0 | 1 | 2 |
| 0 | 0 | 0 | 0 |
求解成功!
| 2 | 3 | 4 | 1 |
| 4 | 1 | 2 | 3 |
| 3 | 4 | 1 | 2 |
| 1 | 2 | 3 | 4 |
```

**Test_case_3**

```
| 0 | 0 | 0 | 0 |
| 2 | 3 | 0 | 0 |
| 0 | 4 | 3 | 0 |
| 0 | 2 | 0 | 0 |
求解成功!
| 4 | 1 | 2 | 3 |
| 2 | 3 | 1 | 4 |
| 1 | 4 | 3 | 2 |
| 3 | 2 | 4 | 1 |
```

**Test_case_4**

```
| 0 | 4 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 3 |
| 0 | 0 | 0 | 0 |
求解成功!
| 2 | 4 | 3 | 1 |
| 3 | 1 | 2 | 4 |
| 1 | 2 | 4 | 3 |
| 4 | 3 | 1 | 2 |
```

**Test_case_5**

```
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 2 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 3 |
求解成功!
| 2 | 3 | 1 | 4 |
| 4 | 1 | 3 | 2 |
| 3 | 2 | 4 | 1 |
| 1 | 4 | 2 | 3 |
```

**Test_case_6**

```
| 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 1 | 4 | 0 |
求解成功!
| 1 | 2 | 3 | 4 |
| 4 | 3 | 2 | 1 |
| 2 | 4 | 1 | 3 |
| 3 | 1 | 4 | 2 |
```