Second year project I
Solving Sudoku

Group 22

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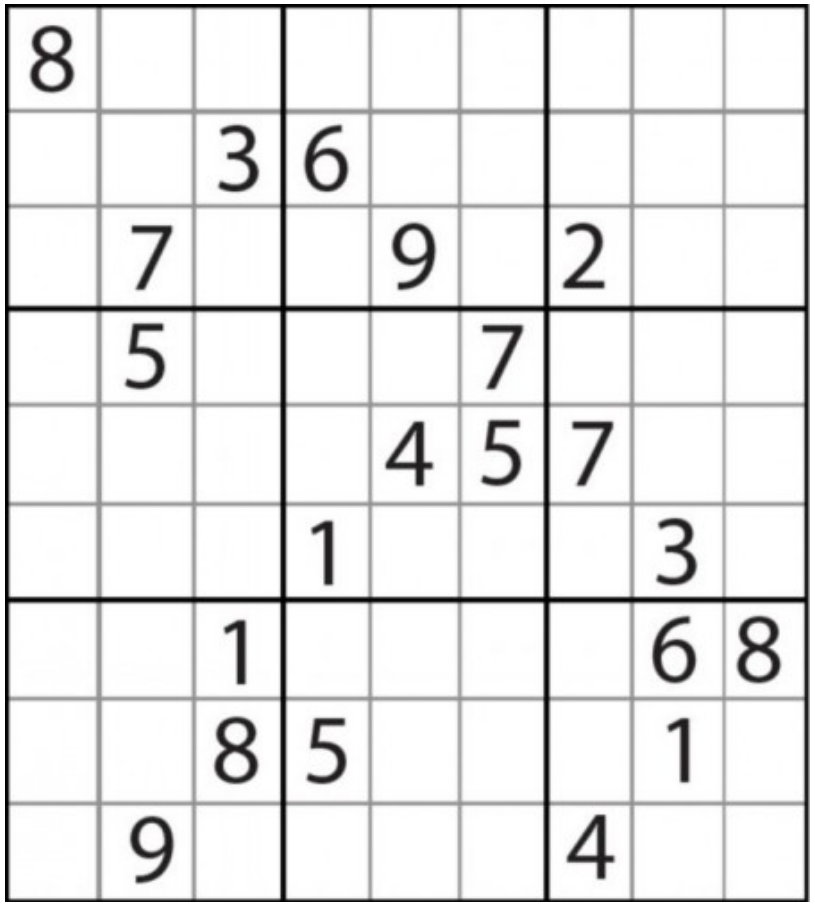
Introduction



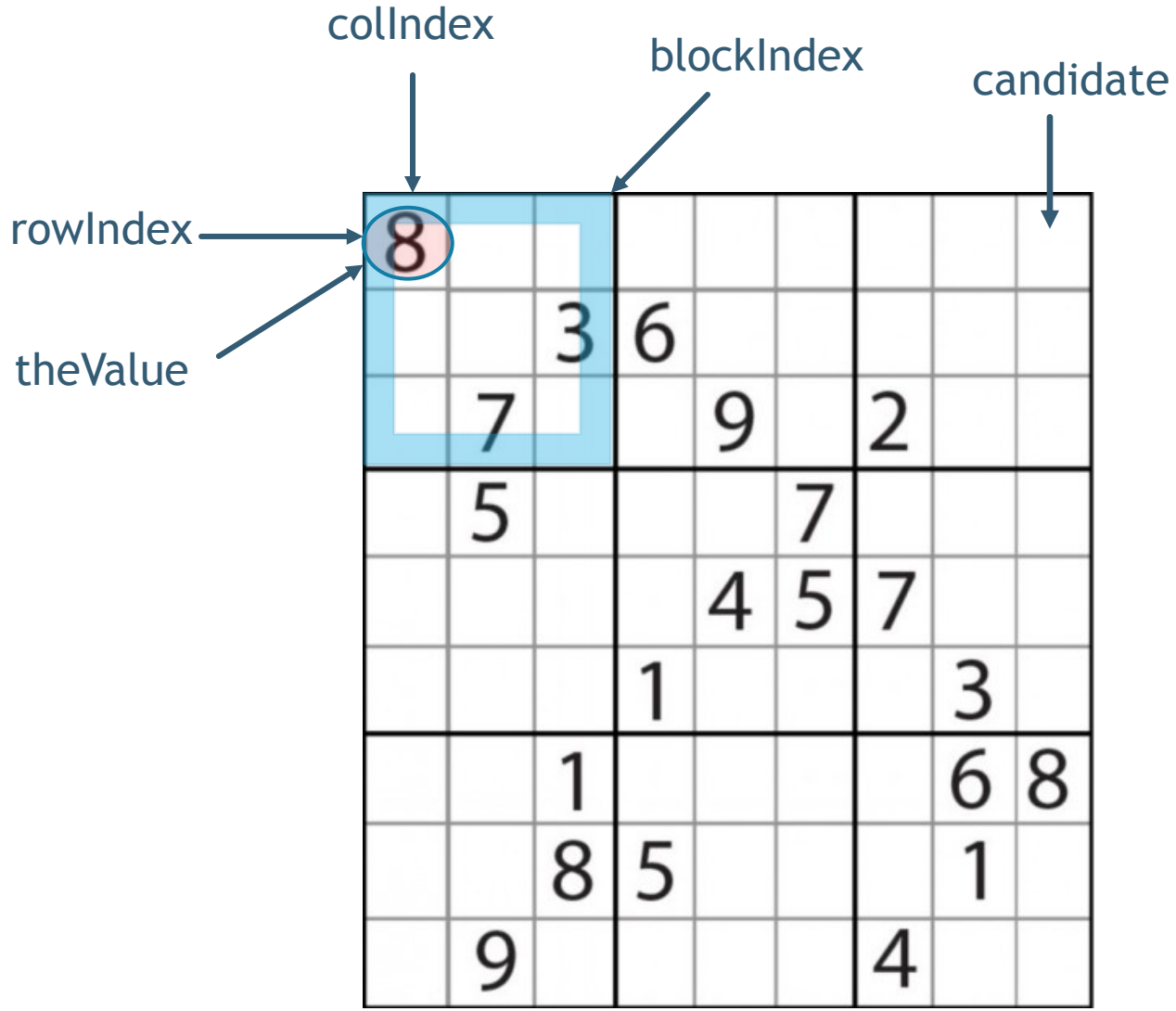
Methods:

- Logic Rule
- Generalization
- Enumeration

General Implementation

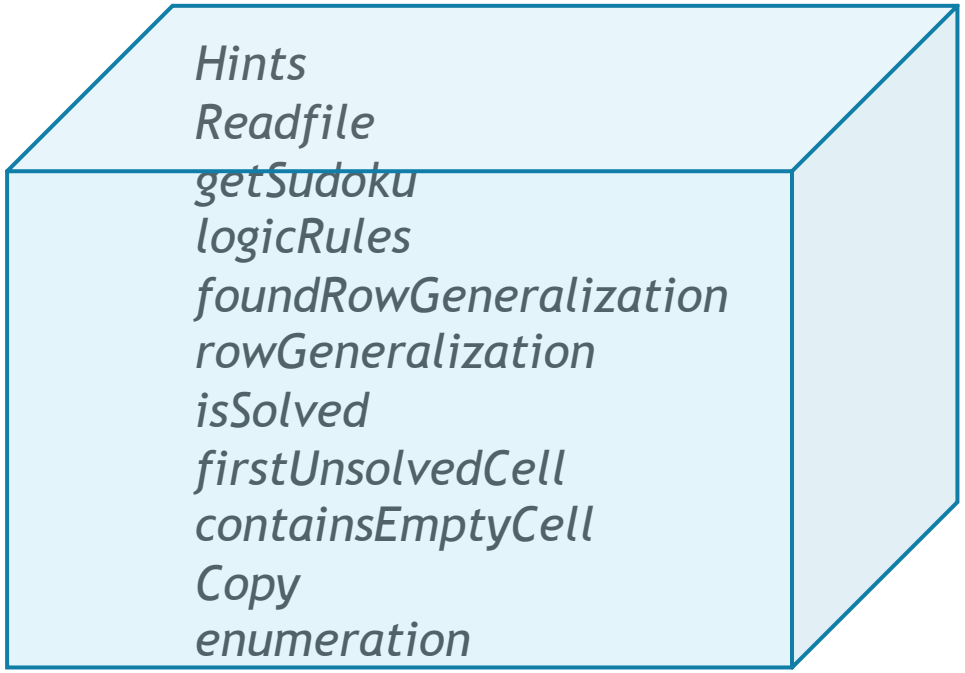
- Cell Class
- Sudoku Class
  - Logic Rule
  - Generalization
  - Enumeration
- Solver Class

Cell Class


colIndex
blockIndex
candidate
rowIndex
theValue
8
3 6
7 9 2
5 7
4 5 7
1 3
1 6 8
8 5 1
9 4

Sudoku class

- Logic rule
- Generalization
- Enumeration



Solver class

- the usage of the three methods
- Print out the results

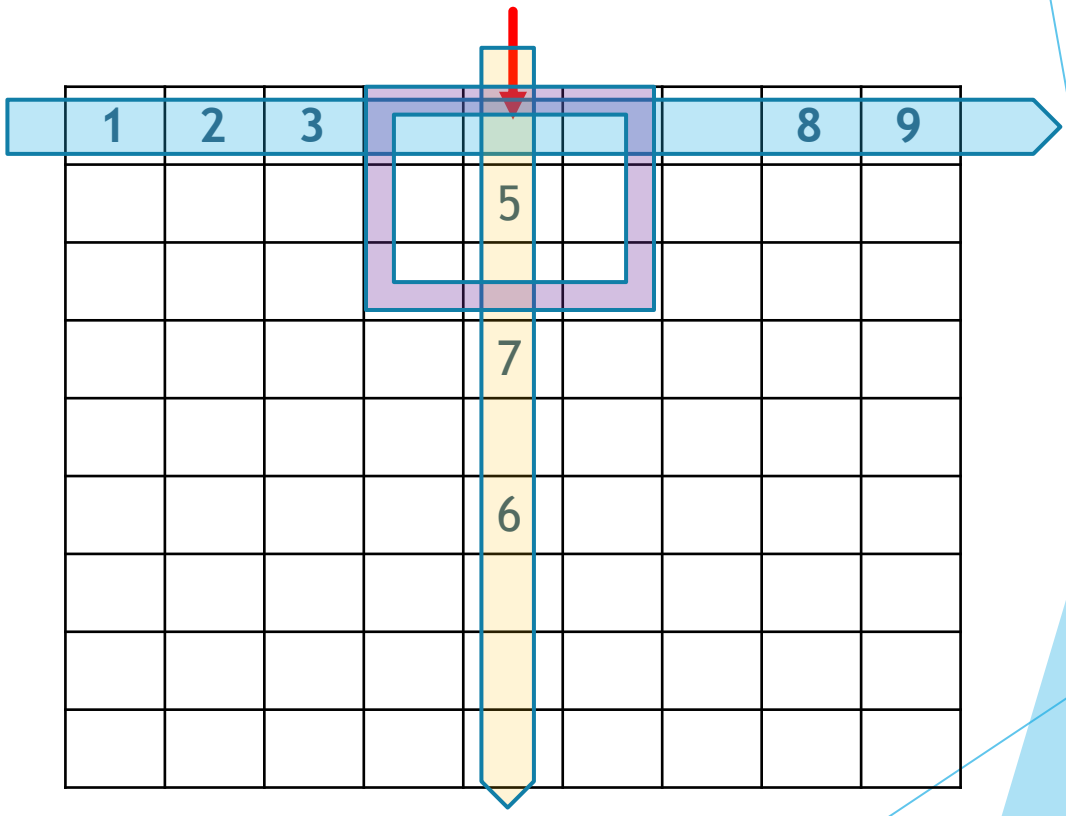
Sudoku class

- Logic rule
- Generalization
- Enumeration

Logic rule

- Check by row, column and block
- Eliminate duplicated candidates
Comparing with the hints
- Find a naked single

For Cell[1][5]:
Candidate: ~~1, 2, 3~~, 4,
~~5, 6, 7, 8, 9~~



Logic rule

Take row for instance

If

```
dequeued.colIndex() !== j
!dequeued.isEmpty()
!mySudoku[dequeued. rowIndex ()][j].isEmpty()
```

↓

```
mySudoku[dequeued.rowIndex()][j].remove(
dequeued.theValue());
```

↓

If

```
mySudoku[dequeued.rowIndex()][j].theValue() == 0
mySudoku[dequeued.rowIndex()][j].isSolved()){
```

↓

```
mySudoku[dequeued.
rowIndex()][j].setValue( mySudoku[dequeued.rowIndex()][j
].getCandidates().get(0));
```

hint

↓

Remove value of the duplicated candidates

↓

Unsolved cell
now only one candidate left

↓

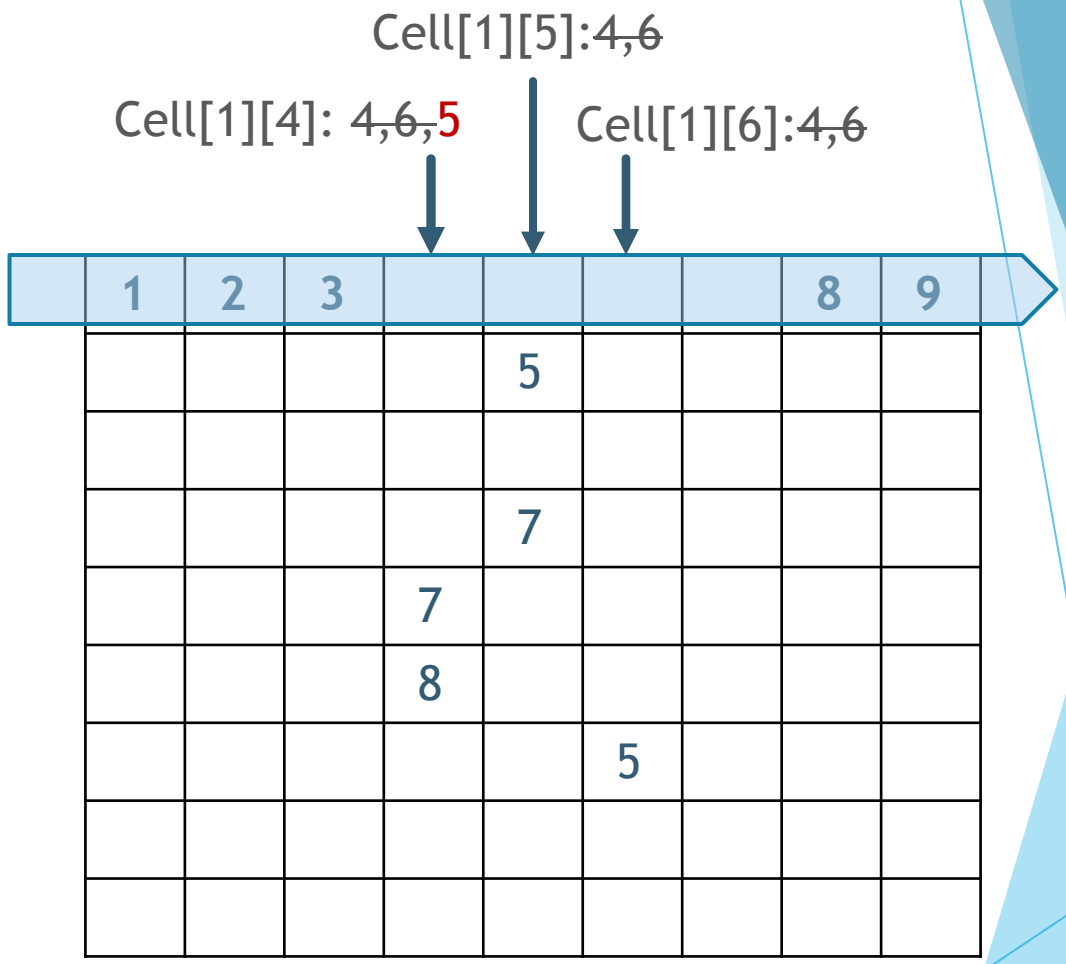
Assign value to the unsolved cell

↓

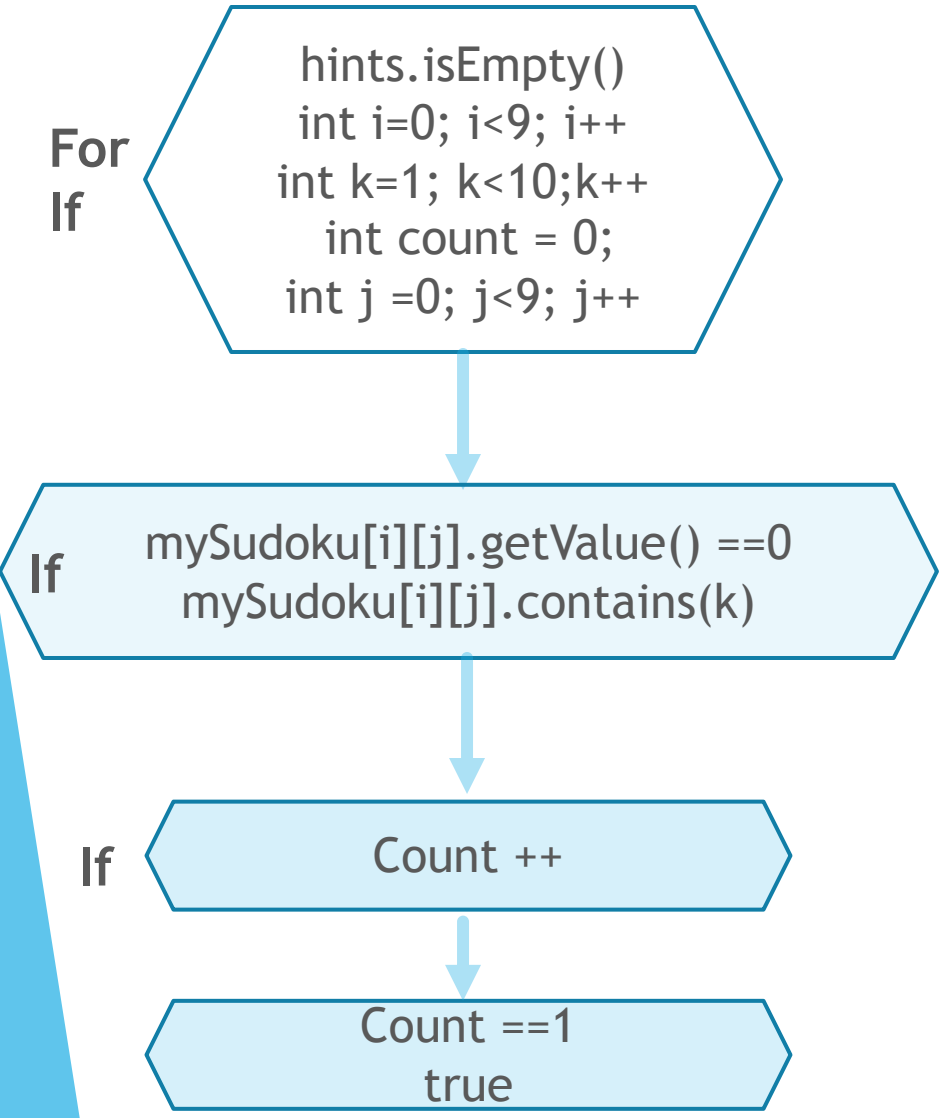
Enqueue hints

Generalization

- Check by row, column and block
- Find hidden single



Generalization



Take row for instance

Fix a row
Go through columns

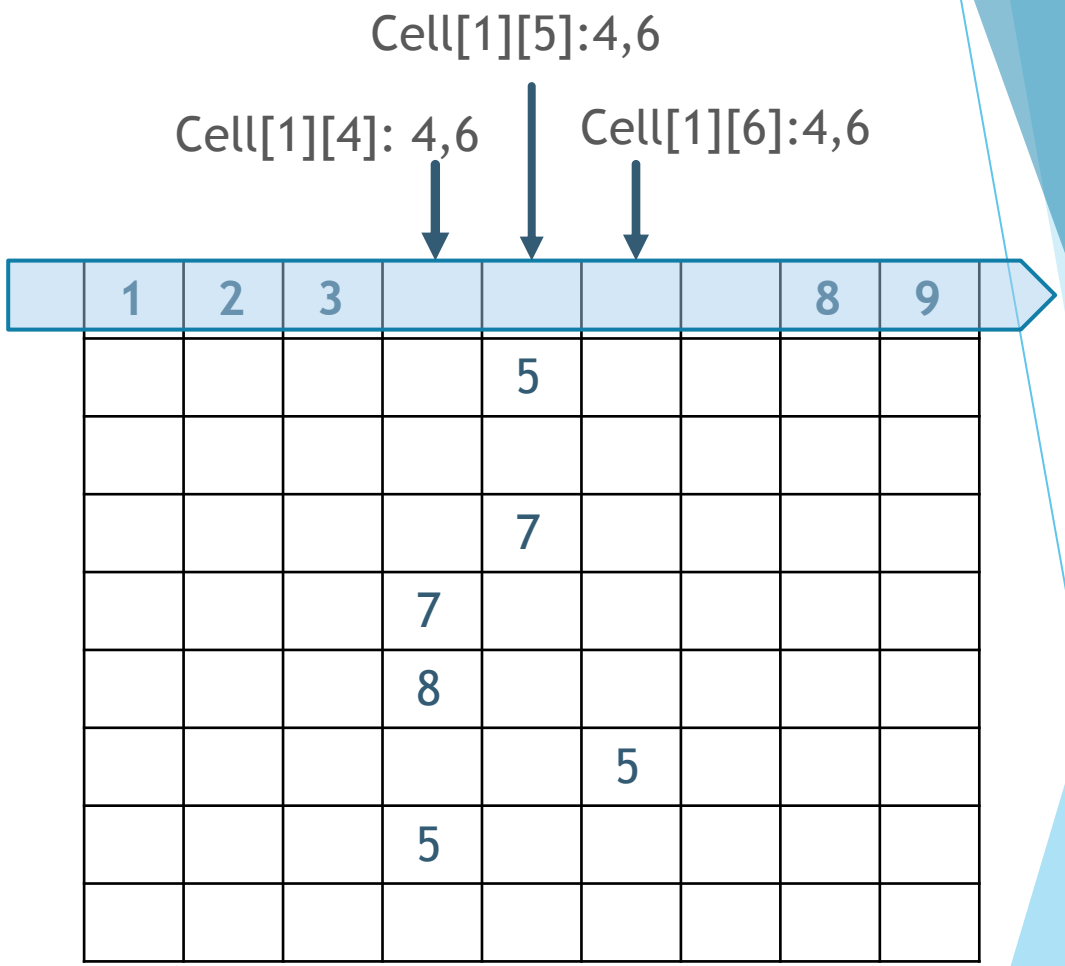
Unsolved cell
Contains same candidates

Number of times that a value k occurs

Find a hidden single
Enqueue as a new hint

Enumeration

- Branching method
- make a guess for an unsolved cell
- And then apply logic rule and generalization again



Enumeration

Check if it is solved

Look for first unsolved cell

Make a copy
Assign values

Make a guess for the first unsolved cell

```
int i=0; i<9; i++
int j =0; j<9; j++
this.finalSudoku[i][j].getValue() !=0
solvedCells++
```

```
outerLoop:
int i=0; i<9; i++
int j=0; j<9; j++
finalSudoku[i][j].getValue()
==0
```

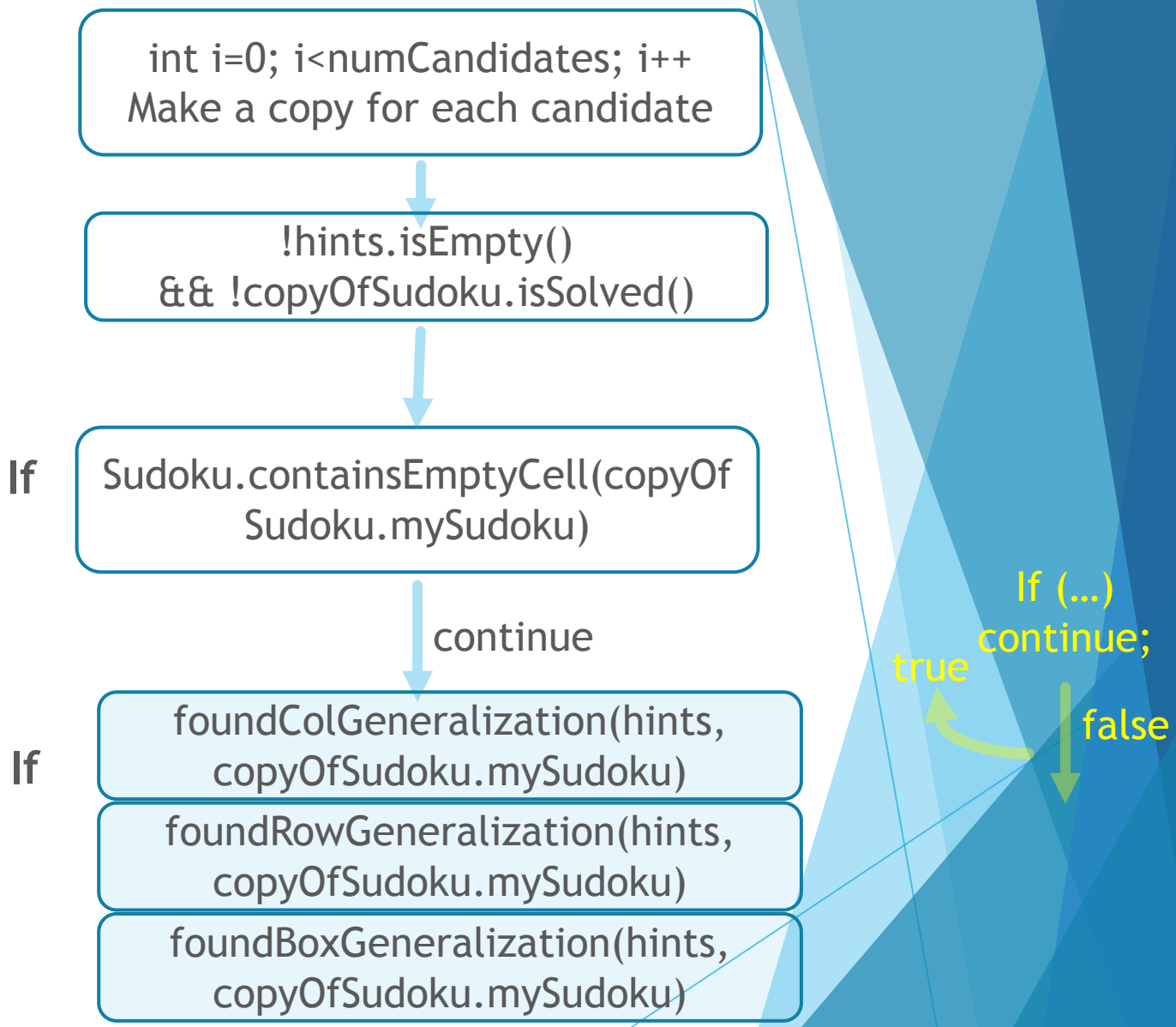
```
copy = finalSudoku[i][j];
break outerLoop;}
```

Enumeration

Use copy to branch out

No solved

Logic rule
Generalization



Conclusion

- Logic rule is a basic method
- Generalization method helps to find more hidden singles
- Enumeration method makes a guess for the remaining unsolved cell, branches out and applies logic rule and generalization again
- Improvement!