

# Sokoban: Search in a complex domain

Yann Chazallon, Nicolas Dossou-Gbété, Tony Chan Ki Hong  
and Michal Staniaszek

October 21, 2013

# Table of Contents

1 Introduction

2 Development Process

3 Evaluation

4 Conclusions



# Table of Contents

1 Introduction

2 Development Process

3 Evaluation

4 Conclusions

# Board Representation

- Two-level representation with static and dynamic objects
-

# Heuristics

# Player Space Search



# Board Space Search





# Bi-directional Search



# Table of Contents

1 Introduction

2 Development Process

**3 Evaluation**

4 Conclusions

# Method Comparison

Search Method	Time limit		
	5 sec	11 sec	15 sec
A*	12	15	16
Best First	56	60	64
Bi-directional Best First	76	81	82
Bi-directional A*	39	41	43

- No significant difference in number of maps solved with different limits
- Is the search going in the right direction?

# Map Performance

- Can be solved within 15 sec, but not 11
- Requires a box to be positioned (at x) and not moved until the end.
- Problem is caused by heuristic preferring boxes on goals

## Map 54

```

#####
#   . . .   #
#   . . . .  #
##### x  #
#     $ $    #
#           # #
###$##### #
#@ $     #$ #
### $    $   #
      ##      #
          #####

```

# Map Performance

- Solved very quickly
- All but one box require only a single move
- Heuristic gives accurate estimate to the goal

## Map 66

```
#####
##.$@ ###
###.# ###
###$#  #
#.$ #.# #
##.$ $# #
#.$ # # #
## #.$ #
#.$ #.###
##.$ $###
#.$ # ###
## $# ###
## .# ###
##    ###
#####
```

# Map Performance

- Unsolved within 15 sec
- Intermediate goal area causes issues with heuristic
- Requires making specific move sequences to get boxes on goals

## Map 93

```

#####
####      @##  #  #
###      $ ##    #
##      $ ##    ## ###
#      $ ##    ## # #
#  $ ##    ##  $ #
# $ ##    ##  # # #
# ##    ##  ## # #
#      ##  ### # #
#####*  ##  ### # #
      ***##          #
#####. . *.#####
          ##. . .#
          #####

```

# Table of Contents

1 Introduction

2 Development Process

3 Evaluation

4 Conclusions

