AI Project 3 Report

Algorithm

- Backtracking:

  Algorithm BT (L, M)

  1. Call BTHelper(L, M, res, ruler, curr)
  2. If true returned, store result in temp
  3. Else return solution as is
  4. L --
  5. If L >= M, goto 1
  6. Return temp

  Algorithm BTHelper (L, M, res, ruler, curr)

  1. If constraint satisfied goto 3
  2. Else return False, []
  3. M--
  4. If M > 0, goto 6
  5. Else return True,ruler
  6. I = 0
  7. If curr+1<I<L, goto to 9
  8. Else goto 12
  9. Call BTHelper(L, M, res, ruler, i)
  10. If True returned, return True,ruler
  11. Else I++, goto 7
  12. If result found, return True,result
  13. Else return False,[]

- Backtracking + Forward Checking

  Algorithm FC (L, M)

  1. Call FCHelper(L, M, res, ruler, curr)
  2. If true returned, store result in temp
  3. Else return solution as is
  4. L --
  5. If L >= M, goto 1
  6. Return temp

  Algorithm FCHelper (L, M, res, ruler, curr, domain)

  1. Call constraintConsistent (domain, ruler, curr)
  2. If step 1 returns True, goto 4

3. Else, return False,[]
4. Place marker
5. If constraint satisfied goto 7
6. Else return False, []
7. M--
8. If M > 0, goto 10
9. Else return True,ruler
10. I = 0
11. If curr+1<I<L, goto to 13
12. Else goto 12
13. Call FCHelper(L, M, res, ruler, i)
14. If True returned, return True,ruler
15. Else I++, goto 11
16. If result found, return True,result
17. Else return False,[]

Statistics

1. Number of consistency checks

L, M	BT	FC
3, 3	2	2
6, 4	16	11
11, 5	93	43
17, 6	734	253
25 ,7	7166	1972
44, 9	597487	117333

2. Time taken to execute

L, M	BT	FC
3, 3	0.0000700950622559	0.000101804733276
6, 4	0.000267028808594	0.000488996505737
11, 5	0.00202512741089	0.00227403640747
17, 6	0.00937604904175	0.00838804244995
25, 7	0.0762989521027	0.0588519573212
44, 9	10.4548079967	6.14834308624

The number of consistency checks performed is same for the L =3 and M = 3. But there is a steep increase in case of Back tracking as the input size becomes large

After L = 72, M = 11, the program takes a long time