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INTERSECTION MANAGEMENT

A Greedy Approach

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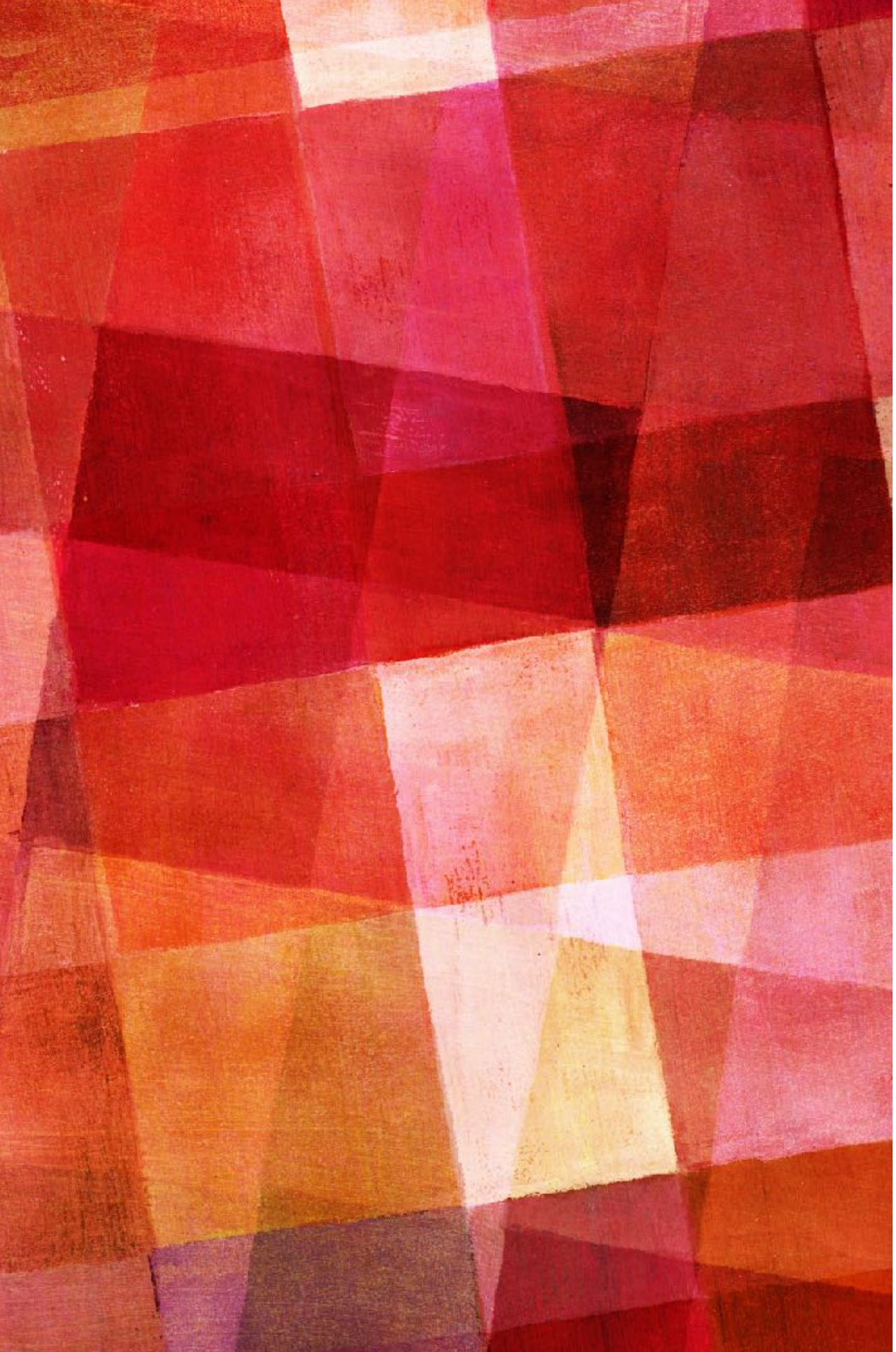
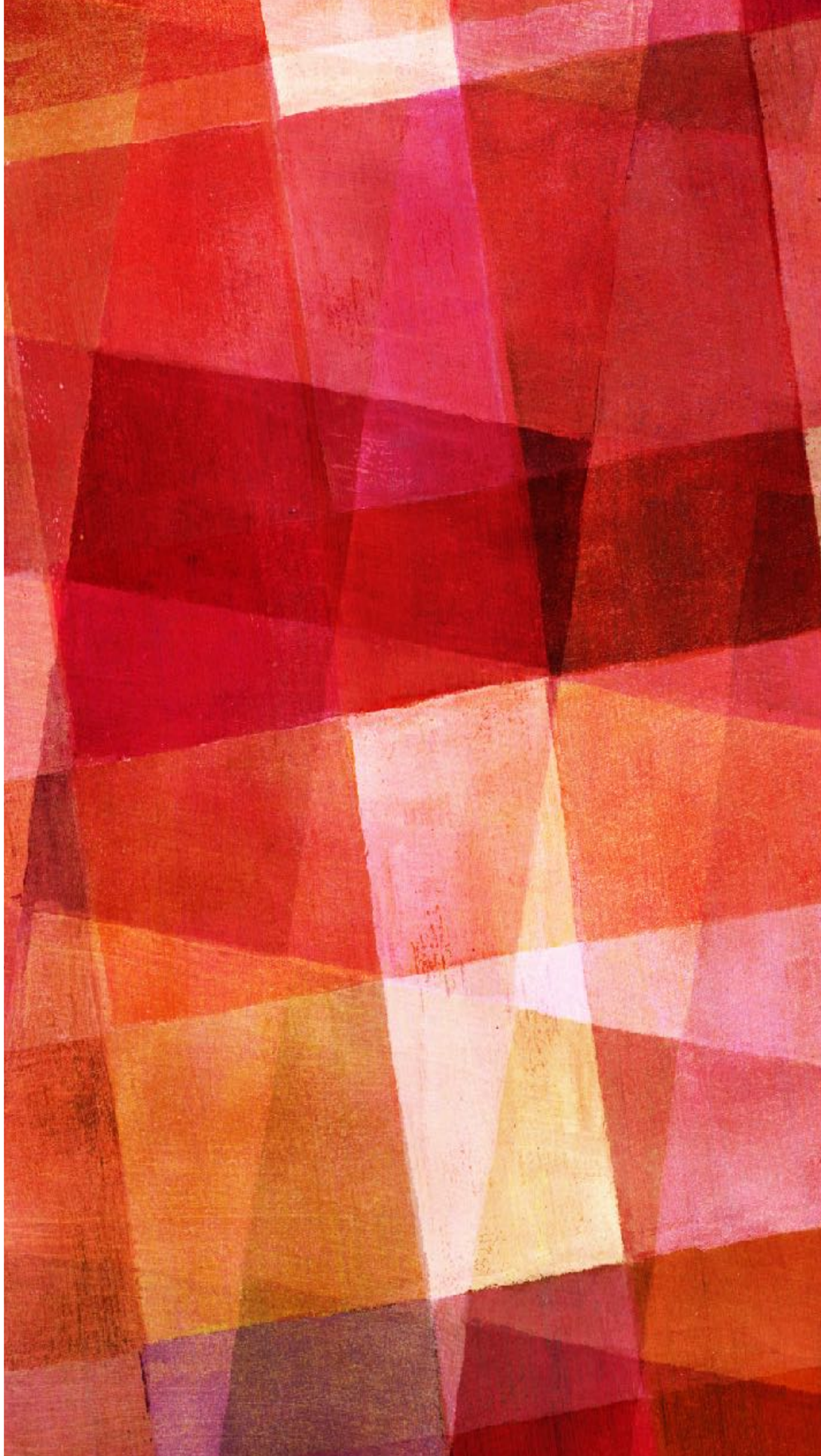


AGENDA

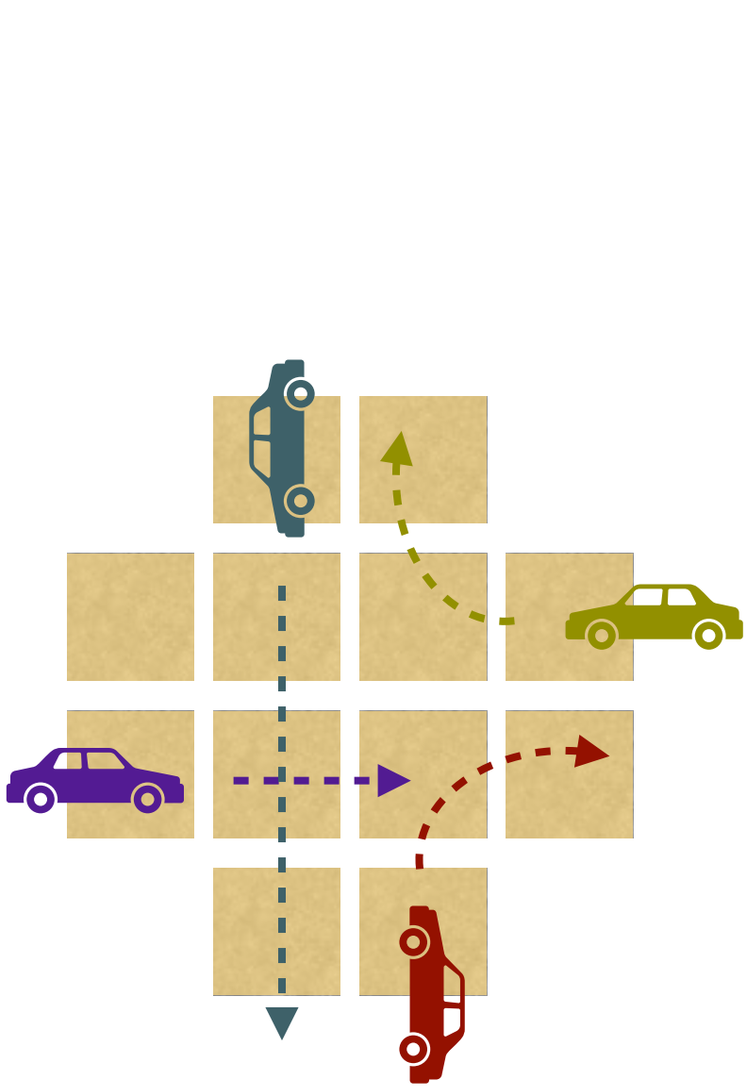
- Our Attempts
- How It Works
- Performance on 5 examples
- Advantages and Alternatives

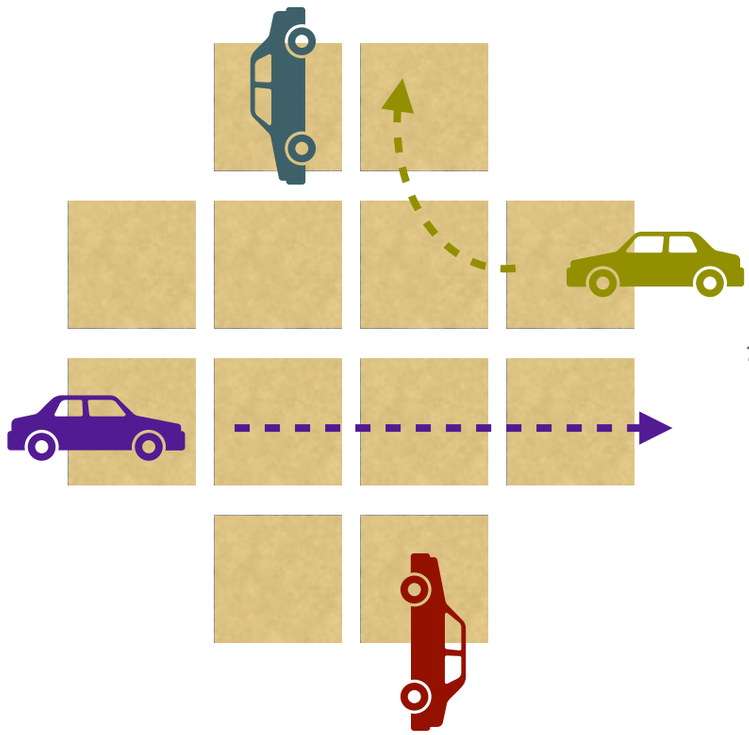
Our Attempts

3 Considerations & Greedy Heuristics

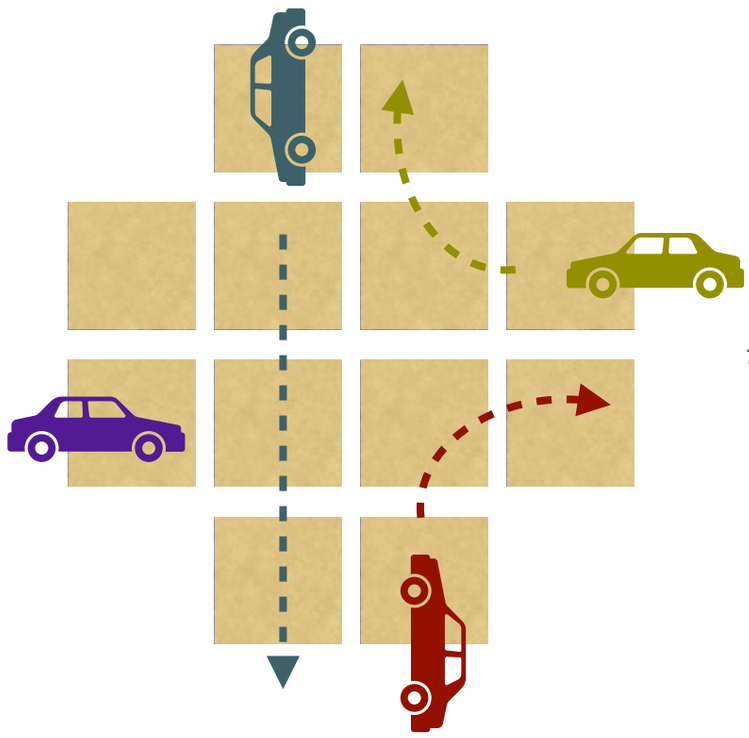


- For Optimal Consideration
  - For each time/round, pass cars as many as possible.



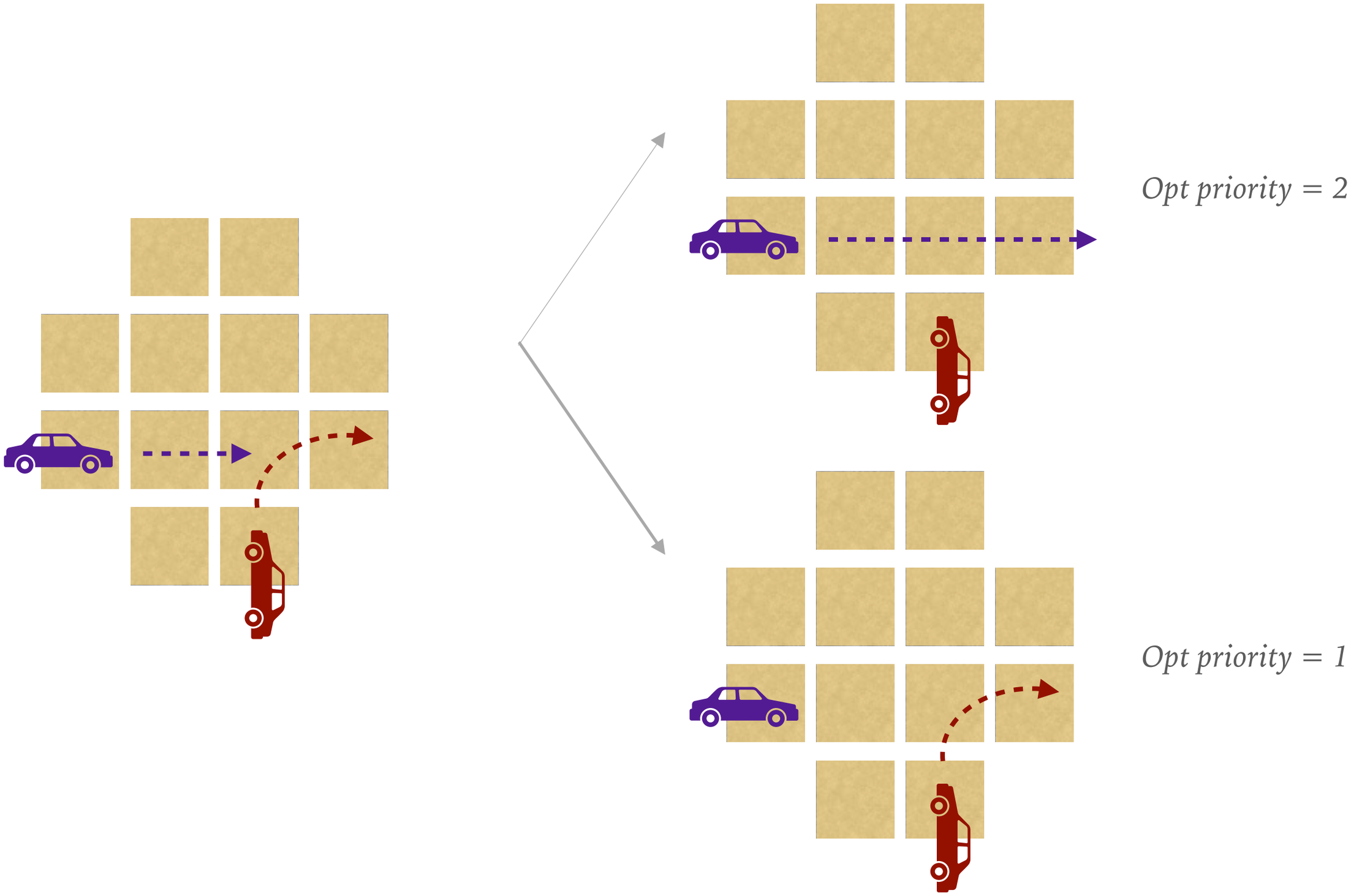


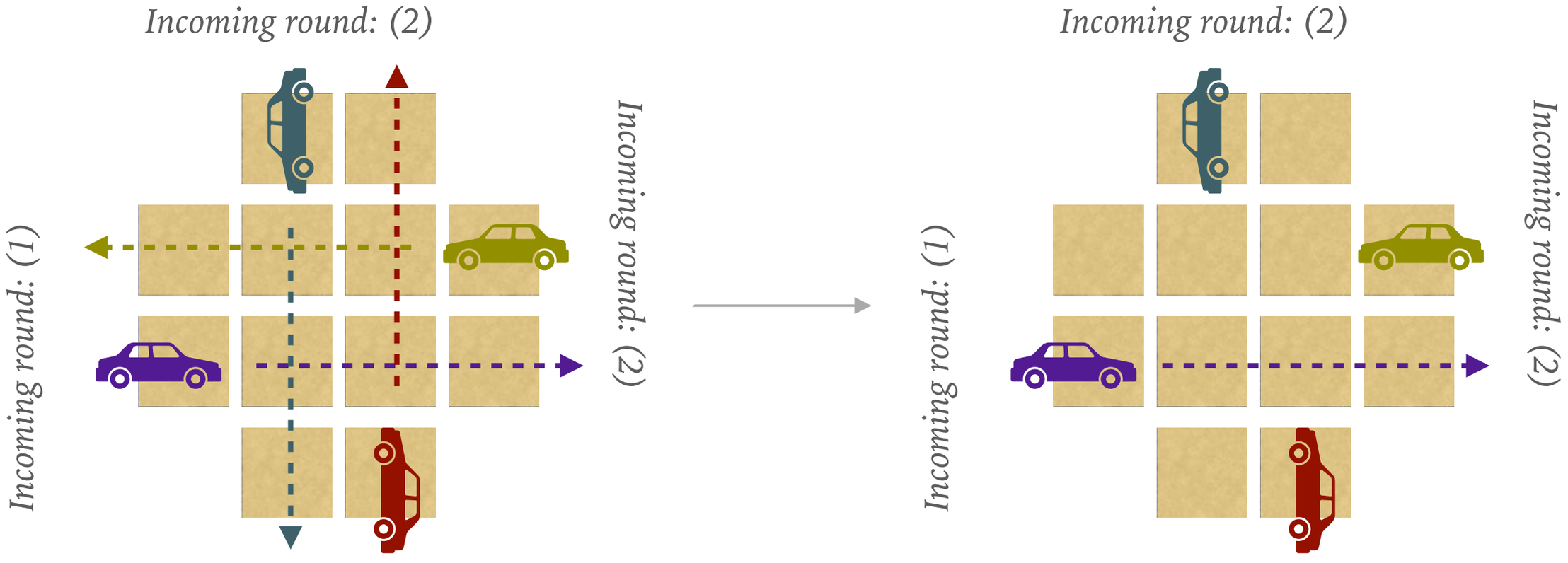
# of car could pass = 1



# of car could pass = 3

- For Optimal Consideration
  - For each time/round, pass cars with higher optimal priority.





- For Pragmatic Consideration
  - To avoid deadlock, we set priority rule FIFO.
  - For each time/round, if there exist 2 or more combinations of passing maximum cars at one time, then pass the cars with higher priority with optimal priority then FIFO priority.

HOW IT WORKS

Algorithm & Demo

IM(S)

//S is unscheduled/not passed cars

//*S'* is scheduled/passed cars

While(*S* is not empty) **do**

C = cars in the first time/round of *S*

Heuristic 1

if (there is only one combination *w* of passing max-cars) **then**

$S = S - w$

$S' = S' + w$

else then

Heuristic 2 & 3

p = one of combinations of passing max-cars, which is with higher priority

$S = S - p$

$S' = S' + p$

End While

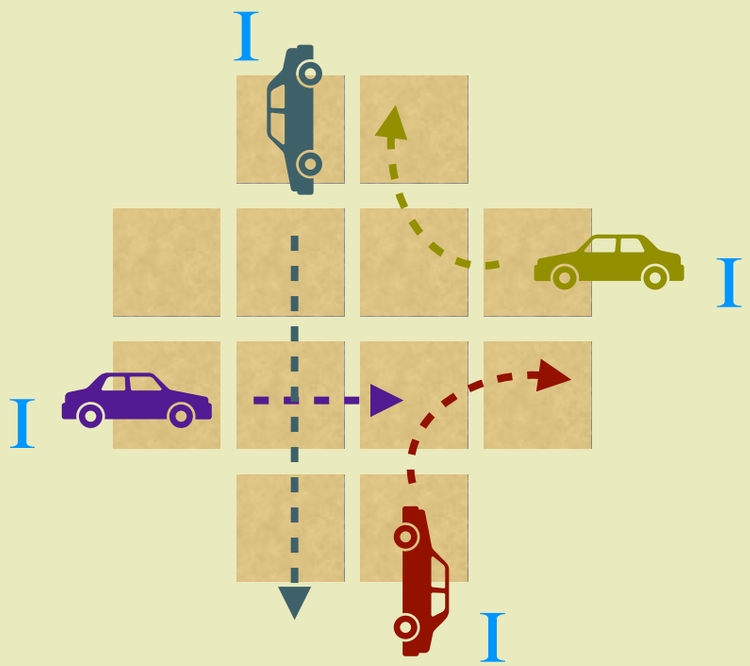
return *S'*

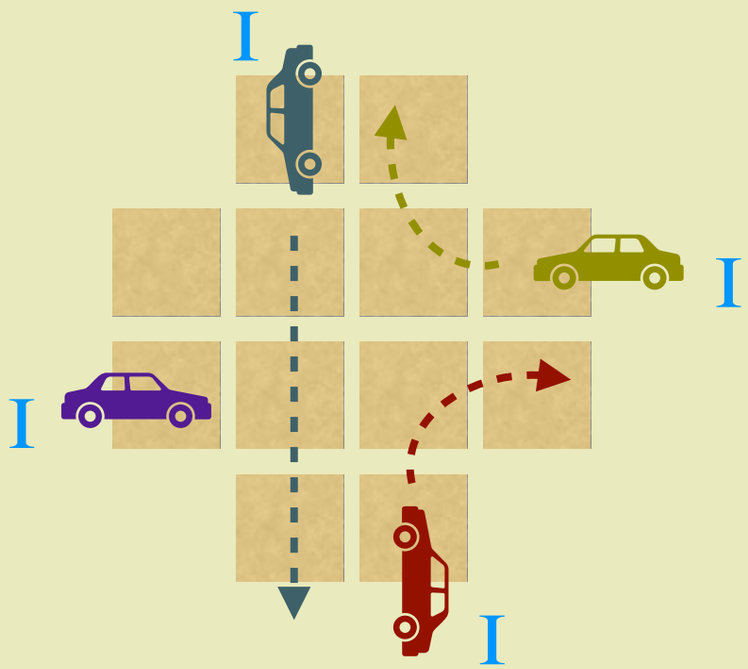
A Greedy Approach

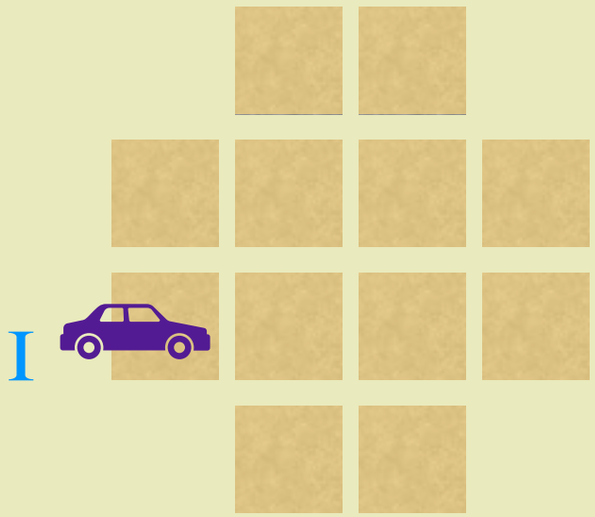
round start

round end

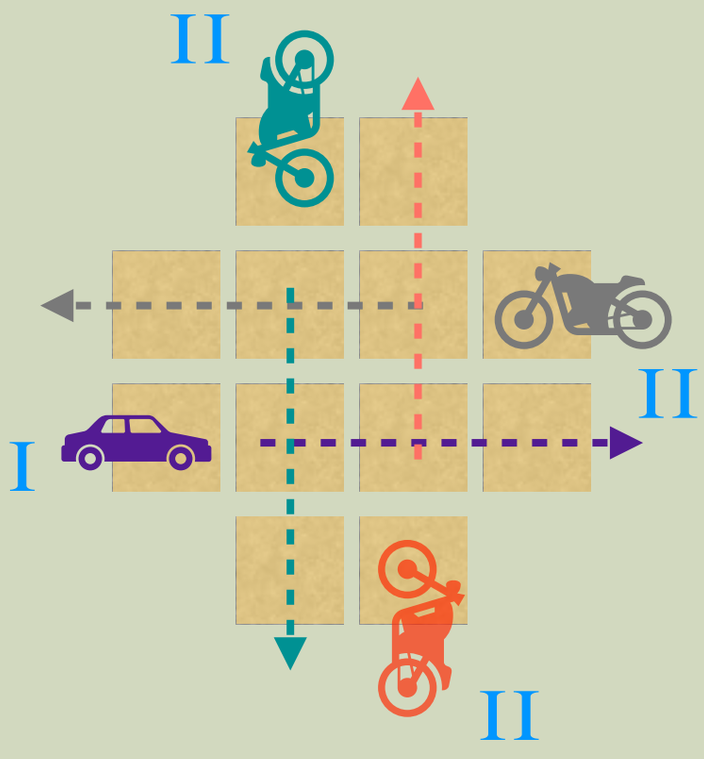
Round 1

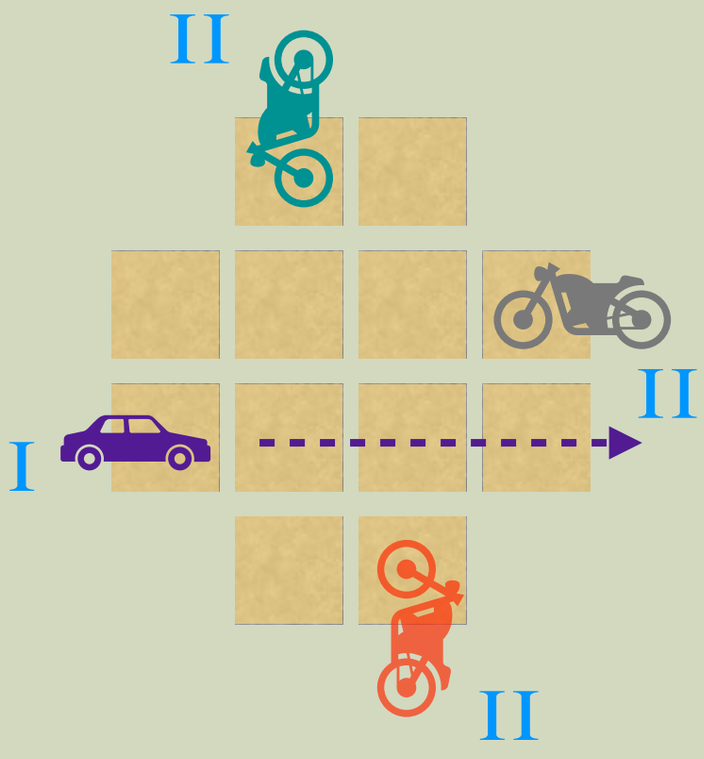


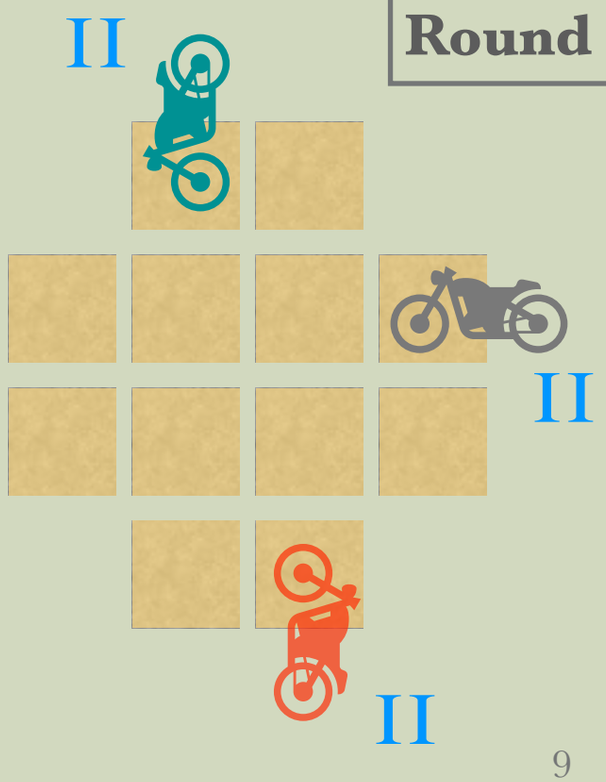




Round 2







PERFOR MANCE

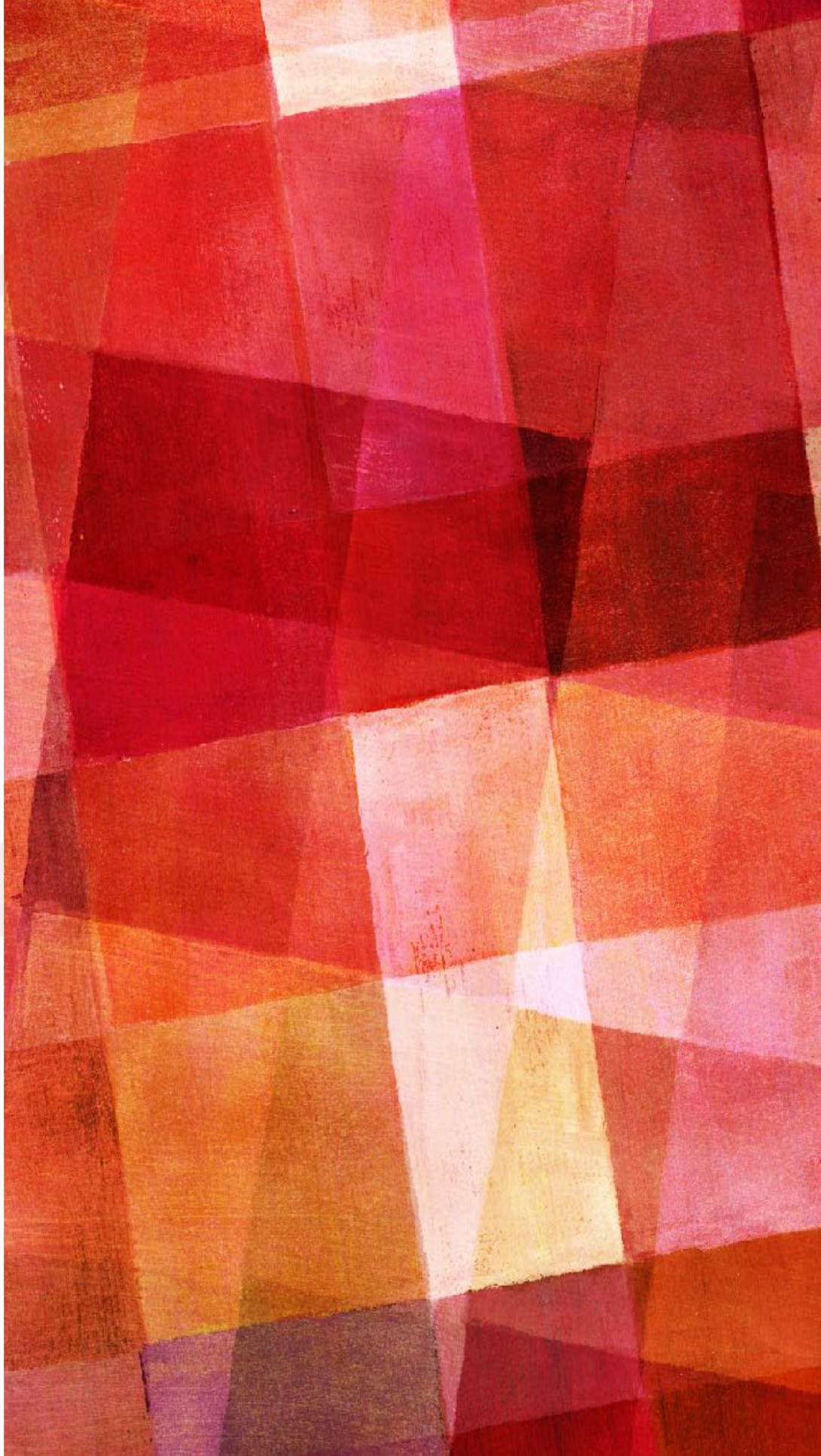
On input_1 to _5

AVG COST

0.67	*3.63*	*2.55*	*2.68*	*3.25*
input_1	*input_2*	*input_3*	*input_4*	*input_5*
<1s	*<1s*	*<1s*	*<1s*	*<1s*

47.595	*155.241*	*337.927*
case_1	*case_5*	*case_10*
<1s	*<1s*	*<1s*

ADVANTAGES & ALTERNATIVES



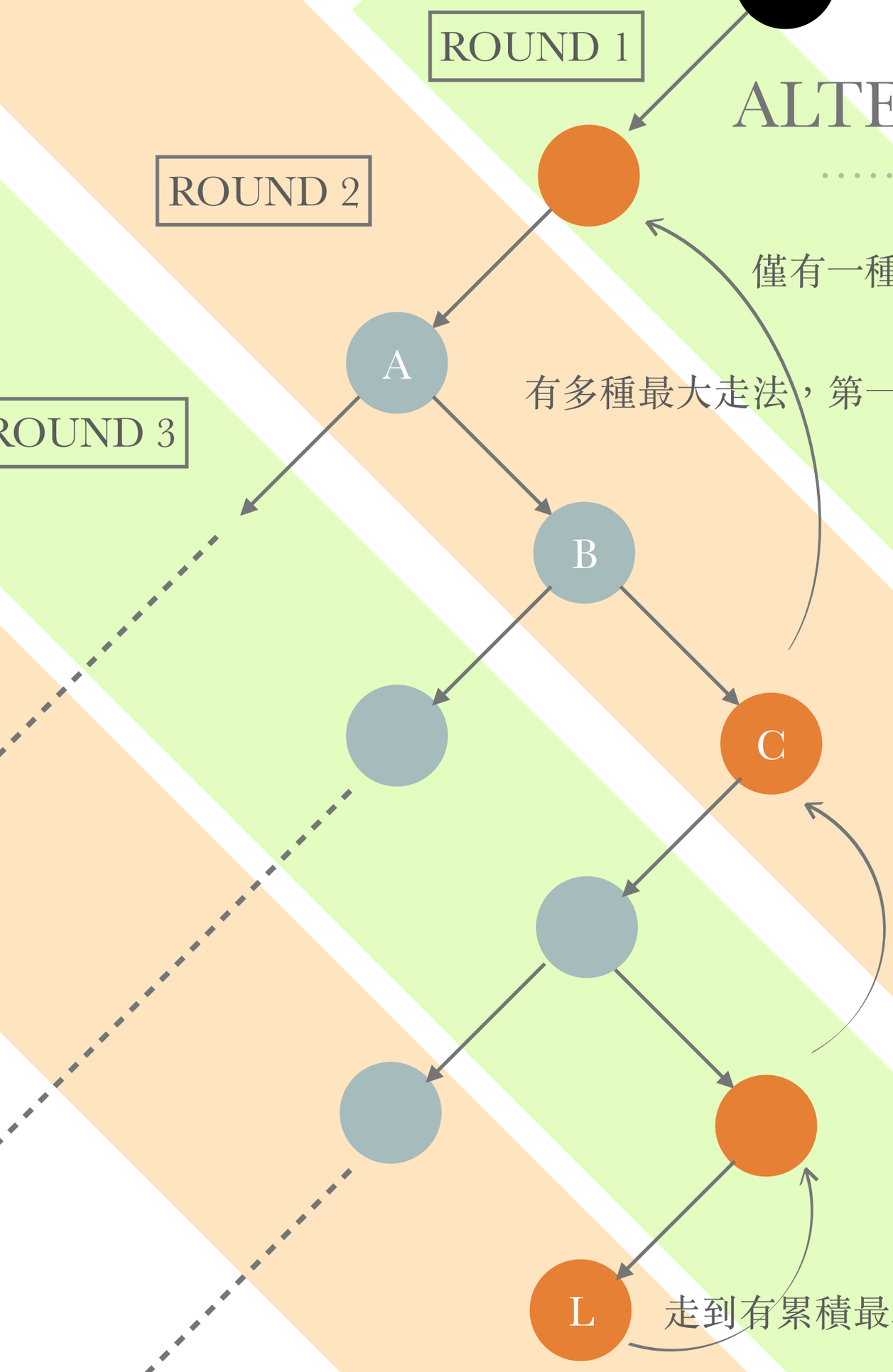
PROS & CONS

- PROS’
  - Pragmatic consideration
  - Can be fitted in on-line model
  - efficiency of time/space
- CONS’
  - Not Optimal

```
N: 00 1E 00 00 1S 1E 00 00
E: 00 1S 1S 1N 00 00 1W 00
S: 1N 1E 1W 1W 1N 1E 1W 00
W: 1N 1E 1S 00 00 1N 00 1E
```

OUR ALGORITHM is TOO MYOPIC

ALTERNATIVE: WIDEN THE VIEW



僅有一種最大走法，增加左子

有多種最大走法，第一種增加左子，其餘增加於右子

走到有累積最小COST的葉子，回溯即為答案

Implement by LCRS B-Tree

{storing a max-passing way}

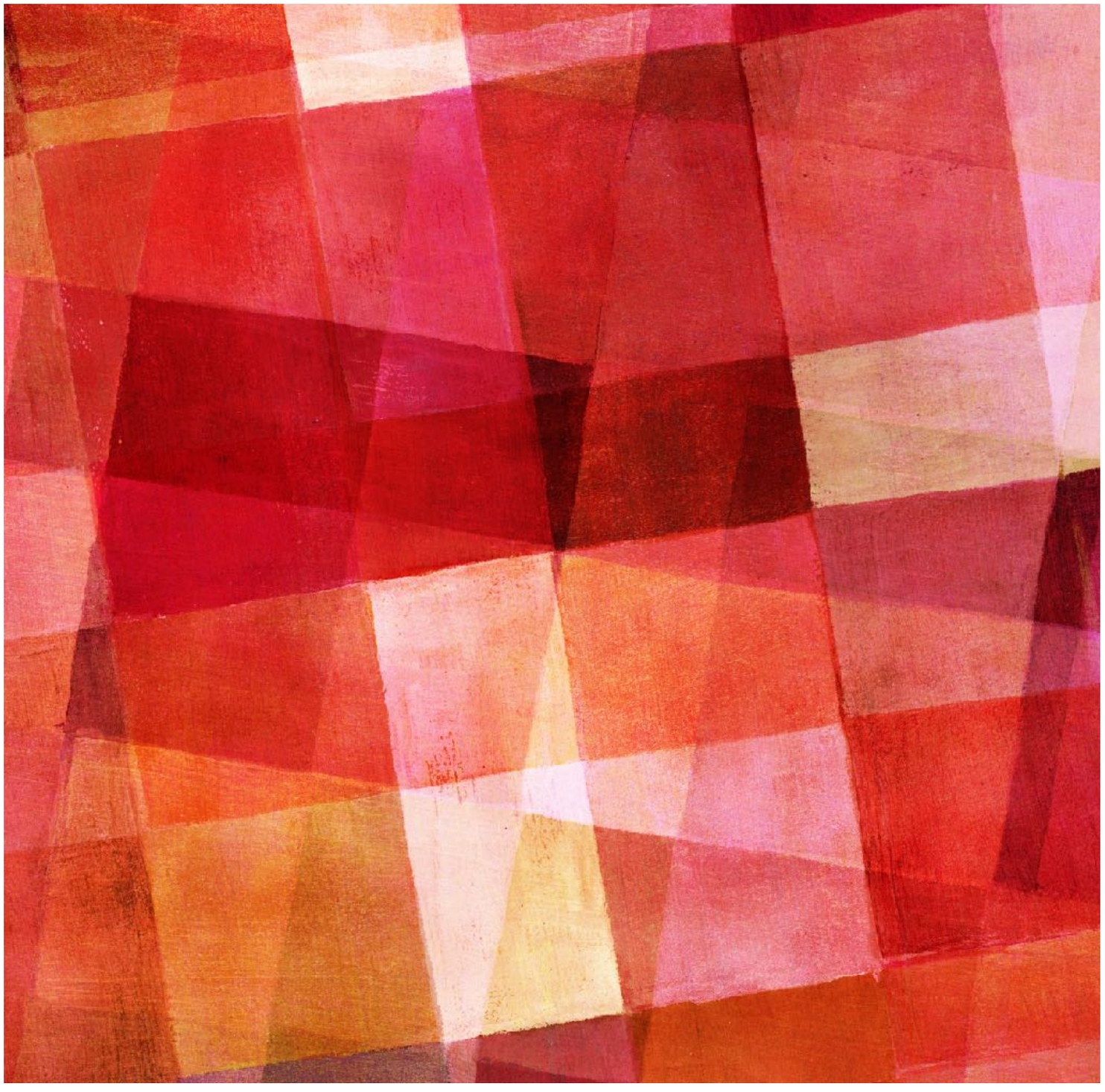
B&B Tactic

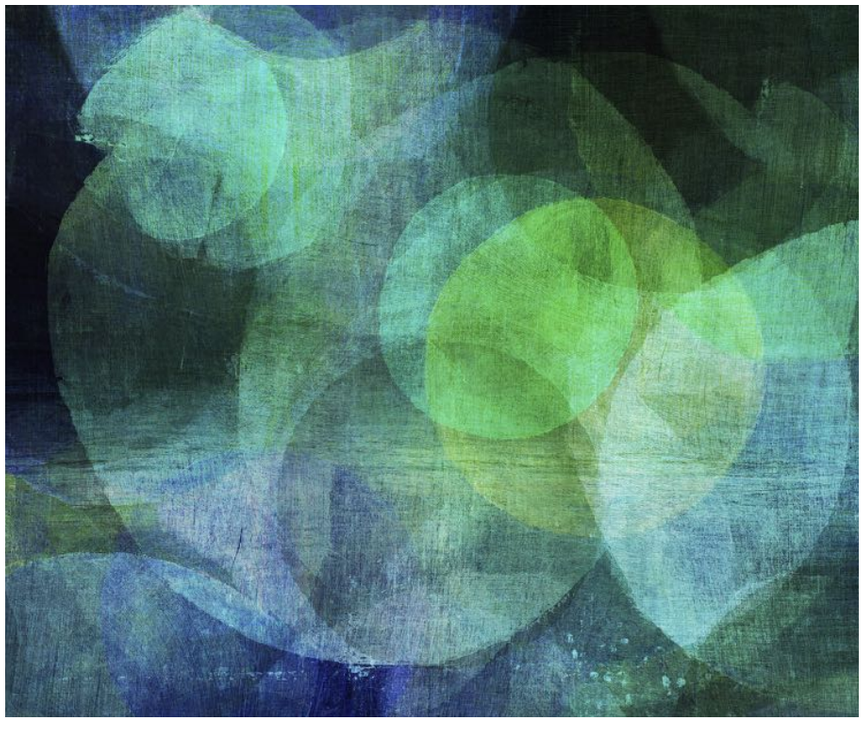
->Find a tight bound by greedy or others

->Build the ANS tree

->Once the accumulated cost be larger than bound or reach a leaf

->Find out the optimal ANS





Thank You for Listening!