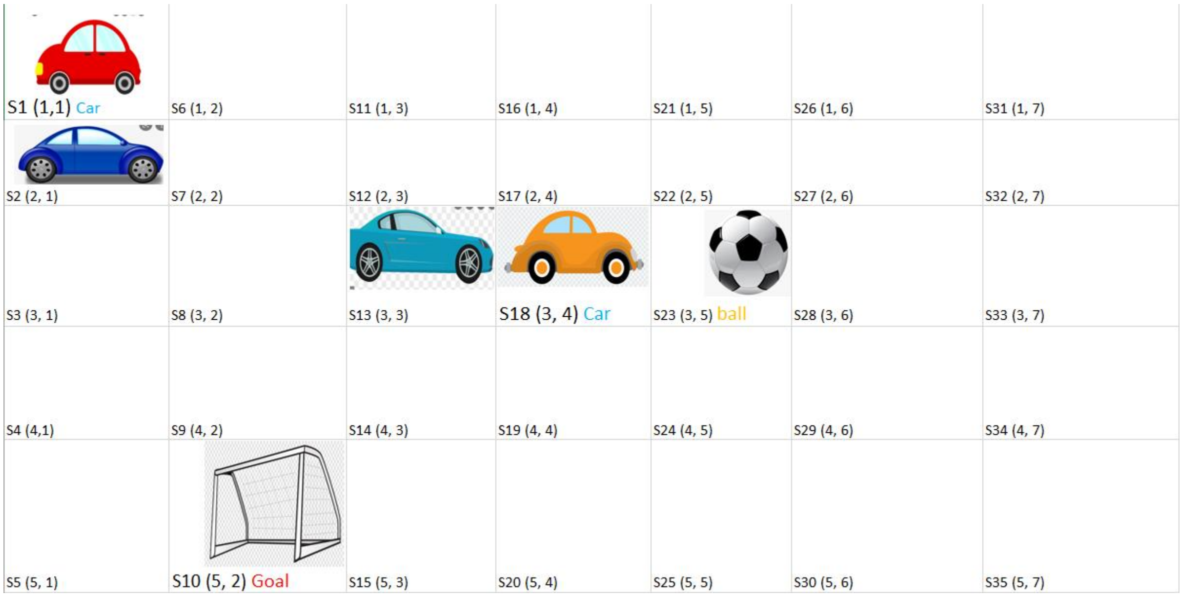
Rocket League Agent

# Phase2 **(implementation & testing stages)**

## Stage #1:

In order to traverse in our problem, since it depends on distance between objects and target we choose to represent our problem as a grid



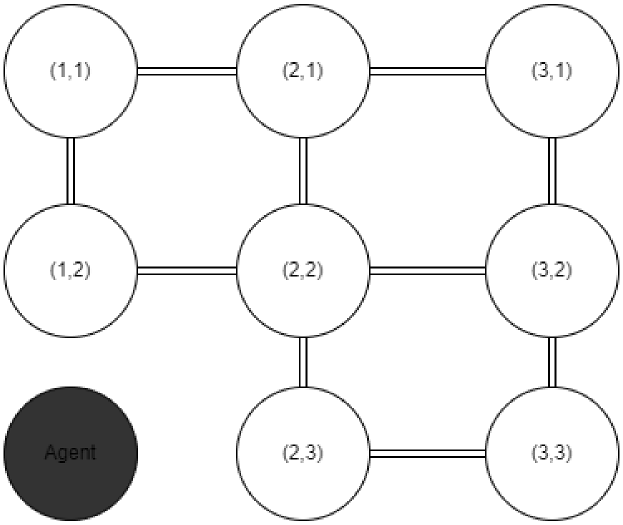
| | | | | | | |
|---|---|---|---|---|---|---|
| S1 (1,1) Car | S6 (1, 2) | S11 (1, 3) | S16 (1, 4) | S21 (1, 5) | S26 (1, 6) | S31 (1, 7) |
| S2 (2, 1) | S7 (2, 2) | S12 (2, 3) | S17 (2, 4) | S22 (2, 5) | S27 (2, 6) | S32 (2, 7) |
| S3 (3, 1) | S8 (3, 2) | S13 (3, 3) | S18 (3, 4) Car | S23 (3, 5) ball | S28 (3, 6) | S33 (3, 7) |
| S4 (4,1) | S9 (4, 2) | S14 (4, 3) | S19 (4, 4) | S24 (4, 5) | S29 (4, 6) | S34 (4, 7) |
| S5 (5, 1) | S10 (5, 2) Goal | S15 (5, 3) | S20 (5, 4) | S25 (5, 5) | S30 (5, 6) | S35 (5, 7) |

- the grid is a representation of the playground
- moving from a grid to another is a distance of one
- In this we have two only states, driving to reach to the ball and dribbling with the ball until scoring
- Other cars are considered as an obstacle that I cannot traverse through
- For instance, in the below grid if our agent is at S1 coordinate (1,1), S2 is an obstacle so it cannot traverse
- f(n) = g(n) + h(n)

- g(n) = cost so far to reach to, as we said before we determine moving from state to another (grid to another) as a cost of 1
- h(n) = estimated cost from n to goal, we assume that it is the Euclidian distance between initial to our ball in case of driving or the goal in state of dribbling

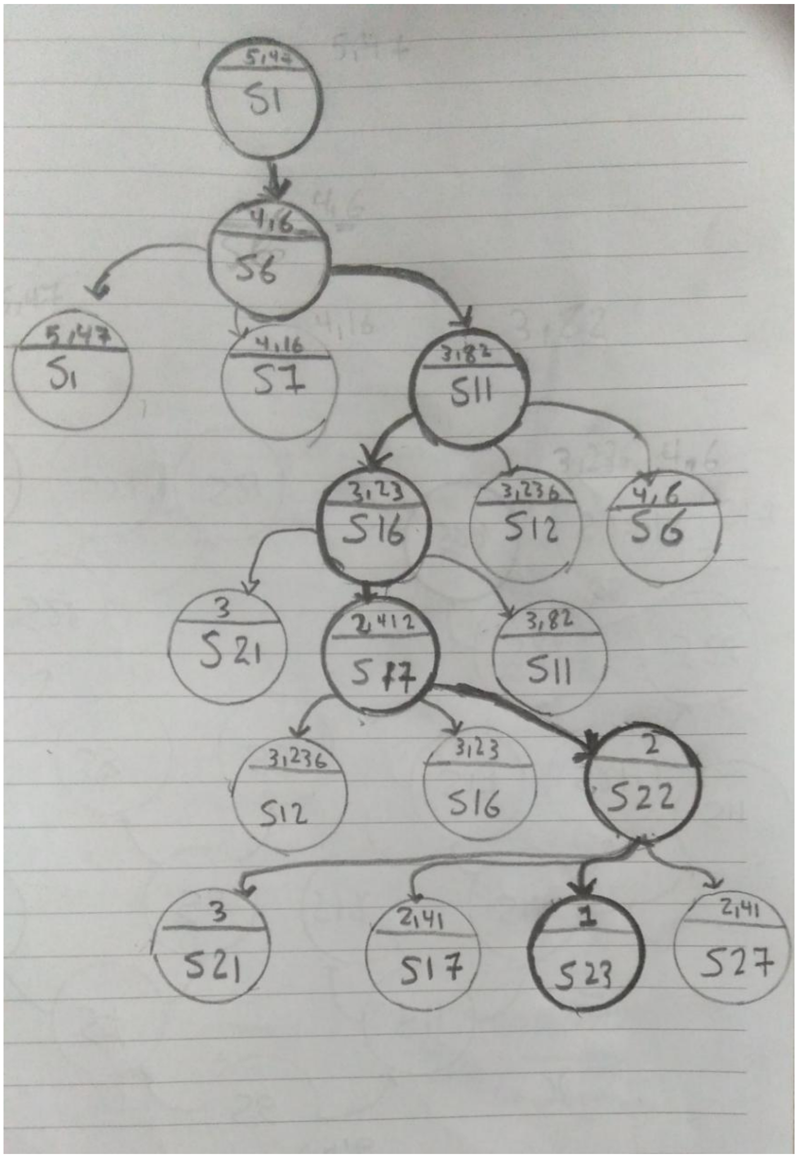
this is how the state graph looks like every cell is a state and if cell contains another agent it won't be part of the state graph (like the dark node here)

each state is represented by its  (x, y) coordinates



This is a solution for the first figure shown.

It shows how the tree is navigated while running the A* search algorithm the number above the state is the heuristic measure (which we assigned to be the Euclidean distance between the state and target).


5,47
S1
4,6
S6
5,47
S1
4,16
S7
3,82
S11
3,23
S16
3,236
S12
4,6
S6
3
S21
2,412
S17
3,82
S11
3,236
S12
3,23
S16
2
S22
3
S21
2,41
S17
1
S23
2,41
S27